University Communication Letter for CBCS

Phone : (O) 0091 - 4542 - 241122 (P)
(G) 0091 - 4542 - 241685

MOTHER TERESA WOMEN'S UNIVERSITY

Kodaikanal - 624 102

Dr.B.Sheela
Registrar

Date : **16.05.2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M.V.Muthiah Govt. Arts College for Women, Dindigul is affiliated to Mother Teresa Women's University, Kodaikanal since 2003 and the Institution strictly adheres to the CBCS (Choice Based Credit System), with revised curriculum once in three years.

16/5/23

Registrar

University Course Approval Letter for CBCS

Phone : (O) 0091 - 4542 - 241122 (P)
(G) 0091 - 4542 - 241685

MOTHER TERESA WOMEN'S UNIVERSITY

Kodaikanal - 624 102

Dr.B.Sheela
Registrar

Date : **17.07.2023**

CERTIFICATE OF AFFILIATION

This is to certify that the M.V.Muthiah Government Arts College for Women located at Dindigul, Tamil Nadu State, was established by the Government of Tamil Nadu and Affiliated by Madurai Kamaraj University, Madurai from the year 1966 to 2002 and then attached to the Mother Teresa Women's University, Kodaikanal from the year 2002 as per the Tamil Nadu Government G.O.(Ms). No.279 dated 01.10.2002.

The College has been receiving funds under section 2(f) & 12(B) of UGC Act 1956. The College is offering Undergraduate , Postgraduate & M.Phil Courses.

17/7/23

Registrar

Registrar,
Mother Teresa Women's University,
Kodaikanal.

Phone : (O) 0091 - 4542 - 241122 (P)
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MOTHER TERESA WOMEN'S UNIVERSITY

Kodaikanal - 624 102

Dr.B.Sheela
Registrar

Date :

17.07.2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M.V.Muthiah Govt. Arts College for Women, Dindigul is affiliated to Mother Teresa Women's University, Kodaikanal since 2003 and the Institution offers 13-UG, 11-PG, 7-M.Phil, 3-Ph.D and 1-PGDCA programmes in the academic year 2023-2024.

17/7/2

Registrar

Registrar,
Mother Teresa Women's University
Kodaikanal.

Phone : (O) 0091 - 4542 - 241122 (P)
(G) 0091 - 4542 - 241685

MOTHER TERESA WOMEN'S UNIVERSITY

Kodaikanal - 624 102

Dr.B.Sheela
Registrar

Date : **17.07.2023**

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M.V.Muthiah Govt. Arts College for Women, Dindigul is affiliated to Mother Teresa Women's University, Kodaikanal since 2003 and the following Programmes are offered in the said College as per approval in this academic year 2023-2024.

S.No	Programme Code	Details of the Programme
	UG EM/TM Shift- I, II	
1.	301	BA Tamil Shift-I
		BA Tamil Shift-II
2.	303	BA English Shift-I
		BA English Shift-II
3.	302	BA History (EM) Shift-I
		BA History (TM) Shift-II
4.	317	BA Economics (EM) Shift-I
		BA Economics (EM) Shift-II
		BA Economics (TM) Shift I
5.	341	B.Com (EM) Shift I
		B.Com (EM) Shift II
6.	321	B.Sc Maths (EM) Shift I
		B.Sc Maths (EM) Shift II
		B.Sc Maths (TM) Shift I
7.	322	B.Sc Physics (EM) Shift I
8.	323	B.Sc Chemistry(EM) Shift I
9.	337	B.Sc Botany (EM) Shift I
10.	338	B.Sc Zoology (EM) Shift I
11.	327	B.Sc Geography (EM) Shift I
		B.Sc Geography (TM) Shift I

12.	326	B.Sc Computer Science (EM) Shift I B.Sc Computer Science (EM) Shift II
13.	316	BBA (EM) Shift I
PG Shift I		
1.	4301	M.A Tamil
2.	4303	M.A English
3.	4302	M.A History
4.	4317	M.A.Economics
5.	4341	M.Com
6.	4321	M.Sc Mathematics
7.	4322	M.Sc Physics
8.	4323	M.Sc Chemistry
9.	4338	M.Sc Zoology
10.	4327	M.Sc Geography
11.	4326	M.Sc Computer Science
M.Phil		
1.	2301	M.Phil Tamil
2.	2303	M.Phil English
3.	2302	M.Phil History
4.	2317	M.Phil Economics
5.	2321	M.Phil Mathematics
6.	2327	M.Phil Geography
7.	2326	M.Phil Computer Science
Ph.D		
1.	PHDCS	Ph.D Maths
2.		Ph.D Computer Science
3.		Ph.D English
Diploma		
1.	DCA	PGDCA

Registrar 17/7/23

Registrar,
Mother Teresa Women's University,
Kodaikanal.

CBCS Syllabus

Department of Tamil

அன்னை தெரசா மகளிர் பல்கலைக்கழகம்
கொடைக்கானல்

தமிழியல் துறை

முதுகலைத் தமிழ் (எம்.ஏ. தமிழ்)

விருப்பம் சார் தெரிவுமுறை (CBCS)

பயன் சார்முறை (OBE)

பொது ஒழுங்குமுறை மற்றும் பாடத்திட்டம்

1. இணையவழி பாடத்திட்ட முதல் குழுக்கூட்ட நாள்: 28.04.2021 (https://meet.google.com/wgs.dvpu.jxx)

2. இணையவழி பாடத்திட்ட இரண்டாம் குழுக்கூட்ட நாள்: 11.06.2021

3. இணையவழி பாடத்திட்ட மூன்றாம் குழுக்கூட்ட நாள்: 12.06.2021 (https://meet.google.com/aex-.nmjy-awj)

கல்விக் குழுக்கூட்ட நாள்: 21.06.2021

2021-2022 கல்வியாண்டு முதல் நடைமுறைப்படுத்துவதற்கு ஒப்புதல் வேண்டிச் சமர்ப்பிக்கப்படுகிறது

Mother Teresa Women's University, Kodaikanal
Department of Tamil Studies
Choice Based Credit System (CBCS)
M.A Tamil Studies
(2021-2022 onwards)

1. About the Programme:

The content of the M.A. Tamil degree programme has been planned carefully and thoughtfully, to offer students, the best possible curricular experience and to bring out upright, sensitive and intelligent citizens in society. The curriculum revision has been premised on the assumption that society requires students, who will serve as its mind, heart and future. Further, one of the major objectives of the curriculum is the employability of the students upon their successful completion of the programme. The project in the final semester enhances student's research attitude and prepares them for Pre-Doctoral Research.

2. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO 1	தமிழ் மொழியை கற்பிக்கும் ஆசிரியர்களாகவும் பல்துறையிலும் பணியாற்றும் பணியாளராகவும் விளங்குவர்.
PEO 2	தமிழ் மொழியின் பல்வேறு இலக்கிய வகைகளையும் வடிவங்களையும் புரிந்துகொண்டு இலக்கிய விமர்சனக் கருத்துக்களையும் இலக்கிய கோட்பாடுகளையும் பயன்படுத்துவர்.
PEO 3	தமிழ் மொழி மற்றும் இலக்கியம் சார்ந்த தகவல்களைப் பெறுவதால் போட்டித்தேர்வுகளை எதிர்கொள்வர்
PEO 4	தமிழ் இலக்கியங்களை படிப்பதன் வாயிலாக தமிழ் இலக்கியங்களை படைக்கும் படைப்பாளர்களாகத் திகழ்வர்.
PEO 5	தமிழ் மொழி மற்றும் இலக்கியங்களை கற்பதன் மூலம் வாழ்வியல் விழுமியங்களைப் பின்பற்றி நடப்பதோடு பிறர்க்கும் கற்பிப்பர்
PEO 6	தமிழ் இலக்கணங்களை கற்பதால் பிழைகள் நீக்கி தமிழ் மொழியை திறம்பட கற்கவும் எழுதவும் பேசவும் முடியும்

3. Eligibility *: Women Candidate should have passed B.A Tamil or anyother degree with Part – I Tamil

4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 90**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

10.PROGRAMME OUTCOMES (POs)

Programme Outcomes	
PO 1	தமிழ் மொழி, தமிழ் இலக்கியம், தமிழ் கணினி பற்றிய ஆழமான அறிவைப் பெறுவதோடு சிறந்த வாழ்க்கையை வாழத் தாம் கற்ற விழுமியங்களைப் பயன்படுத்தமுடியும்.
PO 2	தொழில் நுட்பத் துறையில் தனது பங்காற்றத் தேவையான திறனை மேம்படுத்துதல், ஆளுமையை வளர்ததல் மற்றும் விரிவான அறிவைப் பெற்று தனது திறனை வளர்த்துக் கொள்ள இயலும்.
PO 3	உலகத்தை வடிவமைத்த வரலாற்று, சமூக நெறி முறை, பண்பாடு, கலாச்சார மதிப்புகளையும் சித்தாந்தங்களையும் பகுப்பாய்வு செய்ய முடியும்.
PO 4	சிக்கல் தீர்க்கும் திறன், கணினி மென்பொருள் கருவிகளைக் கையாளும் திறனோடு பல்வேறு போட்டித் தேர்வு எழுதி வெற்றியைப் பெற இயலும்.
PO 5	மனித குலத்தின் நன்மைக்காக மாணவிகள் பன்முகத்திறன்களைப் பயன்படுத்தி தரவுகளைச் சேகரித்து ஆய்வுகளில ஈடுபடும் ஆய்வாளர்களாகும் திறனைப் பெறுதல்.

11. PROGRAMME SPECIFIC OUTCOMES (PSOs)

Programme Specific Outcomes	
இந்த பாடங்களைப் படிப்பதன் மூலம் மாணவியர் பெறும் பயன்.	
PSO1	தமிழ் இலக்கியங்கள், காலந்தோறும் இலக்கிய வகைமைகள், நுவல்பொருளில் ஏற்பட்ட வளர்ச்சி மாற்றம் பற்றி அறிந்து கொள்ளுதல், பிற மொழி இலக்கியங்களுடன் ஒப்பிடல், தமிழ் அகராதிகள், நிகண்டுகள் போன்ற கருவி நூல்களின் வளர்ச்சி, தமிழ் மொழி வரலாற்றின் நோக்கு, போக்கு பற்றி அறிதல்.
PSO2	தமிழ் இலக்கியங்களின் வழி மகளிர் நிலையை அறிதல்
PSO3	தமிழ் இலக்கணநூல் தொல்காப்பியம் உரைக்கும் எழுத்து, சொல், பொருள் அதிகாரக் கருத்தாக்கங்களைக் கற்றுத் தெளிதல்.
PSO4	ஆய்வு நெறிமுறைகளை அறிந்து, ஆய்வேடு உருவாக்கல், ஆய்வுக் கட்டுரைகள் எழுதும் தேர்ச்சி பெறுதல்.
PSO5	ஊடக வேலைவாய்ப்பிற்கான பயிற்சி பெறுதல், தமிழ்க் கணினி மென்பொருள் கருவிகளைக் கையாளும் பயிற்சி பெறுதல்.
PSO6	படைப்பாற்றல் பெறுதல்

முதுகலைத் தமிழ் பாடத்திட்டம்

	முதல் பருவம்						
வ. எ	பாடக் குறியீடு	தாளின் தலைப்பு	புள்ளி	மண	அக மதிப்பீடு	புற மதிப்பீடு	மொத்தம்
1.	P21TAT11	**முதன்மைப் பாடம் - I** இக்கால இலக்கியம் - Ikkala Ilakkiyam	4	5	25	75	100
2.	P21TAT12	**முதன்மைப் பாடம் - II** தொல்காப்பியம் - எழுத்து அதிகாரம் - Tholkappiyam – Eluthathigaram	4	6	25	75	100
3.	P21TAT13	**முதன்மைப் பாடம் - III** சிற்றிலக்கியம் -Chitrilakkiyam	4	5	25	75	100
4.	P21TAT14	**முதன்மைப் பாடம் - IV** இலக்கியத் திறனாய்வும், இலக்கியக் கொள்கைகளும் பெண்ணிய ஆய்வுகளும் - Ilakkiya Thiranaivum Ilakkiya Kolkaikalum Penniya Aaivugalum	4	6	25	75	100
5.	P21TAT15	**முதன்மைப் பாடம் - V** பக்தி இலக்கியம் - Bakthi Ilakkiyam	4	6	25	75	100
6.	P21TAS11	Supportive course I (Skill) Tamil Kaniniyiyal Inaiya Payanpadugal தமிழ்க் கணினி இணையப் பயன்பாடுகள்	2	2	25	75	100
		Total	**22**	**30**	**150**	**450**	**600**

	இரண்டாம் பருவம்						
வ. எ	பாடக் குறியீடு	தாளின் தலைப்பு	புள்ளி	மணி	அக மதிப்பீடு	புற மதிப்பீடு	மொத்தம்
7	P21TAT21	**முதன்மைப் பாடம் - VI** தொல்காப்பியம் - சொல் அதிகாரம் - Tholkappiyam – Chol Athigaram	4	5	25	75	100
8	P21TAT22	**முதன்மைப் பாடம் - VII** காப்பிய இலக்கியம் - Kappiya Ilakkiyam	4	5	25	75	100
9	P21TAT23	**முதன்மைப் பாடம் - VIII** தமிழ் இலக்கண வரலாறு- Tamil illakana varalaru	4	4	25	75	100

10	P21TAT24	**முதன்மைப்பாடம் - IX** இலக்கண உரையாசிரியர்கள் - Illakana Urai Aasiriyargal	4	4	25	75	100
11	P21TAT25	**முதன்மைப் பாடம் - X மேம்பட்ட கணினித் தமிழ், தமிழ்த் தரவக உருவாக்கம் தரவ உருவாக்கம் Advanced Tamil Computing and Tamil Corpus Development**	4	6	25	75	100
12		**NME (பிற துறை பாடம்)**	4	4	25	75	100
13	P21CSS22	Supportive Course- II: Computer Skills for Web Designing and Video Editing	2	2	25	75	100
		Total	**26**	**30**	**175**	**525**	**700**
	மூன்றாம் பருவம்						
வ.எ	பாடக் குறியீடு	தாளின் தலைப்பு	புள்ளி	மணி	அக மதிப்பீடு	புற மதிப்பீடு	மொத்தம்
14	P21TAT31	**முதன்மைப் பாடம் - XI** தொல்காப்பியம் பொருள் அதிகாரம் -I Tholkappiyam Porul Athigaram–I	4	5	25	75	100
15	P21TAT32	**முதன்மைப் பாடம் - XII** தமிழ் இலக்கிய உரையாசிரியர்கள் - Tamil Illakiya Uraiaasiriyargal	4	4	25	75	100
16	P21TAT33	**முதன்மைப் பாடம் - XIII** தொல்காப்பியம் பொருள் அதிகாரம் -II Tholkappiyam Porul Athigaram–II	4	6	25	75	100
17	P21TAT34	**முதன்மைப் பாடம் - XIV** பதினெண்கீழ்க்கணக்கு – அற இலக்கியம் - Pathinen Keelkanakku – Ara Ilakkiyam	4	4	25	75	100
18	P21TAT35	**முதன்மைப் பாடம் - XV** சங்க இலக்கியம் - Sanga Ilakkiyam	4	5	25	75	100
19	P21TAT36	**முதன்மைப் பாடம் - XVI** தமிழ் சிறுவர் இலக்கியம் - Tamil Siruvar Ilakkiyam	4	4	25	75	100

20	P21WSS33	Supportive course III (Women Empowerment) – Common Compulsory Paper	2	2	25	75	100
		மொத்தம்	**26**	**30**	**175**	**525**	**700**
	நான்காம் பருவம்						
வ.எ	பாடக் குறியீடு	தாளின் தலைப்பு	புள்ளி	மணி	அக மதிப்பீடு	புற மதிப்பீடு	மொத்தம்
21	P21TAE411/ P21TAE412/ P21TAE413	Elective I தமிழ் சித்தர் இலக்கியம் Tamil Sithar Illakiyam / Valviyal Neri Ilakiyam – வாழ்வியல் நெறி இலக்கியம் / **MOOC course**	4	4	25	75	100
22	P21TAE421/ P21TAE422/ P21TAE423	Elective II பெண் வழக்காற்றியல் pen vazhakkatriyal / **படைப்புக் கலை / MOOC course***	4	4	25	75	100
23	P21TAR41	Project - ஆய்வறிக்கை	8	22	25	75	100
		மொத்தம்	**16**	**30**	**75**	**225**	**300**
		மொத்தம்	**90**	**120**			**2300**

Non Major Elective (NME)

NME - I: மொழியியல்

கூடுதல் புள்ளிக்குரிய பாடங்கள்:

1. P21TAV11 - மதிப்பு கூட்டுப் பாடம் - Tamil Computing and Applications கணித்தமிழ் பயன்பாடு - 2 புள்ளிகள் (முதல் பருவம்)
2. P21TAI21 - உள்கட்டப் பயிற்சி / தொழில் பயிற்சி - 2 புள்ளிகள் (இரண்டாம் பருவம்)
3. P21TAO31 - இணையப் பாடங்கள் - 2 புள்ளிகள் (மூன்றாம் பருவம்)
4. P21TAV42 – மதிப்பு கூட்டுப் பாடம் - ஊடகத் தமிழ் - 2 புள்ளிகள் (நான்காம் பருவம்)

* Those who have CGPA 9 and want to do the project in Industry / Institution during 4th semester, these two elective papers in IV semester can be opted in third semester itself.

$ For Elective – I / Elective- II, the students can also take either one 4-credit course or two 2-credit courses in MOOC, with the approval of Departmental Committee.

Outside Class Hours (Attendance compulsory, Certificate Mandatory)

- Health, Yoga and Physical fitness.
- Library information access and utilisation
- Employability Training.
- Students Social Responsibility.

SEMESTER I

Course Code	P21TAT11	முதன்மைப் பாடம் - I இக்கால இலக்கியம் - Ikkala Ilakkiyam	L	T	P	C
Core	I		5	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• இக்கால இலக்கியங்களை அறிதல் • சிறந்த படைப்புகளைத் திறனாய்தல் • தானே எழுதப் பயிற்சி பெறுதல் • இக்கால இலக்கியங்களை பயின்று பகுத்து வகை தொகை செய்தல் • இலக்கிய ஆக்கங்களை மதிப்பீடு செய்தல்
அலகு – 1	

இக்கால இலக்கியங்களாகிய கவிதை, மரபுக் கவிதை, புதுக்கவிதை, நாவல், சிறுகதை, நாடகம், உரைநடை ஆகியவற்றின் வரையறை, தோற்றம், வளர்ச்சி, வரலாறு, இன்றைய நிலை, தடம் பதித்தச் சான்றோர்களும் அவர்களது புகழ் பெற்ற இலக்கிய ஆக்கங்களும் பற்றிய சுருக்க வரைவு.

அலகு – 2	**கவிதை இலக்கியம்**
2.1 பாரதியார்-கவிதைகள்	1. பெண்கள் விடுதலைக் கும்மி (15 கவிதைகள் மட்டும்)
பொதுமைப்பாடல்களில் வரும்	1. புதுமைப் பெண் 2. பெண்மை
வசன கவிதையில் வரும்	3. சக்தி 4. மகா சக்திக்கு விண்ணப்பம் 5. ஹே காளி
பல்வகைப்பாடல்களில் வரும்	6. கவிதா தேவியின் அருள் வேண்டல் 7. ராதைப் பாட்டு 8. வள்ளிப்பாட்டு (1), (2)
பாரதி அறுபத்தாறில் வரும்	9. பெண் விடுதலை 10. தாய் மாண்பு 11. பாப்பாப் பாட்டு
வாழ்த்துப்பாக்களில் வரும்	12. நிவேதிதா தேவி
சமூகம் என்பதில் வரும்	13. மனைத் தலைவிக்கு வாழ்த்து

சுதந்திரப் பாடல்களில் வரும்	14. சுதந்திர தேவியின் துதி
2.2 பாரதிதாசன் கவிதைகள்	- குடும்ப விளக்கு – முதல் பாகம்
2.3 நாமக்கல் கவிஞர் கவிதைகள் (6 கவிதைகள் மட்டும்)	1. தமிழிசை 2. கவியமுதம் 3. திருவள்ளுவர் 4. ஔவை 5. கம்பன் 6. அமரகவி பாரதி

அலகு –3	**நாவல் இலக்கியம்**

நாவல் இலக்கியம் - சு.சமுத்திரம் - வேரில் பழுத்த பலா
(சாகித்திய அகாதெமி பரிசு பெற்றது)

அலகு –4	**சிறுகதை இலக்கியம்**

சிறுகதை இலக்கியம் – புதுமைப் பித்தன் படைப்புகள் தொகுதி I - சிறுகதைத் தொகுப்பிலுள்ள 10 கதைகள் மட்டும்

1. கலியாணி
2. கனவுப் பெண்
3. நன்மை பயக்கும் எனின் ...
4. நிகும்பலை
5. காஞ்சனை
6. நியாயந்தான்
7. நம்பிக்கை
8. மனநிழல்
9. மாயவலை
10. கண்ணன்குழல்

அலகு –5	**நாடகம், உரைநடை**

5.1 சுந்தரம் பிள்ளை – மனோன்மணீயம் - நாடகம்.

5.2 இரா.பி சேதுப்பிள்ளை – தமிழ் இன்பம் (இலக்கிய கட்டுரைகள்)
(சாகித்திய அகாதெமி பரிசு பெற்றது)

பயில்முறைப் பயிற்சி

மாணவர் தன் விருப்பத்துக்கு ஏற்ப – தமிழ் பெண் எழுத்தாளரது இலக்கியப் படைப்பைத் தேர்வு செய்து வாசித்து அதன் நிறை குறைகளைப் பரிசீலிக்கும் திறனாய்வுக் கட்டுரை ஒன்றினைப் பத்து பக்க அளவில் சமர்ப்பிக்க வேண்டும்.
பயில் முறைப்பயிற்சி வாசிப்பையும், திறனாய்வுத் திறனையும் மேம்படுத்துவதற்கானது. **இதில் தேர்வுக்குரிய வினா ஏதும் கேட்கப்படக் கூடாது.**

Book(s) for Study

1	சி.சு செல்லப்பா, புதுக்குரல்கள் (எழுத்து வெளியீடு) கவிதை நூலை மாணவியர் படிக்கச் செய்யலாம்.

Book(s) for Reference

1	பாரதியார் கவிதைகள்
2	பாரதிதாசன் - குடும்ப விளக்கு

3	சி.சு செல்லப்பா, புதுக்குரல்கள் (எழுத்து வெளியீடு)
4	நாமக்கல் கவிஞர் கவிதைகள் - தமிழ் இணைய கல்விக் கழக மின் நூலகம்
5	சு.சமுத்திரம் - வேரில் பழுத்த பலா - மதுரை மின் நூல் தொகுப்புத் திட்ட நூலகம்
6	புதுமைப் பித்தன் படைப்புகள் - மதுரை மின் நூல் தொகுப்புத் திட்ட நூலகம்
7	சுந்தரம் பிள்ளை – மனோன்மணீயம், தமிழ் இணைய கல்விக் கழக மின் நூலகம்
8	இரா.பி சேதுப்பிள்ளை – தமிழ் இன்பம் (இலக்கிய கட்டுரைகள்), சென்னை பழனியப்பா பிரதர்ஸ் 2007, மதுரை மின் நூல் தொகுப்புத் திட்ட நூலகம்

Course Outcome

CO1	இக்கால இலக்கியங்களை அறிதல்	[K2]
CO2	சிறந்த படைப்புகளைத் திறனாய்தல்	[K3]
CO3	தானே எழுதப் பயிற்சி பெறுதல்	[K3] , [K6]
CO4	இக்கால இலக்கியங்களை பயின்று பகுத்து வகை தொகை செய்தல்	[K5]
CO5	இலக்கிய ஆக்கங்களை மதிப்பீடு செய்தல்	[K5]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	1	2	2	2	2	2
CO2	3	3	2	2	1	2	2	2	3	2	3
CO3	3	3	2	3	3	3	3	3	3	2	1
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT12	தொல்காப்பியம் - எழுத்து அதிகாரம்	L	T	P	C
Core	II		6	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• மொழி இலக்கண அடிப்படை விதிகளை அறிதல் • இலக்கண மரபு இன்றளவும் மாறாமல் தொடர்ந்து வரும் பாங்கை உணர்தல் • பிழை இன்றி மொழி கையாளும் பயிற்சி பெறுதல் • அடிப்படை விதிகளைக் கற்றுத் தேர்ச்சி பெறுதல் • இலக்கண விதிகளை இன்றைய மொழியுடன் பொருத்திக் காணல்
அலகு – 1	**பாயிரம்** - நூல் மரபு, மொழி மரபு
அலகு –2	பிறப்பியல், புணரியல்
அலகு –3	தொகை மரபு, உருபியல்
அலகு – 4	உயிர் மயங்கியல், புள்ளி மயங்கியல்
அலகு – 5	குற்றியலுகரப் புணரியல்

பயில் முறைப் பயிற்சி

மாணவர் தனக்கு விருப்பமான சிறுகதை, கவிதை, கட்டுரை, நாடகம், புதினப் பகுதியிலிருந்து மூன்று (அ) நான்கு பக்கங்களைத் தேர்வு செய்து, அப்பகுதியில் இடம் பெற்றுள்ளசொற்களில், சொல்லின் முதலில் வந்த எழுத்துக்கள், சொல்லின் இடையில் வந்த எழுத்துக்கள், சொல்லின் இறுதியில் வந்த எழுத்துக்களை அடிக்கோடிட்டுதொல்காப்பிய மொழிமரபு நூற்பாக்களுடன், அவை பொருந்தி வருதல் மரபு (அ) வேறுபடும் நிலையைச் சுட்டிக்காட்டி, பத்து, பத்து சொற்களைச் சான்று காட்டி பயில் முறை கட்டுரை ஒன்றினை ஆறு பக்கங்களுக்குள் எழுதி, ஒவ்வொருவரும் சமர்ப்பிக்க வேண்டும்.

குறிப்பு: பயில் முறை பயிற்சி மாணவர்கள் அறிவுத் தெளிவு பெறுதல் பொருட்டே ஆகும்.

இப்பகுதியில் இருந்து தேர்வுக்கு வினா ஏதும் இடம்பெறக் கூடாது.

Book(s) for Study

1	தொல்காப்பியம் - இளம்பூரணர் உரை- சைவ சித்தாந்த நூல் பதிப்புக் கழக வெளியீடு, சென்னை.

Course Outcome		
CO1	மொழி இலக்கண அடிப்படை விதிகளை அறிதல்	[K1]
CO2	இலக்கண மரபு இன்றளவும் மாறாமல் தொடர்ந்து வரும் பாங்கை உணர்தல்	[K2]
CO3	பிழை இன்றி மொழி கையாளும் பயிற்சி பெறுதல்	[K3]
CO4	அடிப்படை விதிகளைக் கற்றுத் தேர்ச்சி பெறுதல்	[K3]
CO5	இலக்கண விதிகளை இன்றைய மொழியுடன் பொருத்திக் காணல்	[K5]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	1	3	2	2	3	2	2	2	3	2	3
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT13	சிற்றிலக்கியம்	L	T	P	C
Core	III		5	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• தனித்த இலக்கிய வகைகளது தோற்றம் பற்றி அறிதல் • சிற்றிலக்கிய இலக்கண விதிமுறைகளைப் பரிசீலித்தல் • நுவல்பொருள் மரபின் பின்னணி அறிதல். o புலமை வெளிப்பாடு o தெய்வம் போற்றல் o தனி மனிதர் போற்றல் • சிற்றிலக்கியங்களைத் திறனாய்தல் • எண்ணிக்கையில் பெருகிய திறத்தை மதிப்பிடுதல்
அலகு – 1	தமிழ் சிற்றிலக்கியத் தோற்றம் - வளர்ச்சி – வரலாறு – எண்ணிக்கை – வகைகள் - தமிழ் இலக்கண நூல்கள் தரும் இலக்கண வரையறைகள் - சுருக்க வரைவு.
அலகு –2	சேரமான் பெருமாள் நாயனாரின் ‘திருக்கைலாய ஞான உலா – 197 அடிகள்.
அலகு –3	சின்னப்ப நாயக்கரின் பழனிப்பிள்ளைத்தமிழ் முழுவதும்
அலகு – 4	நம்பியாண்டார் நம்பிகள் அருளிய, ஆளுடைய பிள்ளையார் திருக்கலம்பகம் - முழுவதும் - 49 செய்யுட்கள்.
அலகு – 5	தமிழில் சித்திரக்கவிகள் - திருமங்கை ஆழ்வாரின், திருஎழு கூற்றிருக்கை.

Book(s) for Reference

1	சேரமான் பெருமாள் நாயனார், திருக்கைலாய ஞான உலாப.964-968. பதினோராம் திருமுறை. ச.வே.சுப்பிரமணியன், (ப.ஆ) பன்னிரு திருமுறை, சென்னை, மணிவாசகர் பதிப்பகம் 2009.
2	சின்னப்ப நாயக்கர்,பழனிப் பிள்ளைத்தமிழ், சென்னை. உ.வே.சாமிநாதையர் நூல் நிலைய வெளியீடு 1932, மு.ப, 2020, இ.ப.,
3	நம்பியாண்டார் நம்பி, ஆளுடைய பிள்ளையார் திருக்கலம்பகம், பக்கம் - 1049 – 1054 -49 செய்யுட்கள்- பதினோராம் திருமுறை, ச.வே.சுப்பிரமணியன் (ப.ஆ1) பன்னிரு திருமுறை, சென்னை, மணிவாசகர் பதிப்பகம், 2009.
4	திருமங்கை ஆழ்வார், திருவெழு கூற்றிருக்கை- நாலாயிரத் திவ்விய பிரபந்தம் - மூன்றாவது ஆயிரம் - இயற்பா – பாஷ்யகாராச்சாரியார் (ப.ஆ) சிதம்பரம், ஆதித்யா ஸ்ரேயா பதிப்பகம், 2005.

Course Outcomes		
CO1	• தனித்த இலக்கிய வகைகளது தோற்றம் பற்றி அறிதல்	[K1]
CO2	• சிற்றிலக்கிய இலக்கண விதிமுறைகளைப் பரிசீலித்தல்	[K3]
CO3	• நுவல்பொருள் மரபின் பின்னணி அறிதல். o புலமை வெளிப்பாடு o தெய்வம் போற்றல் o தனி மனிதர் போற்றல்	[K2]
CO4	• சிற்றிலக்கியங்களைத் திறனாய்தல்	[K4]
CO5	• எண்ணிக்கையில் பெருகிய திறத்தை மதிப்பிடுதல்	[K5]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	2
CO3	3	3	2	3	3	3	3	3	3	2	1
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT14	இலக்கியத் திறனாய்வும், இலக்கியக்கொள்கைகளும் பெண்ணிய ஆய்வுகளும்	L	T	P	C
Core	IV		6	0	0	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**				
Course Objectives		• இலக்கியத்தைத் திறனாய்வு செய்யும் பயிற்சி பெறுதல் • இலக்கிய கொள்கைகளை உருவாக்குதல் • பெண்ணிய ஆய்வு மேற்கொள்ளுதல் • கட்டுரை எழுதப் பயிற்சி பெறுதல் • பெண்ணிய நோக்கில் ஆய்வு செய்தல்				
அலகு – 1		இலக்கியம் - வரையறை - இலக்கியத் தோற்றத்துக்கான காரணங்கள் - அறிவியல் - இலக்கியம் இடையிலான வேறுபாடு - இலக்கியமும், வாழ்க்கையும் - இலக்கியமும் திறனாய்வும், மதிப்பீடுகளும், பயன்களும்.				
அலகு –2		இலக்கியக் கொள்கை – விளக்கம் - வரலாறு - இலக்கியக் கொள்கைகளின் வகைகள் - அக வெழுச்சி கொள்கை – தெய்வீக அகத்தெழுச்சி- அவயவிக் கொள்கை- அறிவியல் கொள்கை – அழகியல் கொள்கை – உணர்ச்சிக் கொள்கை – சமுதாய கொள்கை- இலக்கிய கொள்கை- இலக்கியத் திறனாய்வு இடையிலான உறவுகள்.				
அலகு –3		இலக்கியத் திறனாய்வு – விளக்கம் - இலக்கியத் திறனாய்வு வகைகள், விதிமுறைத் திறனாய்வு – விளக்கமுறைத் திறனாய்வு – மதிப்பீட்டு முறைத் திறனாய்வு – வரலாற்று முறைத் திறனாய்வு – படைப்பு முறைத் திறனாய்வு – மரபு வழித் திறனாய்வு – அழகியல் திறனாய்வு - மூலபாடத் திறனாய்வு – ஒப்பீட்டு முறைத் திறனாய்வு – வாழ்க்கை வரலாற்று முறைத் திறனாய்வு – பாராட்டு முறைத் திறனாய்வு – அறிவியல் முறைத் திறனாய்வு – சமுதாயவியல் திறனாய்வு- உளவியல் அணுகுமுறை- மொழியியல் அணுகுமுறை – உருவவியல் அணுகுமுறை- அமைப்பியல் திறனாய்வு – மார்க்சியத் திறனாய்வு – திறனாய்வின் பயன்கள்.				
அலகு – 4		தொல்காப்பியக் கொள்கைகள் - இலக்கிய வடிவம் - உள்ளடக்கம் - திணைகள் - முதல்பொருள், கருப்பொருள், உரிப்பொருள் - இலக்கிய அகம்- புறம் -கொள்கைகள் - அற இலக்கியக் கொள்கைகள் - காப்பியக் கொள்கைகள் - சிற்றிலக்கியக் கொள்கைகள் - இக்கால இலக்கியக் கொள்கைகள்.				

அலகு – 5	இலக்கியத்தில் கற்பனை – கற்பனை வகைகள் - உணர்ச்சிகள் - மொழி நடை- நவீனத் திறனாய்வு அணுகுமுறைகள – பெண்ணியத் திறனாய்வு – விளிம்புநிலை மக்கள் வாழ்வியல் - இனவரைவியல் அணுகுமுறைகள்.

Book(s) for Study	
1	சு.பாலச்சந்திரன் - இலக்கியத் திறனாய்வு
2	தா.ஏ.ஞானமூர்த்தி - இலக்கியத் திறனாய்வு
3	அ.அ.மணவாளன் - இருபதாம் நூற்றாண்டின் இலக்கியக் கோட்பாடுகள்
4	மு.வரதராசன் - இலக்கியத் திறன்
5	மு.வரதராசன் - இலக்கிய மரபு
6	அரங்க.சுப்பையா - இலக்கியத் திறனாய்வு - இசங்கள் - கொள்கைகள்
7	இலக்கியக் கொள்கைகள் - உலகத் தமிழ் ஆராய்ச்சி நிறுவன வெளியீடு.
8	அ.ச. ஞானசம்பந்தன் , இலக்கியக் கலை.

Course Outcomes		
CO1	• இலக்கியத்தைத் திறனாய்வு செய்யும் பயிற்சி பெறுதல்	[K6]
CO2	• இலக்கியக் கொள்கைகளை உருவாக்குதல்	[K6]
CO3	• பெண்ணிய ஆய்வு மேற்கொள்ளுதல்	[K4] ,[K5]
CO4	• கட்டுரை எழுதப் பயிற்சி பெறுதல்	[K3]
CO5	• பெண்ணிய நோக்கில் ஆய்வு செய்தல்	[K5]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT15	பக்தி இலக்கியம்	L	T	P	C
Core	V		6	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• சமயஞ்சார் இலக்கிய மரபை அறிதல் • இலக்கிய வளர்ச்சிக்கு சமயங்களின் கொடை பற்றி பரிசீலித்தல் • சைவ, வைணவ இலக்கிய நுவல் பொருளைக் கற்றல் • கம்பராமாயணத்தை கற்றல் • கிறித்தவ இலக்கியம், இசுலாமிய இலக்கியங்களைக் கற்றல்
அலகு – 1	தமிழில் சமய இலக்கிய தோற்றப் பின்னணி

தமிழகத்தில் சைவம் வைணவம், சமணம், பௌத்தம், கிறித்தவம், இசுலாமியம் ஆகிய சமயங்களைச் சார்ந்து தமிழ் இலக்கியங்கள் தோன்றி வளர்ந்த வரலாறு பற்றிய சுருக்க வரைவு.

அலகு –2	சைவ சமயஞ்சார் இலக்கியம்

பன்னிரு திருமுறை- நூல் குறிப்பு – பதினெண் சைவ சித்தாந்தங்கள் - நூல் குறிப்பு – சைவத் திருமடங்கள் - சைவ சமய இதழ்கள் - குறிப்பு

2.1 திருஞான சம்பந்தர் - தேவாரம் - 4.திருவாவடுதுறை- "இடரினும் தளரினும் எனதுறு நோய்" என்று தொடங்கும் 2834 வது பாடல் முதல் "அலை புனல் ஆவடுதுறை அமர்ந்த" எனும் 2844 வரை உள்ள 11 பாடல்கள் மட்டும்.

2.2திருநாவுக்கரசர் - தேவாரம் - ஐந்தாம் திருமுறை – 9 – திருமுறைக்காடு – "ஓத மால் கடல் பரவி உலகு எலாம்" என்றும் தொடங்கும் 5312 ஆவது பாடல் முதல் "குறைகாட்டான் விட்ட தேர் குத்த மாமலை" எனும் 5320 வது பாடல் வரை உள்ள 9 பாடல்கள் மட்டும்.

2.3 சுந்தரர் - ஏழாம் திருமுறை- தேவாரம் - 5 திருவீரட்டானம் - போற்றித் திருத்தாண்டகம் - "எல்லாம் சிவன் என நின்றாய் போற்றி" என்று தொடங்கும் 6287 வது பாடல் முதல் "முக்கணா போற்றி முதல்வர் போற்றி" எனும் 6296 வது பாடல் வரையிலான 10 பாடல்கள் மட்டும்.

2.4 மாணிக்க வாசகர் - எட்டாம் திருமுறை – திருவாசகம் - 19 திருத்தசாங்கம் - "ஏரார் இளங்கிளியே" என்று தொடங்கும் 358 வது பாடல் முதல், "சோலைப் பசுங்கிளியே" எனும் 367 வது பாடல் வரையிலான 10 பாடங்கள் மட்டும்.

2.5 காரைக்காலம்மை – பதினோராம் திருமுறை – 3.திரு இரட்டை மணிமாலை – "கிளர்ந்து உந்து வெந்துயர் வந்தடும்போது" எனும் முதல் பாடல் முதல் "உத்தமராய் வாழ்வா" எனும் இருபதாவது பாடல் வரையிலான 20 பாடல்கள் மட்டும்.

அலகு –3	**வைணவ சமயம் சார் இலக்கியம்**

3.1 நாலாயிரத் திவ்விய பிரபந்தம் - நூல் குறிப்பு – நாத முனிகள் - இராமானுசர் - திவ்விய பிரபந்த உரைகள்.

3.2 நாலாயிரத் திவ்விய பிரபந்தம் - முதலாயிரம் பெரியாழ்வார் திருமொழி – ஏழாம் திருமொழி – தளர்நடைப் பருவம் - "தொடர் சங்கிலி கை சலார் பிலா ரென்னத் தூங்கு பொன்மணி ஒலிப்ப" என்று தொடங்கும் 86 வது பாடல் முதல் "ஆயர் குலத்தினில் வந்து தோன்றிய அஞ்சன வண்ணன்" எனும் 96 வது பாடல் வரையிலான 11 பாடல்கள்.

3.2.1 ஆண்டாள் - நாச்சியார் திருமொழி – பதினான்காம் திருமொழி – "பட்டி மேய்ந்தோர் காரேறு பலதெவற்கு ஓர் கீழ்க்கன்றாய்" எனும் 637 வது பாடல் முதல் "பருந்தாட் களிற்றுக்கு அருள் செய்த பரமன்" எனும் 646 வது பாடல் வரையிலான 10 பாடல்கள்.

3.3 நாலாயிரத் திவ்விய பிரபந்தம் - இரண்டாம் ஆயிரம் - திருமங்கை ஆழ்வார் - பெரிய திருமொழி – ஆறாம் திருமொழி – நைமிசாரணியம் - "வாணிலா முறுவல்" என்று தொடங்கும் 998 வது பாடல் முதல், "ஏதம் வந்து அணுகா வண்ணம்" எனும் 1007 வது பாடல் வரையிலான 10 பாடல்கள்.

3.4 நாலாயிரத் திவ்விய பிரபந்தம் - மூன்றாம் ஆயிரம் - இயற்பா – பேயாழ்வார் - மூன்றாம் திருவந்தாதி – "பார்த்த கடுவன் சுனை நீர் நிழல் கண்டு ஏறும்" எனும் 2349 வது பாடல் முதல் "ஆய்ந்த அருமறையோன் நான் முகத்தோன்" எனும் 2358 வது பாடல் வரையிலான 10 பாடல்கள்.

3.5 நாலாயிரத் திவ்விய பிரபந்தம் - நான்காம் ஆயிரம் - நம்மாழ்வார் - திருவாய்மொழி – பத்தாம் திருவாய் மொழி – "மாலை நண்ணித் தொழுது எழுமினோ வினை கெட" எனும் 3656 வது பாடல் முதல் "மால் உமது வாஞ்சை முற்றும்" எனும் 3666 தனியன் வரையிலான 12 பாடல்கள்.

அலகு – 4	கம்பராமாயணம்

பால காண்டம் - 22 கடிமணப் படலம் - "இடம்படு புகழ்ச் சனகர் கோன் இனிது பேண" என்று தொடங்கும் 1160 வது பாடல் முதல் "ஈந்து அளவு இல்லது ஓர் இன்பம் நுகர்ந்தே" எனும் 1262 ஆவது பாடல் வரையிலான 103 பாடல்கள்.

அலகு - 5	கிறித்தவ இலக்கியம் - இசுலாமிய இலக்கியம்

கிறித்தவ இலக்கியம் - தேம்பாவணி – கதை சுருக்க வரைவு –
இசுலாமிய இலக்கியம் - சீறாப்புராணம் - கதை சுருக்க வரைவு.
5.1 – தேம்பாவணி- முதல் காண்டம் - 6. ஈரறம் பொருத்து படலம் -454-526 வரை 73 செய்யுள்கள்
5.2 – சீறாப்புராணம்- இரண்டாவது காண்டம் - 7வது படலம் - ஹபீபு மக்கத்துக்கு வந்த படலம் - 419 -510 வரை 89 செய்யுட்கள்.

Book(s) for Study

1	ச.வே.சுப்பிரமணியன் (ப.ஆ), பன்னிரு திருமுறை, சென்னை, மணிவாசகர் பதிப்பகம்.
2	பாஷ்யகாராச்சாரியார், நாலாயிரத் திவ்விய பிரபந்தம், முதலாயிரம், இரண்டாம் ஆயிரம், மூன்றாம் ஆயிரம், நான்காம் ஆயிரம், சிதம்பரம், ஆதித்யா ஸ்ரேயாப் பதிப்பகம்.

3	ச.வே. சுப்பிரமணியன் (ப.ஆ) கம்பராமாயணம், சென்னை மணிவாசகர் பதிப்பகம்.	
4	தேம்பாவணி – மதுரை மின் நூல் தொகுப்புத் திட்டம்	
5	சீறாப் புராணம் - மதுரை மின் நூல் தொகுப்புத் திட்டம்.	
Course Outcomes		
CO1	• சமயஞ்சார் இலக்கிய மரபை அறிதல்	[K1]
CO2	• இலக்கிய வளர்ச்சிக்கு சமயங்களின் கொடை பற்றி பரிசீலித்தல்	[K4]
CO3	• சைவ, வைணவ இலக்கிய நுவல் பொருளைக் கற்றல்	[K2]
CO4	• கம்பராமாயணத்தைக் கற்றல்	[K1] ,[K2]
CO5	• கிறித்தவ இலக்கியம், இசுலாமிய இலக்கியங்களைக் கற்றல்	[K1] ,[K2]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

<u>Mapping of COs with POs & PSOs:</u>

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

SEMESTER II

Course Code	P21TAT21	தொல்காப்பியம் - சொல் அதிகாரம்	L	T	P	C
Core	VI		5	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• மொழி இலக்கண அடிப்படை விதிகளை அறிதல் • இலக்கண மரபு இன்றளவும் மாறாமல் தொடர்ந்து வரும் பாங்கை உணர்தல் • பிழை இன்றி மொழி கையாளும் பயிற்சி பெறுதல் • அடிப்படை விதிகளை கற்றுத் தேர்ச்சி பெறுதல் • இலக்கண விதிகளை இன்றைய மொழியுடன் பொருத்திக் காணல்
அலகு – 1	கிளவியாக்கம்
அலகு –2	வேற்றுமை இயல், வேற்றுமை மயங்கியல்
அலகு –3	விளி மரபு, பெயரியல்
அலகு – 4	வினையியல், இடையியல்
அலகு - 5	உரியியல், எச்சவியல்

பயில் முறைப் பயிற்சி

மாணவர் தன் விருப்பத்துக்கு ஏற்ப ஏதேனும் ஒரு சிறுகதை, புதினம், கட்டுரை, நாடகம், செய்யுட்களின் பகுதி – ஐந்து பக்க அளவிலான இலக்கியப் பகுதியைத் தேர்வு செய்து அதில் இடம்பெற்றிருக்கும் சொற்கள், திணை, பால், சுட்டு, வினா, மூவிடப் பெயர்கள், வேற்றுமை உருபுகள், விளித்தல் முறை, வினைச் சொற்கள், இடைச் சொற்கள், உரிச் சொற்கள், இயற்சொல், திரிசொல், திசைச் சொல், வடசொல், பிறசொல், உருபுகளின் மயக்கம் என்று பகுத்துப் பரிசீலித்து ஐந்து முதல் பத்து பக்க அளவிலான கட்டுரை எழுதிச் சமர்ப்பித்தல் வேண்டும்.

பயில்முறைசார் இப்பகுதி தெளிவு பெறுதற்கான பயிற்சியே தவிர இதிலிருந்து தேர்வுக்கான வினா ஏதும் இடம் பெறக்கூடாது.

Book(s) for Study	
1	தொல்காப்பியம் - சொல் அதிகாரம் - சேனா வரையர் உரை – திருநெல்வேலி சைவ சித்தாந்த நூற்பதிப்புக் கழக வெளியீடு.

Course Outcome		
CO1	• மொழி இலக்கண அடிப்படை விதிகளை அறிதல்	[K1]
CO2	• இலக்கண மரபு இன்றளவும் மறாமல் தொடர்ந்து வரும் பாங்கை உணர்தல்	[K2]
CO3	• பிழை இன்றி மொழி கையாளும் பயிற்சி பெறுதல்	[K3]
CO4	• அடிப்படை விதிகளை கற்றுத் தேர்ச்சி பெறுதல்	[K3]
CO5	• இலக்கண விதிகளை இன்றைய மொழியுடன் பொருத்திக் காணல்	[K4],[K5]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT22	காப்பிய இலக்கியம்	L	T	P	C
Core	VII		5	0	0	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**				
Course Objectives		• தமிழ்க் காப்பியங்களை அறிதல் • காப்பிய இலக்கண விதிகள், கட்டமைப்பைக் கற்றுத் தேர்தல் • நுவல் பொருளின் விழுமியங்களை விளக்குதல் • திறனாய்தல் • ஒப்பிடுதல்				
அலகு – 1		பெருங்காப்பிய நிலை பேசுங்காலை என்னும் தண்டியலங்கார காப்பிய இலக்கண வரையறை – தமிழில் ஐம்பெரும் காப்பியங்கள் - ஐஞ்சிறு காப்பியங்கள் - பாரத, இராமாயண நூல்கள் - திருவிளையாடல் புராணம், கந்த புராணம் உள்ளிட்ட புராணங்கள் - கிளைக் கதைகள்- சிறுகாப்பிய மரபு – சுருக்க வரைவு.				
அலகு –2		சிலப்பதிகாரம் வஞ்சிக் காண்டம் முழுவதும்				
அலகு –3		மணிமேகலை – 5 காதைகள் மட்டும் 26 வஞ்சி மாநகர் புக்க காதை 27 சமயக் கணக்கர் தம் திறம் கேட்ட காதை 28 கச்சி மாநகர் புக்க காதை 29 தவத்திறம் பூண்டு தருமம் கேட்ட காதை 30 பவத்திறம் அறுக எனப் பாவை தோற்ற காதை				
அலகு – 4		சீவக சிந்தாமணி 13.முத்தி இலம்பகம் 13.1 விசயை துறவு – “நீரேந்தி நெய் மிதந்து” எனும் 2599 வது செய்யுள் முதல் “முழுது உலகு எழில் ஏத்து” எனும் 2651 வது செய்யுள் வரையிலான 53 செய்யுட்கள் மட்டும்				
அலகு – 5		5.1 எச்.ஏ.கிருஷ்ண பிள்ளை - இரட்சணிய யாத்திரிகம் - கதைச் சுருக்க வரைவு. 5.2 கவிமணி தேசிக விநாயகம் பிள்ளை – ஆசிய ஜோதி – கதைச் சுருக்க வரைவு.				
பயில் முறைப் பயிற்சி						
‘அறம், பொருள், இன்பம், வீடு அடைதல் நூற்பயனே’ என்று அறநெறி உணர்த்தும் இலக்குடன் காப்பியம் படைப்பது தமிழ் இலக்கிய மரபு. பாவிகம் என்பர். அவ்வகையில் மாணவர் தனக்கு விருப்பமான ஏதேனும் ஒரு காப்பிய நூலின் கதையமைப்பில் இடம் பெற்றிருக்கும் அறநெறியைச் சுட்டிக் காட்டி ஐந்து பக்க அளவில் கட்டுரை எழுதிச் சமர்பிக்க வேண்டும். பயில்முறைப் பயிற்சியில் இருந்து தேர்வுக்கான வினா ஏதும் இடம்பெறக் கூடாது.						

Book(s) for Study	
1	தண்டியலங்காரம்
2	ச.வே.சு (உ.ஆ) ஐம்பெருங்காப்பியங்கள் - மூலமும் தெளிவுரையும், சென்னை, மணிவாசகர் பதிப்பகம்,2013.
3	ஹெச்.ஏ.கிருஷ்ண பிள்ளை, இரட்சணிய யாத்திரிகம்
4	கவிமணி தேசிக விநாயகம் பிள்ளை, ஆசிய ஜோதி.

Course Outcomes		
CO1	• தமிழ்க் காப்பியங்களை அறிதல்	[K1]
CO2	• காப்பிய இலக்கண விதிகள், கட்டமைப்பைக் கற்றுத் தேர்தல்	[K2]
CO3	• நுவல் பொருளின் விழுமியங்களை விளக்குதல்	[K3]
CO4	• திறனாய்தல்	[K5]
CO5	• ஒப்பிடுதல்	[K4]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**

K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT23	தமிழ் இலக்கண வரலாறு	L	T	P	C
Core	VIII		4	0	0	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**				
Course Objectives		• இலக்கண உருவாக்க நெறிகளைக் கண்டறிதல் • இலக்கண அடிப்படைகளைத் தெரிந்து கொள்ளுதல் • காலம்தோறும் உருவான புது இலக்கிய வகைகள், அவற்றுக்கான இலக்கண நூல்கள் உருவான சூழல் அறிதல் • இன்றைய மொழிக்கான இலக்கண உருவாக்கத் திறன் தெரிதல் • தமிழ் இலக்கண வரலாறு பற்றி தெரிந்து கொள்ளுதல்				
அலகு – 1		தமிழ் இலக்கண மரபு தொல்காப்பியம் கூறும் எழுத்து, சொல், பொருள் மரபு. வீரசோழியம் கூறும் எழுத்து, சொல், பொருள், யாப்பு, அணி எனும் ஐந்திலக்கண மரபு வண்ணச் சரபம் தண்டபாணி சுவாமிகள் கூறும் புலமை இலக்கண மரபுடன் அறுவகை இலக்கண மரபுகள் பற்றிய சுருக்க வரைவு.				
அலகு –2		தமிழ் எழுத்திலக்கண நூல்களின் வரலாறு – எட்டு நூல்கள் - தொல்காப்பியம் - வீரசோழீயம் - நேமிநாதம் - நன்னூல் - இலக்கண விளக்கம் - தொன்னூல் விளக்கம் - முத்து வீரியம் - சுவாமிநாதம்.				
அலகு –3		தமிழ்ச்சொல் இலக்கண நூல்களின் வரலாறும், நுவல் முறையும் - தொல்காப்பியம் -வீரசோழீயம் - நேமிநாதம் - நன்னூல் - பிரயோக விவேகம் - இலக்கண விளக்கம் - இலக்கணக் கொத்து – தொன்னூல் விளக்கம் - முத்து வீரியம் - சுவாமிநாதம் - பதினொரு நூல்கள்.				
அலகு – 4		பொருள் இலக்கண நூல்கள் - அகப்பொருள் இலக்கண நூல்கள் - இறையனார் களவியல், தமிழ்நெறி விளக்கம் - நம்பியகப் பொருள், களவியல் காரிகை – மாறன் அகப்பொருள். புறப்பொருள் இலக்கண நூல்கள் - புறப்பொருள் வெண்பா மாலை - இலக்கண விளக்கத்தின் புறத்திணையியல்.				
அலகு - 5		5.1 தமிழ் யாப்பிலக்கண நூல்களின் வரலாறு – தொல்காப்பியச் செய்யுளியல் - யாப்பருங்கலம் - யாப்பருங்கலக் காரிகை, யாப்பதிகாரம் போல்வன 5.2 சான்றிலக்கிய நூல்கள் - சிதம்பரச் செய்யுட் கோவை, தஞ்சைவாணன் கோவை போல்வன 5.3 தமிழ் பாட்டியல் இலக்கண நூல்கள் - பன்னிரு பாட்டியல், வெண்பாப் பாட்டியல், சிதம்பரப் பாட்டியல் போல்வன				

	5.4 பிரபந்த இலக்கண நூல்கள் - பிரபந்த மரபியல், பிரபந்தத் திரட்டு, பிரபந்த தீபிகை போல்வன 5.5 அணியிலக்கண நூல்கள் - தண்டியலங்காரம், மாறன் அலங்காரம் போல்வன

குறிப்பு:

கி.பி இரண்டாம் நூற்றாண்டில் தோன்றிய தொல்காபபியம் முதல் இருபதாம் நூற்றாணடில் தோன்றிய விருத்தப்பாவியல் வரை தமிழில் 49 இலக்கண நூல்கள் தோன்றிய பாரம்பரியச் சிறப்பை அறிமுகம் செய்யும் இப்பாடத்தில் வினாக்கள் இலக்கண நூற்பாக்களை மையமிட்டு அமைதல் கூடாது.

Book(s) for Study

1	இரா.இளங்குமரன், இலக்கண வரலாறு சென்னை, ச.வே.சுப்பிரமணியன் (ப.ஆ), மணிவாசகர் பதிப்பகம், 2006
2	தமிழ் இலக்கண நூல்கள் மூலம் முழுவதும், சிதம்பரம், மெய்யப்பன் பதிப்பகம், 2009, இ.ப

Course Outcomes

CO1	• இலக்கண உருவாக்க நெறிகளைக் கண்டறிதல்	[K2]
CO2	• இலக்கண அடிப்படைகளைத் தெரிந்து கொள்ளுதல்	[K1]
CO3	• காலம்தோறும் உருவான புது இலக்கிய வகைகள், அவற்றுக்கான இலக்கண நூல்கள் உருவான சூழல் அறிதல்	[K2]
CO4	• இன்றைய மொழிக்கான இலக்கண உருவாக்கத் திறன் தெரிதல்	[K6]
CO5	• தமிழ் இலக்கண வரலாறு பற்றி தெரிந்து கொள்ளுதல்	[K2]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT24	இலக்கண உரையாசிரியர்கள்	L	T	P	C
Core	IX		4	0	0	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**				
Course Objectives		• உரையாசிரியர்களது கொடையை உணர்தல் • உரை எழுதும் திறன் பெறுதல் • பயிற்சி பெறுதல் • உரை நயங்களைக் கண்டறிதல் • உரை வரலாறு அறிதல்				
அலகு – 1		தமிழ் இலக்கண உரையாசிரியர்கள் - தொல்காப்பிய உரையாசிரியர்கள் - இளம்பூரணர் - சேனாவரையர் - பேராசிரியர் - தெய்வச் சிலையார் - கல்லாடர் - பழைய உரை - இறையனார் அகப்பொருள் உரை.				
அலகு –2		நச்சினார்க்கினியரது வரலாறும், சிறப்பு இயல்புகளும் - தொல்காப்பிய உரைத்திறன் - பல்கலைப் புலமைத் திறன்.				
அலகு –3		நன்னூல் உரையாசிரியர்கள் - நன்னூல் உரைகள் - மயிலை நாதர் - சங்கர நமச்சிவாயர் - ஆண்டிப்புலவர் - இராமாநுசக் கவிராயர் - விசாகப் பெருமாள் ஐயர் - ஆறுமுக நாவலர் - சடகோப இராமாநுசர்				
அலகு – 4		சிவஞான முனிவரது வரலாறும், சிறப்பியல்புகளும் - அவரது நன்னூல் விருத்தியுரை - சூத்திர விருத்தி - இலக்கண விளக்கச் சூறாவளி – மறுப்புரை நூல்கள்				
அலகு – 5		யாப்பருங்கல விருத்தியுரை – யாப்பருங்கலக் காரிகை உரை – தண்டியலங்கார உரை – நம்பி அகப்பொருள் விளக்க உரை – பாட்டியல் உரைகள் - ஐந்திலக்கண நூல்களும் உரைகளும் - அணிநூல் உரைகள்				
Book(s) for Study						
1	மு.வை.அரவிந்தன், உரையாசிரியர்கள், சென்னை, மணிவாசகர் பதிப்பகம்					
Course Outcomes						
CO1	• உரையாசிரியர்களது கொடையை உணர்தல்	[K3]				
CO2	• உரை எழுதும் திறன் பெறுதல்	[K6]				
CO3	• பயிற்சி பெறுதல்	[K6]				

CO4	• உரை நயங்களைக் கண்டறிதல்	[K4] , [K5]
CO5	• உரை வரலாறு அறிதல்	[K2]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் - வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT25	Advanced Tamil Computing and Tamil Carpus Development மேம்பட்ட கணினித் தமிழ், தமிழ்த் தரவக உருவாக்கம்	L	T	P	C
Core	X		6	0	0	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டுப் பயிற்சி** **K4: பகுத்தல் - வகை தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**				
Course Objectives		• கணினித்தமிழ் பாகுபடுத்தும் கருவிகளை அறிதல் • கணித்தமிழ் கருவிகளைப் பயன்படுத்தும் திறன் பெறுதல் • இயற்கை மொழி ஆய்வு கருவிகளைத் தமிழில் உருவாக்குதல் • கணினிவழித் தமிழ் மொழிபெயர்ப்பு நுட்பங்களில் தேர்ச்சி பெறுதல் • தமிழ் தரவகத்தைக் கணினியில் உருவாக்குதல்				
அலகு – 1		மேம்பட்ட தமிழ் கணினியியல் கருவிகள் உருவாக்கம் - தமிழ் பிரதி பாகுபடுத்தும் கருவிகள் - தொடர்களைக் கட்டுடைத்துப் படிக்கும் பாகுபாட்டிகள் - சொல் பகுப்பி – சொல் அலகுகளைக் கண்டறிதல் - தமிழ்க் கணினியியல் அறிமுகம் - பயன்பாட்டிலுள்ள பல்வேறு கருவிகள்				
அலகு – 2		ஆழமற்ற பாகுபடுத்தி - ஆழமற்ற பாகுபடுத்தி – விளக்க வரையறை (விதிமுறைகளின் அடிப்படையிலும், இயந்திர வழி கற்றல் சார் அமைப்பின் அடிப்படையிலும்). – தொடரைப் பல்வேறு மொழி அலகுகளாகப் பகுத்தல் (பெயர்கள், வினைகள், பெயரடைகள் போல்வன) பிறகு அவற்றைப் பொருள் தரும் முறையில் இணைத்தல் (பெயர் தொகுதிகள், வினைத் தொகுதிகள் போன்றன) இயற்கை மொழி ஆய்வு பயன்பாட்டிற்கு ஏற்புடைத்து - பேச்சின் பகுதிகளைத் தேடிக் கண்டுபிடிப்பிகள் - பெயர்த் தொடர் / வினைத் தொடர் தேர்ந்தெடுப்பிகள் சொல் உட்கூறு கண்டறிவி.				
அலகு – 3		ஆழமான பாகுபடுத்தி விளக்க வரையறை - ஆழமான பாகுபடுத்தியை உருவாக்குதல் - இலக்கண விதிமுறைகளின் அடிப்படை - கணினிமுறை அடிப்படை - உருபன்களைப் பாகுபடுத்துதல் - தமிழ் சார்பு பாகுபடுத்தி - தமிழில் உருவாக்குதல்.				
அலகு – 4		இயந்திர மொழிபெயர்ப்பு - இயந்திர மொழிபெயர்ப்புத் தளங்கள் - இயந்திர மொழிபெயர்ப்புக் கருவிகள் - இயந்திர மொழிபெயர்ப்பு மொழிகள் - மூல மொழி - இலக்கு மொழி - மொழிபெயர்ப்புத் தொழில் நுட்பங்கள் - மொழி பெயர்ப்பு நெறிகள் - விதிகள் - மொழி பெயர்ப்பின் பயன்பாடு – மொழிபெயர்ப்பதில் எதிர்கொள்ளும் மொழி சார், பண்பாடு சார் – தொழில்நுட்பக் கருவி சார் சிக்கல்களும் தீர்வு கண்டறி செயல்பாடுகளும்.				
அலகு – 5		தமிழ் தரவக உருவாக்கம் - தமிழ் நுவல் பொருள் உருவாக்க முறைகள் - விக்கிப்பீடியா மற்றும் தமிழ் வலைமனை வளாகங்கள் - வெவ்வேறு இலக்கண கூறுகளைத் தமிழில் பகுத்தல் அதற்கான பகுப்பாய்வி கருவியின் துணை கொண்டு தமிழ் உள்ளடக்கத்தைப் பகுத்தல்.(Palinka – தமிழ் கருவி)				

Book(s) for Study	
1	கணிப்பொறியில் தமிழ். த. பிரகாஷ் - பெரிகாம் நூல் வெளியீடு மற்றும் விற்பனை, 36அசீஸ்முல்க் இரண்டாம் தெரு, ஆயிரம் விளக்கு. சென்னை 2005.
2	தமிழ் இயற்கை மொழி ஆய்வு - கு.சுப்பையா பிள்ளை – உலகத் தமிழ் ஆராய்ச்சி நிறுவன வெளியீடு 2012
3	கணிப்பொறி வழித் தமிழ் வினைகளின் பகுப்பாய்வு - சென்னை, செவ்வேள் கபிலன், மொழியியல் கழகம். 1994.
4	கணினித் தமிழ் முனைவர். இல. சுந்தரம் - சென்னை விகடன் பிரசுரம் 2015
5	கம்ப்யூட்டர் A to Z காம்கேர். கே. புவனேசுவரி - சென்னை விகடன் பிரசுரம் 2009
6	இன்டாநெட் A to Z காம்கேர். கே. புவனேசுவரி - சென்னை விகடன் பிரசுரம் 2010
7	தமிழ் மென்பொருட்கள் பன்னிருகை வடிவேலன் - சென்னை நோக்கு,2014
8	பைதான் புரோகிராமிங் சோமசுந்தரம் செ்னறாயன் - அமேசான் கிண்டில். 2020
9	தமிழும் கணிப்பொறியும், மா. ஆண்டோ பீட்டா. – சென்னை கற்பகம் புத்தகாலயம். 2002.
10	கணிப்பொறி அறிவியல் தகவல் தொடர்பு. – தமிழ் வளர்ச்சிக் கழகம் தொழில் நுட்பம் மு. பொன்னவைக்கோ, சென்னை பல்கலைக்கழகம்,2012
11	Corpus Linguistics: An Introducation Kindle Edition;Author: NiladriSekhar Dash; Pearson; 1st Edition (1st October 2007)
12	An Introduction to Corpus Linguistics; Author: Graeme Kennedy; Routledge:1998
13	Natural Language Processing with Phython: Analyzing Text with the Natural Language Toolkit Ist Edition: Steven Bird, Ewan Klein, Edward Loper.
14	Machine Translation; Pushpak Bhattacharya; Chapman and Hall / CRC;2015
Related Online Contents (Websites)	
15	GATE.ac.uk – relaseases/gate-2.0alpha3-build516/doc/userguide.html
16	NLTK website: 1.Language Processing and Python (nltk.org)
17	AU-KBC Tools: http://78.46.86.133:8080/aukbe-nlp/
18	Search Engine AU-KBC: Searchko:www.searchko.co.in
19	PALinkA: A high-end tool for syntactic and semantic annotation for Tamil Text: Customized by AU-KBC for Tamil. To download: http://78.46.86.133/PALinkA.tar.gz

Course Outcomes		
CO1	• கணினித்தமிழ் பாகுபடுத்தும் கருவிகளை அறிதல்	[K1], [K2]
CO2	• கணித்தமிழ் கருவிகளைப் பயன்படுத்தும் திறன் பெறுதல்	[K3]
CO3	• இயற்கை மொழி ஆய்வு கருவிகளைத் தமிழில் உருவாக்குதல்	[K6]
CO4	• கணினிவழித் தமிழ் மொழிபெயர்ப்பு நுட்பங்களில் தேர்ச்சி பெறுதல்	[K3]
CO5	• தமிழ் தரவகத்தைக் கணினியில் உருவாக்குதல்	[K6]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAN21	மொழியியல்	L	T	P	C
NME - I			6	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• மொழியியல் நோக்கில் தமிழிலக்கியம், தமிழ் இலக்கணத்தை அணுகுதல் • அகராதி உருவாக்கப் பயிற்சி பெறுதல் • தமிழ் மொழியின் கட்டமைப்பை இன்றைய மொழியியல் நோக்கில் பரிசீலித்தல் • தமிழ் ஒலியன் உருபன் தொடர் அமைப்பு, சொல் பொருள் பற்றி கற்றல் • காலந்தோறும் நேரிட்ட சொல் பொருள் மாற்றங்களைப் பரிசீலித்தல்
அலகு – 1	மொழியும் மொழியியலும் - மொழியியல் வரையறை - மொழியியலின் பிரிவுகள் - ஒலிகள் - ஒலியியல் - ஒலியியல் வகைகள் - ஒலி உறுப்புகள் - குரல் எழுப்புதல் - ஒலித்தல் - உயிரொலிகள் - மெய் ஒலிகள் - பிற ஒலிகள்
அலகு –2	ஒலியனியல் என்றால் என்ன? - ஒலியன் வரையறை –ஒலியன் - மாற்றொலியன் - ஒலியன் சேர்க்கைகள் - ஒலியன் அசைகள்
அலகு –3	உருபனியல் என்றால் என்ன? - உருபன் விளக்க வரையறை - உருபு – உருபன் வகைகள் - மாற்றுருபன் - வேர்ச்சொல் - அடிச்சொல் - ஒட்டுகள் - உருபு வகைகள் - ஓரினமாதல் - வேறினமாதல்
அலகு – 4	தொடரியல் - தமிழ்த் தொடர் அமைப்பு – பெயர்ச்சொல், வினைச்சொல், வேற்றுமை உருபுகள், பெயரடை, வினையடை, காலம் காட்டும் வினை உருபுகள், உரிச்சொல் செய்வினைத் தொடர், செயப்பாட்டு வினைத் தொடர் - எளிய தொடர், கூட்டுத் தொடர், கலவைத் தொடர் - எழுவாய், பயனிலை, செயப்படு பொருள் - திணை - எண் - பால் - இடம் தொடர்களில் அமைதல்
அலகு – 5	சொல் பொருளியல் - ஒரு பொருள் பன்மொழி - பல பொருள் ஒரு மொழி – காலப் போக்கில் நேரும் சொல் பொருள் மாற்றம் - கடன் வாங்கல் - மங்கல வழக்கு – குழஉக் குறி - இடக்கரடக்கல் - பேச்சு மொழி – எழுத்து மொழி - இயற்சொல் - திசைச்சொல் - திரிசொல் - வடசொல் - பயன் பாடுகள்.

Book(s) for Study

1	கி. கருணாகரன், வ. ஜெயா- மொழியியல், குமரன் பதிப்பகம் சென்னை
2	இராதா செல்லப்பன், மொழியியல், கவியமுதம் வெளியீடு, திருச்சி
3	முத்துச் சண்முகன், இக்கால மொழியியல், மதுரை 1980.

Course Outcomes		
CO1	• மொழியியல் நோக்கில் தமிழிலக்கியம், தமிழ் இலக்கணத்தை அணுகுதல்	[K1], [K2]
CO2	• அகராதி உருவாக்கப் பயிற்சி பெறுதல்	[K3]
CO3	• தமிழ் மொழியின் கட்டமைப்பை இன்றைய மொழியியல் நோக்கில் பரிசீலித்தல்	[K6]
CO4	• தமிழ் ஒலியன் உருபன் தொடர் அமைப்பு, சொல் பொருள் பற்றி கற்றல்	[K3]
CO5	• காலந்தோறும் நேரிட்ட சொல் பொருள் மாற்றங்களைப் பரிசீலித்தல்	[K6]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAS11	தமிழ் கணினி இணையப் பயன்பாடுகள்	L	T	P	C
Supportive course	I		2	0	0	2

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• கணினி இணையவழி தமிழைக் கையாளும் பயிற்சி பெறுதல் • கணினித் தமிழ் மென்பொருள்களை தெரிந்துகொள்ளுதல் • தமிழ் செயலிகளை உருவாக்கும் திறன் பெறுதல் • இயந்திர மொழிபெயர்ப்பைக் கையாளுதல் • கணித்தமிழில் இன்றைய நவீன கருவிகளைக் கையாளுதல்
அலகு – 1	கணினியின் கட்டமைப்பும், செயல்பாடும் - வன்பொருள், மென்பொருள் தொழில்நுட்பங்கள்.
அலகு –2	கணித் தமிழ் அச்சு செய்தலும், அஞ்சல் பரிமாற்றமும் வேர்ட் (Word) எக்ஸல் (Excel) பவர் பாயிண்ட் (Power Point) அக்சஸ் (Access)
அலகு –3	கணினியில் தமிழ் எழுத்துக்கள் - தமிழ் மென்பொருட்கள் - தமிழ் சொற்பிழை திருத்தி – சந்திப் பிழை திருத்தி - இலக்கணப் பிழை திருத்தி – பேச்சு எழுத்து மாற்றி – ஒலி எழுத்து உணரி – கையெழுத்து உணரி – தமிழ் மென்பொருளைப் பெறும் முறைகள் - தமிழ் மென்பொருள் தோன்றிய வரலாறு.
அலகு – 4	இணையமும் தமிழும் - இணையத்தின் அடிப்படைப் பயன்கள் - தமிழ் இணைய தள முகவரிகள் - மாநாடுகள் - இணைய வழி கல்விப் பணிகள் - இணையத்தில் தமிழ் அச்சு இதழ்கள் - இணையத்தில் தமிழ் மின் இதழ்கள். இணைய வழி தமிழ் கற்றல், கற்பித்தல் - இணைய நூலகப் பயன்பாடு – மின் கற்றலின் பண்புகள் - வகைகள் - பயன்கள் - இணைய அகராதிகள் பயன்பாடு – தமிழ் இணைய அகராதியின் தனிச்சிறப்பு - இணைய அகராதியைப் பயன்படுத்தும் முறை மற்றும் தேடல் வகை - இணையத் தமிழ் இதழ்களின் முகவரிகள் - தமிழ் இணைய நூலகங்கள் - தமிழ்ச் சுவடிகள் கணினியில் - தமிழ் நூல்களைப் பதிவிறக்கம் , பதிவேற்றம் செய்யத் தக்க இணைய முகவரிகள்.
அலகு – 5	தமிழ் மின்னஞ்சல் - தமிழ் வலைப் பூக்கள் - வலைப் பூக்கள் உருவாக்கம் - தமிழ் மின் எழுத்துரு பதிவிறக்கம் செய்தல் - தமிழ் விக்கிப் பீடியா – மின் வணிகம் - விக்கிப் பீடியா தரவுகள் - விக்கிபீடியாவில் எழுதும் முறை- சமூக ஊடகங்கள் -- இணைப்பு முறை – (Linking Method) - வகுப்பறை- படிவங்கள் - கலந்து உரையாடல் - கருத்தரங்கிற்குப் பயன்படும் இணைய இணைப்புகள் - (Web link) ஒலி வடிவ கருத்துரை பதிவு (Audio Lecture) ஒலி-ஒளி வடிவ உரைப் பதிவு முறைகள் (Video Lectures) மூடுல் தளம் (Moodle Lecture) மின் பாடங்கள் (MOOC courses).

Book(s) for Study		
1	த.பிரகாஷ், கணிப்பொறியில் தமிழ், சென்னை, பெரிகாம் வெளியீடு 2005.	
2	கு. சுப்பையா பிள்ளை, தமிழ் இயற்கை மொழி ஆய்வு, உலகத்தமிழ் ஆராய்ச்சி நிறுவனம், 2012	
3	இல.சுந்தரம், கணினித் தமிழ், சென்னை, விகடன் பிரசுரம்.	
4	துரை.மணிகண்டன், இணையமும், தமிழும், சென்னை நல் நிலம் 2008.	
5	துரை.மணிகண்டன், த.வானதி,'தமிழ் கணினி இணையப் பயன்பாடுகள், தஞ்சாவூர், கமலினி பதிப்பகம், 2016.	
6	க.துரையரசன், இணையமும் இனிய தமிழும், திருச்சி இசைப் பதிப்பகம், 2009	
7	த.பிரகாஷ், இணையத் தமிழில் மின்னஞ்சல்.	
8	துரை.மணிகண்டன், இணையத்தில் தமிழ்த் தரவு தளங்கள், கௌதம் பதிப்பகம், சென்னை.	
9	துரை.மணிகண்டன், இணையத்தில் தமிழ் வலைபூக்கள், கௌதம் பதிப்பகம், சென்னை.	
Course Outcomes		
CO1	• கணினி இணையவழி தமிழைக் கையாளும் பயிற்சி பெறுதல்	[K3]
CO2	• கணினித் தமிழ் மென்பொருள்களை தெரிந்துகொள்ளுதல்	[K2]
CO3	• தமிழ் செயலிகளை உருவாக்கும் திறன் பெறுதல்	[K3]
CO4	• இயந்திர மொழிபெயர்ப்பைக் கையாளுதல்	[K3]
CO5	• கணித்தமிழில் இன்றைய நவீன கருவிகளைக் கையாளுதல்	[K3]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

SEMESTER III

Course Code	P21TAT31	தொல்காப்பியம் - பொருளதிகாரம் - 1	L	T	P	C
Core	XI		5	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• இலக்கிய கருப்பொருள் பற்றி அறிதல் • தமிழர் வாழ்வியல் நெறிகளை உணர்தல் • விழுமியங்களைப் போற்றுதல் • நன்னெறிகளைப் பின்பற்றுதல் • பழந்தமிழர் வாழ்வியலைத் தெரிந்து கொள்ளுதல்
அலகு - 1	அகத்திணையியல்
அலகு - 2	புறத்திணையியல்
அலகு - 3	களவியல்
அலகு - 4	கற்பியல்
அலகு - 5	பொருளியல்

பயில்முறை பயிற்சி:

பதினெண்கீழ்க்கணக்கு நூல்களுள் இடம்பெற்றிருக்கும் அகநூல்கள் ஆறு,புறநூல் ஒன்று ஆகியவற்றிலிருந்து மாணவர் தனக்கு பிடித்த பத்து செய்யுட்களைத் தெரிவுசெய்து, அவை தொல்காப்பியப் பொருளதிகார இலக்கண மரபைக் கொண்டு அமைந்துள்ளமையைக் கதை மாந்தர் கூற்றுக்கள் முதல், கரு, உரிப்பொருள் இடம்பெறல், களவு, கற்பியல் கூறுகள், அமைந்துள்ள விதத்தைப் பரிசீலித்து ஐந்து பக்க அளவில் கட்டுரை சமர்ப்பிக்கவேண்டும். வெண்பாயாப்பில் அமைந்துள்ள செய்யுட்களைத் தொல்காப்பிய பொருளதிகாரக் கருத்துக்களின் அடிப்படையில் அணுகும் பயிற்சிக் கட்டுரை இதுவாகும். **இதிலிருந்து தேர்வுக்கான வினா ஏதும் கேட்கப்படக் கூடாது.**

Book(s) for Study

1	தொல்காப்பியம் - பொருளதிகாரம் - இளம்பூரணர் உரை - திருநெல்வேலி சைவசித்தாந்த நூற்பதிப்புக் கழகம்.

Course Outcomes		
CO1	• இலக்கியக் கருப்பொருள் பற்றி அறிதல்	[K2]
CO2	• தமிழர் வாழ்வியல் நெறிகளை உணர்தல்	[K2]
CO3	• விழுமியங்களைப் போற்றுதல்	[K3]
CO4	• நன்னெறிகளைப் பின்பற்றுதல்	[K3]
CO5	• பழந்தமிழர் வாழ்வியலைத் தெரிந்து கொள்ளுதல்	[K1]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT32	தமிழ் இலக்கிய உரையாசிரியர்கள்	L	T	P	C
Core	XII		4	0	0	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**				
Course Objectives		• உரை எழுதுநெறி அறிதல் • உரை காணும் ஆற்றல் பெறுதல் • வாசிப்பை மிகுவித்தல் • உரையாசிரியர்களது கொடையை உணர்தல் • உரை நயங்களைக் கண்டறிதல்				
அலகு- 1		உரை என்பதன் விளக்கம் - உரைவகைகள் - உரையாசிரியர்கள்தம் தனித் திறன்கள் - தமிழ் உரைகளின் தோற்றமும், வளர்ச்சியும், இன்றைய நிலையும்.				
அலகு- 2		சங்க இலக்கிய உரைகள் - பத்துப்பாட்டு உரைகள் - எட்டுத்தொகை உரைகள் - பதினெண்கீழ்க் கணக்கு உரைகள் - திருக்குறள் உரைகள் - பரிமேலழகர் உரைத் திறன்.				
அலகு- 3		தமிழ்க் காப்பிய உரையாசிரியர்கள் - அரும்பத உரையாசிரியர் - அடியார்க்கு நல்லார் - சமய திவாகர வாமன முனிவர் - கம்பராமாயண உரைகள் - புராண, இதிகாச உரைகள்				
அலகு- 4		தமிழ் சமய இலக்கிய உரையாசிரியர்கள் - நாலாயிரத் திவ்விய பிரபந்த வியாக்கியானங்கள், திருமுறை உரைகள், சைவ சித்தாந்த உரைகள் - சைவசாத்திர உரைகள்- சிவஞான முனிவரின் உரைத்திறன்.				
அலகு- 5		**தமிழ் சிற்றிலக்கிய உரைகள்** திருக்கோவையார் - தக்கயாகப் பரணி - மூவருலா – பழைய உரை, நீதிநூல் உரைகள், பத்தொன்பதாம் நூற்றாண்டு இலக்கிய உரையாசிரியர்கள் , இருபதாம் நூற்றாண்டு இலக்கிய உரையாசிரியர்கள்.				
Book(s) for Study						
1	மு.வை.அரவிந்தன், உரையாசிரியர்கள், சென்னை மணிவாசகர் பதிப்பகம்.					

Course Outcomes		
CO1	• உரை எழுதுநெறி அறிதல்	[K2]
CO2	• உரை காணும் ஆற்றல் பெறுதல்	[K2]
CO3	• வாசிப்பை மிகுவித்தல்	[K3]
CO4	• உரையாசிரியர்களது கொடையை உணர்தல்	[K4]
CO5	• உரை நயங்களைக் கண்டறிதல்	[K5]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT33	தொல்காப்பியம் பொருள்அதிகாரம் - II (இறுதி நான்கு இயல்கள் மட்டும்)	L	T	P	C
Core	XIII		6	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• இலக்கிய யாப்பியல் மரபு அறிதல் • மெய்ப்பாடுகள் பற்றிப் பரிசீலித்தல் • அணிகள் பற்றித் திறனாய்தல் • மரபுசார் பயிற்சி பெறுதல் • உவமைகளின் வகைகளைக் கண்டறிதல்
அலகு – 1	மெய்ப்பாட்டியல்
அலகு – 2	உவமயியல்
அலகு – 3	செய்யுளியல் - 1259 நூற்பா முதல் 1376 வரை
அலகு – 4	செய்யுளியல் -1377 வது நூற்பாமுதல் 1499 வரை
அலகு – 5	மரபியல்

பயில்முறைப் பயிற்சி:

மாணவர் தன் விருப்பத்திற்கேற்ப இலக்கியத்தைத் தேர்வுசெய்து,அதில் ஐந்துசெய்யுட்கள் அல்லது இக்கால இலக்கியம் ஆயின் அதன் ஐந்துபக்கங்களில் இடம்பெற்றிருக்கும் மெய்ப்பாடுகள் (அ) உவமைகள் உவமஉருபுகள் செய்யுள் உறுப்புகள்,மரபுசார்ஆண்பால் பெயர்கள்,பெண்பால் பெயர்கள், இளமைப் பெயர்கள் பற்றி நான்குபக்கஅளவில் கட்டுரை எழுதிச் சமர்ப்பிக்கவேண்டும். இது மாணவரதுபுரிதலுக்காகவும் பயிற்சிக்காகவுமானது.
இதில் தேர்வுக்கானவினாக்கள் கேட்கக் கூடாது.

Book(s) for Study

1	தொல்காப்பியம் - பொருளதிகாரம் - இளம்பூரணர் உரை - திருநெல்வேலி சைவசித்தாந்த நூற்பதிப்புக் கழகவெளியீடு

Course Outcomes

CO1	• இலக்கிய யாப்பியல் மரபு அறிதல்	[K2]
CO2	• மெய்ப்பாடுகள் பற்றிப் பரிசீலித்தல்	[K4]
CO3	• அணிகள் பற்றித் திறனாய்தல்	[K5]
CO4	• மரபுசார் பயிற்சி பெறுதல்	[K6]
CO5	• உவமைகளின் வகைகளைக் கண்டறிதல்	[K2]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT34	பதினெண்கீழ்க்கணக்கு - அறஇலக்கியம்	L	T	P	C
Core	XIV		4	0	0	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**				
Course Objectives		• அறஞ்சார் விழுமியங்களைப் போற்றல் • வாழ்வியல் அறங்களைக் கடைப்பிடிக்கும் பயிற்சி பெறுதல் • நன்னெறிசார் வாழ்வினைப் பின்பற்றுதல் • அறஇலக்கியத்தைக் கற்றல் • அறஇலக்கிய போக்கும் நோக்கும் கண்டறிதல்				
அலகு – 1		பதினெண்கீழ்க்கணக்கு நூல்கள் - காலம் - நூலமைப்பு– அறநூல்கள் பதினொன்று–அகநூல்கள் - ஆறு, புறநூல்- ஒன்று - யாப்பமைவும் பொருளமைதியும் - சுருக்கவரைவு.				
		1.1 திருக்குறள் - அறத்துப்பால் - பத்து அதிகாரங்கள்				
		5. இல்வாழ்க்கை 6. வாழ்க்கைத் துணைநலம் 7. மக்கள் பேறு 8. அன்புடைமை 9. விருந்தோம்பல் 10.இனியவை கூறல் 11. செய்ந்நன்றிஅறிதல் 12. நடுவுநிலைமை 13. அடக்கமுடைமை 14. ஒழுக்கம் உடைமை மொத்தம் 100 குறட்பாக்கள்				
அலகு –2		**நாலடியார் - ஐந்துஅதிகாரங்கள்**				
		அதிகாரம் - 4 -அறன் வலியுறுத்தல் அதிகாரம் - 9 -பிறர் மனை நயவாமை அதிகாரம் - 16 - மேன் மக்கள் அதிகாரம் - 38 - பொதுமகளிர் அதிகாரம் - 39 - கற்புடைமகளிர் - மொத்தம் 50 செய்யுட்கள்				

அலகு –3	**3.1 நான்மணிக்கடிகை**
	"எள்ளற்க என்றும் எளியார் என்று" என்னும் முதல் பாடல் முதல் "இன்னாமை வேண்டின் இரவு எழுக" என்னும் பதினைந்தாவது பாடல் வரையிலான பதினைந்து செய்யுட்கள்.
	3.2 பழமொழி
	"பெரியநட்டார்க்கும் பகைவர்க்கும் சென்று" என்று தொடங்கும் பத்தாவது செய்யுள் முதல் 'இசைவகொடுப்பதூம், இல் என்பதூஉம்" என்னும் இருபத்துநான்காவதுசெய்யுள் வரையிலான 15 செய்யுட்கள்.
	3.3 சிறுபஞ்ச மூலம்
	"பொருள் உடையான் கண்ணதேபோகம்" என்னும் முதலாவதுசெய்யுள் முதல், 'கதம் நன்று சான்றாண்மை தீது' எனும் பதினைந்தாவது செய்யுள் வரையிலான 15 செய்யுட்கள்.
அலகு – 4	**4.1 திரிகடுகம்**
	"தாளாளன் என்பான் கடன்படாவாழ்பவன்" எனும் பனிரண்டாவது செய்யுள் முதல் "ஒல்வது அறியும் விருந்தினனும்" எனும் இருபத்து ஆறாவது செய்யுள் வரையிலான பதினைந்து செய்யுட்கள்.
	4.2 ஆசாரக் கோவை
	"நன்றி அறிதல் பொறையுடைமை" எனும் முதல் பாடல் முதல் "வைகறையாமம் துயில் எழுந்து தான் செய்யும்" என்னும் நான்காவது பாடல் வரையிலான நான்கு செய்யுட்கள்.
	4.3 முதுமொழிக் காஞ்சி
	1. சிறந்தபத்து "ஆர்கலி உலகத்து மக்கட்கு எல்லாம் ஓதலின் சிறந்தன்று ஒழுக்கம் உடைமை" என்னும் செய்யுள் முதல் "முற்பெருகலிற்பின் சிறுகாமை சிறந்தன்று" என்னும் செய்யுள் வரை
அலகு - 5	**5.1 ஏலாதி**
	"அவாஅறுக்கல் உற்றான், தளரான் அவ்வைந்தின்" என்று தொடங்கும் பதினோராவது செய்யுள் முதல் "பாடுஅகம் சாராமை" எனும் இருபத்தைந்தாவது செய்யுள் வரையிலான 15 செய்யுட்கள்.
	5.2 இன்னாநாற்பது
	"பந்தம் இல்லாதமனையின் வனப்பு இன்னா" என்னும் முதல் செய்யுள் முதல் "புல் ஆர் புரவிமணி இன்றிஊர்வு இன்னா" எனும் பதினைந்தாவது செய்யுள் வரையிலான 15 செய்யுட்கள்.

	5.3 இனியவைநாற்பது
	"பிச்சைபுக்கு ஆயினும் கற்றல் மிக இனிதே" என்னும் முதல் செய்யுள் முதல் "பிறன் மனை பின்நோக்காப் பீடு இனிது" எனும் பதினைந்தாவது செய்யுள் வரையிலான 15 செய்யுட்கள்.

பயில்முறைப் பயிற்சி:

மாணவர் தம் மனம் கவர்ந்த பத்து அற இலக்கிய விழுமியங்களைத் தேர்வு செய்து மூன்று பக்க அளவில் எழுதிச் சமர்ப்பித்தல் வேண்டும்.

Book(s) for Study

1	ச.வே.சுப்பிரமணியன்(ப.ஆ) தமிழ்ச் செவ்வியல் நூல்கள்,சென்னைமணிவாசகர் பதிப்பகம் . 2008

Course Outcomes

CO1	• அறஞ்சார் விழுமியங்களைப் போற்றல்	[K2]
CO2	• வாழ்வியல் அறங்களைக் கடைப்பிடிக்கும் பயிற்சி பெறுதல்	[K4]
CO3	• நன்னெறிசார் வாழ்வினைப் பின்பற்றுதல்	[K5]
CO4	• அறஇலக்கியத்தைக் கற்றல்	[K6]
CO5	• அறஇலக்கிய போக்கும் நோக்கும் கண்டறிதல்	[K2]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT35	சங்கஇலக்கியம்	L	T	P	C
Core	XV		5	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• செவ்வியல் மரபறிதல் • சங்க இலக்கிய நுவல் பொருள் அறிதல் • திறனாய்தல் • விழுமியங்களை அறிதல் • சங்ககால மக்களின் வாழ்வியலைப் புரிந்து கொள்ளுதல்
அலகு – 1	**நற்றிணை**
	ஔவையார் பாடிய 7 செய்யுட்கள் செய்யுள் எண் - 129, 187, 295, 371, 381, 390, 394, (129) பெருநகைகேளாய் தோழி (187) நெய்தல் கூம்ப,நிழல் குணக்குஒழுக (295) முரிந்தசிலம்பின்,நெரிந்தவள்ளியின் (371) காயாங் குன்றத்துக் கொன்றைபோல (381) அருந்துயர் உழத்தலின் உண்மைசான்ம் எனப் (390) வாளை வாயின் பிறழநாளும் (394) மரம் தலை மணந்த…நனந்தலைக் கானத்து
	1-2 குறுந்தொகை:
	வெள்ளிவீதியார் - பாடிய 8 செய்யுட்கள் - 27, 44, 58, 130, 146, 149, 169, 386 (27)கன்றும் உண்ணாது, கலத்தினும் படாது (44)காலேபரிதப்பினவே,கண்ணே (58) இடிக்கும் கேளிர் நும் குறை ஆக (130) நிலம் தொட்டுப் புகாஅர்,வானம் ஏறார் (146) அம்மவாழிதோழி! நம் ஊர்ப் (149) அளிதோதானேநாணே! நம்மொடு (169) சுரம் செல் யானைக் கல் உறுகோட்டின் (386) வெண் மணல் விரிந்தவீததைகானல்
	1.3 - ஐங்குநுறூறு கபிலர் பாடியகுறிஞ்சித்திணையில் 26. குன்றக் குறவன் பத்து 251 “குன்றக் குறவன் ஆர்ப்பின் எழிலி” என்று தொடங்கும் பாடல் முதல் “குன்றக் குறவன் காதல் மடமகள்” எனும் 260 வது பாடல் வரையிலான - 10 செய்யுட்கள்.

அலகு –2	**கலித் தொகை**
	சோழன் நல்லுருத்திரன் பாடிய முல்லைக்கலி பாடல்கள் - 17 ‘‘தளிபெறு தண்புலத்துத் தலைப்பெயற்கு அரும்பு ஈன்று’’ என தொடங்கும் 101 ஆவது பாடல் முதல் ‘‘மாண உருக்கிய நன் பொன் மணிஉறீஇ’’ எனும் 117 வதுபாடல் வரையிலான பாடல் வரை
அலகு –3	**3-1 அகநாநூறு**
	அம்மூவனார் பாடிய 10, 140, 280, 370, 390 ஆகிய 5 பாடல்கள் (10) வான் கடல் பரப்பில் தூவற்குஎதிரிய (140) பெருங்கடல் வேட்டத்துச் சிறுகுடிப் பரதவர் (280) பொன் அடர்ந்தன்ன,ஒள் இணர்ச் செருந்தி (370) வளைவாய்க் கோதையர் வண்டல் தைஇ (390) உவர் விளைஉப்பின் கொள்ளைசாற்றி
	3.2. பரிபாடல்
	ஆசிரியர் நல்லந்துவனார் பாடிய 6,8,11, 20,ஆகிய 4 செய்யுட்கள் (6) நிறைகடல் முகந்துஉராய்,நிறைந்துநீர் துளும்பும் தம் எனும் வையைப் பாடல் (8)மண்மிசைஅவிழ்துழாய் மலர்தருசெல்வத்துப் எனும் செவ்வேள் பற்றிய பாடல் (11) விரிகதிர் மதியமொடு,வியல்விசும்புபுணர்ப்பஎனும் வையைபற்றிய பாடல். (20) கடல்குறைபடுத்தநீர் கல் குறைபட எறிந்து எனும் வையை பற்றிய பாடல்
அலகு – 4	**4-1 புறநானூறு**
	அள்ளூர் நன்முல்லையார் - 306 - 1 ஒக்கூர் மாசாத்தியார் - 279 - 1 ஔவையார் - 87, 140, 290, 390 - 4 காக்கைப் பாடினியார் நச்செள்ளையார் - 278 - 1 காவற்பெண்டு - 86 - 1 குறமகள் இளவெயினியார் - 157 - 1 பாரிமகளிர் - 112 - 1 பூதப்பாண்டியன் தேவிபெருங்கோட்பெண்டு – 246 - 1 பேய்மகள் இளவெயினி - 11 - 1 மாறோக்கத்துநப்பசலையார் - 280 - 1 வெண்ணிக் குயத்தியார் - 66 - 1 வெறிபாடிய காமக்கணியார் - 302 - 1 - ஆகிய 15 செய்யுள்கள் (306) களிறுபொரக் கலங்குகழல் முள்வேலி (279) கெடுகசிந்தை,கடிது இவள் துணிவே (87) களம் புகல் ஓம்புமின், தெவ்விர், போர் எதிர்ந்து (140) தடவுநிலைப் பலவின்,நாஞ்சில் பொருநன் (290) இவற்குஈந்துஉண்மதி,கள்ளே,சினப்போர் (390) அறவைநெஞ்சத்துஆயர்,வளரும் (278) நரம்புஎழுந்துஉலறிய நிரம்பாமென்தோள் (86) சிற்றில் நற்றூண் பற்றி, நின்மகன்

	((157) தமர் தற் தப்பின் அதுநோன்றல்லும் (112) அற்றைத் திங்கள் அவ்வெண் நிலவின் (246) பல் சான்றீரே! பல் சான்றீரே!
	4.2. பதிற்றுப்பத்து
	இளஞ்சேரல் இரும்பொறையைப் பெருங்குன்ணூர் கிழார் பாடிய ஒன்பதாம் பத்துப் பாடல்கள். ‘‘குட்டுவன் இரும்பொறைக்கு மையூர் கிழாஅன்’’ என்று தொடங்கும் பதிகச் செய்யுள் முதல் ‘‘மீன்வயின் நிற்ப, வானம் வாய்ப்ப’’ எனும் 90 ஆவது செய்யுள் வரையிலான 11 செய்யுட்கள்
அலகு - 5	பட்டினப்பாலை முழுவதும்

Book(s) for Study	
1	தமிழ்ச் செவ்வியல் நூல்கள் தொகுப்பு, தமிழ்ப் பல்கலைக்கழகம் தஞ்சை.
2	ச.வே சுப்பிரமணியன் (ப.ஆ) தமிழ்ச் செவ்வியல் நூல்கள் - சென்னை, மணிவாசகர்,பதிப்பகம், 2008.

Course Outcomes		
CO1	• செவ்வியல் மரபறிதல்	[K2]
CO2	• சங்க இலக்கிய நுவல் பொருள் அறிதல்	[K4]
CO3	• திறனாய்தல்	[K5]
CO4	• விழுமியங்களை அறிதல்	[K6]
CO5	• சங்ககால மக்களின் வாழ்வியலைப் புரிந்து கொள்ளுதல்	[K2]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAT36	தமிழ் சிறுவர் இலக்கியம்	L	T	P	C
Core	XVI		4	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• குழந்தை இலக்கிய உருவாக்கப் பயிற்சி பெறுதல் • வரலாறு அறிதல் • வகைமை உணர்தல் • நவீனவடிவில் ஊடகங்களில் கையாளத் தேர்ச்சி பெறுதல் • குழந்தை இலக்கிய நுவல்பொருளைப் பரிசீலித்தல்
அலகு – 1	தமிழ் சிறுவர் இலக்கியத்தின் தோற்றம், வளர்ச்சி, வரலாறு, இன்றைய நிலை, தடம் பதித்த சான்றோர்களும் அவர்களது பங்களிப்பும் - சுருக்கவரைவு.
அலகு –2	குழந்தைப் பாடல்கள் - பாடல் வகைகள்- கதைப் பாடல்கள் - கவிமணிதேசிக விநாயகம் பிள்ளை–அழ.வள்ளியப்பா- பூவண்ணன்.
அலகு –3	குழந்தைகளுக்கான கதை இலக்கியங்கள் - தமிழகக் கதைகள் - அயல் மாநிலக் கதைகள் - விக்கிரமாதித்தன் கதைகள் - தெனாலிராமன் கதைகள் - பீர்பால் கதைகள் - அயல் நாட்டுக் கதைகள் - முல்லாநசீருத்தின் கதைகள் - புராணக் கதைகள் - இதிகாசக் கதைகள் - வீரதீரசாகசக் கதைகள் - வேதாளம், ஒற்றைக் கை மாயாவி கதைகள் - துப்பறியும் கதைகள் - நீதிக் கதைகள் - சிறுவர் சித்திரப் படக் கதைகள் - அயல் நாட்டு மொழிபெயர்ப்பு கதைகள்.
அலகு – 4	சிறுவர் நாடகங்கள் - நாடக வகைகள் - புதினங்கள் - சிறுவர் இதழ்கள் - வானொலி நிகழ்ச்சிகள் - தொலைக்காட்சி நிகழ்ச்சிகள் - சிறுவர் திரைப்படங்கள் - சிறுவர் இணைப்பு இதழ்கள்.
அலகு - 5	சிறுவர் இலக்கிய வளர்ச்சிக்கான போட்டிகள் -பரிசுகள் - சிறுவர்களுக்கான கேலிச் சித்திரக் கணினிபடங்கள் - தொடர்கள் - கதைமாந்தர்கள் -சிறுவர் இலக்கியம். இன்றைய நோக்கும், போக்கும் - சிறுவர் விளையாட்டுகள் - அன்றும், இன்றும், கணினி விளையாட்டுகளின் விளைவுகள்.

Book(s) for Study

1	வே.தா.கோபாலகிருஷ்ணன், குழந்தை இலக்கியவரலாறு,சென்னை,சாந்தி நூலகம், 1960.

2	கிரி.பி.வி.பாப்பாபாட்டுபாடியபாவலர்கள்,சென்னை,சைவசித்தாந்த நூற்பதிப்புக் ககம்.
3	அகமது பஷீர்.குழந்தை இலக்கியத் திறனாய்வு,சென்னை, ஜே.சீ.ஏ. வெளியீட்டகம், 1978.
4	சுகுமாரன்,தமிழ்குழந்தை இலக்கியம்,சென்னை,தாமரைபப்ளிகேஷன்ஸ்,2015.
5	அழ.வள்ளியப்பா,மலரும் உள்ளம் (தொகுதிI,II) சென்னை 2011.
6	பூவண்ணன்,சிறுவர் இலக்கியக் களஞ்சியம் (தொகுதி 1 முதல் 15வரை) கோவை,பூவண்ணன் பதிப்பகம், 1995-96,1997-1998)
7	பூவண்ணன்,அழ.வள்ளியப்பா-இந்திய 'இலக்கியசிற்பிகள், புதுதில்லி, சாகித்திய அகாதமி வெளியீடு, 2008.

Course Outcomes

CO1	• குழந்தை இலக்கிய உருவாக்கப் பயிற்சி பெறுதல்	[K6]
CO2	• வரலாறு அறிதல்	[K2]
CO3	• வகைமை உணர்தல்	[K2]
CO4	• நவீனவடிவில் ஊடகங்களில் கையாளத் தேர்ச்சி பெறுதல்	[K6]
CO5	• குழந்தை இலக்கிய நுவல்பொருளைப் பரிசீலித்தல்	[K5]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் - வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

SEMESTER IV

Course Code	P21TAE41	தமிழ் சித்தர் இலக்கியம்	L	T	P	C
Elective Option	I 1		4	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• சித்தர் இலக்கிய நெறி அறிதல் • தமிழில் சித்தர் இலக்கிய வகைமை அறிதல் • மெய்ஞானம் தெளிதல் • நோய் தீர்க்கும் வழிமுறைகளைத் தெரிந்து கொள்ளுதல் • சித்திகள் பற்றித் தெரிந்து கொள்ளுதல்
அலகு – 1	சித்தர்கள் யாவர்? – பதினெண்சித்தர் பாடல்கள் - தமிழில் சித்தர் இலக்கியம் - வரையறை – விளக்கம் - வரலாறு.
அலகு –2	திருமூலர் திருமந்திரத்தில் சித்தர் இலக்கியக் கூறுகள் - தாயுமானவர் - குணங்குடி மஸ்தான் சாகிபு பாடல்களில் சித்தர் இலக்கியக் கூறுகள் - பெரிய ஞானக்கோவை அறிமுகம்
அலகு –3	சிவவாக்கியர் பாடல், பட்டினத்தார் பாடல் உரைக்கும் வாழ்வியல் கருத்துக்கள்
அலகு – 4	இடைக்காட்டுச் சித்தர் - பாம்பாட்டிச் சித்தர் - அகப்பேய்ச் சித்தர் பாடல்களின் வழி சித்தர்களது மெய்ம்மைத்தேடல்களும், ஞானக் கருத்துக்களும்
அலகு – 5	பத்திரகிரியார் மெய்ஞ்ஞானப் புலம்பல் வழி மெய்ஞான தத்துவக் கூறுகள்.

Book(s) for Reference

1	பதினெண்சித்தர்களது பாடல் திரட்டு, மணிவாசகர் நூலகம்.
2	சித்தர் இலக்கியம் - தமிழ் இணையக் கல்விக்கழக மின் நூலகம்.

Course Outcomes

CO1	• சித்தர் இலக்கிய நெறி அறிதல்	[K2]
CO2	• தமிழில் சித்தர் இலக்கிய வகைமை அறிதல்	[K2]
CO3	• மெய்ஞானம் தெளிதல்	[K5]
CO4	• நோய் தீர்க்கும் வழிமுறைகளைத் தெரிந்து கொள்ளுதல்	[K1]
CO5	• சித்திகள் பற்றித் தெரிந்து கொள்ளுதல்	[K1]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் - வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAE412	வாழ்வியல் நெறி இலக்கியம்	L	T	P	C
Elective Option	I 2		4	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• வாழ்வியல் விழுமியங்கள் பற்றி அறிதல் • நன்னெறி மரபறிதல் • வாழ்வியல் அறங்களைப் பின்பற்றி மாட்சியுடன் வாழும் பயிற்சி பெறுதல் • இன்றைய நடைமுறை வாழ்வில் அவை பயன்படும் விதம் குறித்துத் தெளிவு பெறுதல் • தமிழர் தம் வாழ்வியல் அறங்களை அறிந்து கொள்ளுதல்
அலகு – 1	ஆத்திசூடி, கொன்றை வேந்தன் கூறும் வாழ்வியல் நெறிகள்
அலகு –2	மூதுரை, நல்வழி உரைக்கும் வாழ்வியல் நன்னெறிகள்
அலகு –3	வெற்றி வேற்கை (நறுந்தொகை) உலகநீதி கூறும் அறநெறிகள்
அலகு – 4	நீதிநெறி விளக்கம், அறநெறிச்சாரம் நுவலும் வாழ்வியல் அறங்கள்
அலகு – 5	நீதிநூல் நுவலும் வாழ்வியல் மாட்சி.

Book(s) for Study

1	வாழ்வியல் நெறி இலக்கியம் - தமிழ் இணையக் கல்விக்கழக மின்நூலகம்.

Course Outcomes

CO1	• வாழ்வியல் விழுமியங்கள் பற்றி அறிதல்	[K2]
CO2	• நன்னெறி மரபறிதல்	[K2]
CO3	• வாழ்வியல் அறங்களைப் பின்பற்றி மாட்சியுடன் வாழும் பயிற்சி பெறுதல்	[K6]
CO4	• இன்றைய நடைமுறை வாழ்வில் அவை பயன்படும் விதம் குறித்துத் தெளிவு பெறுதல்	[K3]
CO5	• தமிழர் தம் வாழ்வியல் அறங்களை அறிந்து கொள்ளுதல	[K1]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் - வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAE421	பெண் வழக்காற்றியல்	L	T	P	C
Elective Option	II 1		4	0	0	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**				
Course Objectives		• மகளிரின் வாழ்வியல் வழக்காறுகளை அறிதல் • கள ஆய்வு செய்தல் • மரபின் தொடர்ச்சியையும் மாற்றங்களையும் கண்டறிதல். • மகளிர் விளையாட்டுகளைத் தெரிந்து கொள்ளுதல் • பெண் பாடல்களைப் பரிசீலித்தல்				
அலகு – 1		பெண் வழக்காற்றியல் - வரைவிலக்கணம் - பெண் பாடல்கள் - தாலாட்டு– ஒப்பாரி– பிறந்தவீட்டார்–புகுந்தவீட்டார் உறவு நிலைப் பாடல்கள் - கதைப்பாடல் - வள்ளிகதை – அல்லி கதை – நல்லதங்காள் கதை–மாசாணி அம்மன் கதை வரலாறு				
அலகு –2		புழங்குபொருட்கள் - மனையில் புழங்கும் பொருட்கள் - அட்டில் கருவிகள் - முகத்தல் - அளத்தல் - நிறுத்தல் - நீட்டல் சார் அளவைக் கருவிகள்				
அலகு –3		தழையாடை– மலர்– அணிகலன்கள் - ஒப்பனைப் பொருட்கள் - ஒப்பனை முறைகள் - தலைமுடி அலங்காரம் - தொய்யில் எழுதுதல் - மருதாணிப் பூச்சு–சுண்ணப்பொடிகள் - மை எழுதல்				
அலகு – 4		வழிபாடுகள் - வேலன் வெறியாட்டு – குரவைக் கூத்து–துணங்கைக் கூத்து–மண நிகழ்வில் மகளிர் பங்கு– (சிலப்பதிகார மங்கலவாழ்த்துப் பாடல் வழி) – நலங்குப் பாடல் - ஆய்ச்சியர், வேட்டுவர் வழிபாடு–விரிச்சி பார்த்தல் - கண், தோள் துடித்தல் - முளைப் பாலிகை–பொங்கல் வைத்தல் - மாவிளக்குபோடுதல்				
அலகு – 5		**விளையாட்டுகள்:**				
		புனலாடல் (குறிஞ்சிப்பாட்டு) நீராடல் (பரிபாடல், திருப்பாவை, கழங்கு, ஊசல், சாழல், அம்மானை, வள்ளைப்பாட்டு, தெள்ளேனம் - கூடல் இழைத்தல் - சிற்றில் இழைத்தல் - தாயம் - பல்லாங்குழி–நொண்டியடித்தல் - கயிறுகுதித்தல் - ஆடல் - மயிலாட்டம் - பாம்பாட்டம் - கரகாட்டம் - கண் பொத்தி ஆடும் ஆட்டம், ஓடிப்பிடித்தல் -பந்தாடல் - மணற்பாவை–மலர்ப் பந்து – மணலுள் ஒளித்து வைத்து எடுக்கச் சொல்லுதல் - சோழி உருட்டல்.				
Book(s) for Study						
1	நாட்டுப்புற இலக்கியம் - தமிழ் இணையக் கல்விக்கழக மின்நூலகம்.					

Course Outcomes		
CO1	• மகளிரின் வாழ்வியல் வழக்காறுகளை அறிதல்	[K2]
CO2	• கள ஆய்வு செய்தல்	[K3]
CO3	• மரபின் தொடர்ச்சியையும் மாற்றங்களையும் கண்டறிதல்.	[K4]
CO4	• மகளிர் விளையாட்டுகளை தெரிந்து கொள்ளுதல்	[K1]
CO5	• பெண் பாடல்களை பரிசீலித்தல்	[K5]

K1: புரிதல் **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி**
K4: பகுத்தல் - வகைத்தொகை செய்தல் **K5 : மதிப்பீடு** **K6: படைத்தல்**

Mapping of COs with POs & PSOs:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAE422	படைப்புக் கலை	L	T	P	C
Elective Option	II 2		4	0	0	4

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectiv	• படைப்பிலக்கியப் பயிற்சி பெறுதல் • எழுது திறன் பெறுதல் • திறனாயும் தேர்ச்சி பெறுதல் • படைப்பிலக்கியத்தின் நயங்களைப் போற்றுதல் • கருத்து வெளியீட்டு நுட்பங்களை அறிதல்
அலகு- 1	கவிதை எழுதுதல் - புதுக்கவிதை எழுதுதல் தலைப்புக்கேற்பத் தந்த அடி அளவிற்குள் (1-15 அடிகள்) புதுக்கவிதை எழுதுதல். மரபுக் கவிதை எழுதுதல், குழந்தைப்பாடல் எழுதுதல்
அலகு- 2	சிறுகதை எழுதுதல் - தந்த தலைப்பில் நான்கு பக்க அளவில் சிறுகதை எழுதுதல் அறிவூட்டும் குழந்தைகளுக்கான கதை எழுதுதல் - அறிவியல் கதை எழுதுதல்
அலகு- 3	கட்டுரை எழுதுதல் - ஐந்து பக்க அளவு 1. இலக்கியத் திறனாய்வுக் கட்டுரை 2. தன் வரலாற்றுக் கட்டுரை 3. பொதுக் கட்டுரை 4. வாழ்க்கை வரலாற்றுக் கட்டுரை 5. அறிவியல் தொழில்நுட்பக் கட்டுரை 6. செய்திக் கட்டுரை
அலகு- 4	கடிதம் எழுதுதல்: 4-1 பணி வாய்ப்புக் கடிதம் 4-2 ஆசிரியர்கள்,நூலகர், நிர்வாகிகள், உயர் அதிகாரிகளுக்குக் கடிதம் எழுதுதல்
அலகு- 5	ஊடகங்களுக்கு எழுதுதல் 1. துணுக்கு 2. ஓரங்க நாடகம் 3. உரையாடல் 4. தொடர் 5. குறும்படம் 6. வில்லுப்பாட்டு வடிவில் எழுதுதல்

Book(s) for Study		
1	கி.வா.ஜகந்நாதன், தினமணி கட்டுரைகள்	
Course Outcomes		
CO1	• படைப்பிலக்கியப் பயிற்சி பெறுதல்	[K6]
CO2	• எழுது திறன் பெறுதல்	[K3]
CO3	• திறனாய்வில் தேர்ச்சி பெறுதல்	[K5]
CO4	• படைப்பிலக்கியத்தின் நயங்களைப் போற்றுதல்	[K4]
CO5	• கருத்து வெளியீட்டு நுட்பங்களை அறிதல்	[k4]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் - வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAR41	ஆய்வுநெறிகள் ஆய்வறிக்கை	L	T	P	C
Project			0	0	22	8

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• ஆய்வு நெறிகளை அறிதல் • ஆய்விற்கான தகவல்களை சேகரித்தல் • தலைப்பிற்கு ஏற்பக் கள ஆய்வின் வழி தகவல்களைச் சேகரித்தல் • தலைப்பிற்கு ஏற்ப இலக்கியங்களின் வழி தகவல்களைச் சேகரித்தல் • ஆய்வு நெறிகளின்படி ஆய்வறிக்கை உருவாக்குதல்

மாணவர்கள் தம் விருப்பத்திற்குஏற்ப இலக்கிய, இலக்கண நூல்களைத் தேர்வுசெய்து அதைப் பரிசீலித்து 50 முதல் 60 பக்க அளவிலான ஆய்வறிக்கை சமர்பிக்கலாம்.

கள ஆய்வுசெய்து தகவல் சேகரித்து ஆய்வறிக்கை சமர்பிக்கலாம்.

ஊடகநிகழ்ச்சிகள், திரைப்படங்கள், நாளிதழ்கள் இதழ்களது உள்ளடக்கம் குறித்துப் பரிசீலித்து ஆய்வு அறிக்கை சமர்பிக்கலாம்.

ஆய்வுநெறிகள் தாள்: -

அலகு – 1	இலக்கிய ஆய்வு– நூல் தேர்வு–தரவு சேகரித்தல், வகைப்படுத்துதல் - தொகைசெய்தல், - பகுத்துப் பார்த்தல் - புரிந்துகொள்ளல் - வெளிப்படுத்தல் காரண – காரிய முறைப்படி பரிசீலித்து முடிவு கூறுதல் - (சான்று–வ.சுப. மாணிக்கனாரின் தமிழ்க்காதல்)
அலகு –2	இலக்கணஆய்வு -இலக்கண விதிமுறைகளைபரிசீலித்தல் - இலக்கண நூல் தேர்வு - இலக்கணவிதிகளைப் பிரித்தல் - வகைப்படுத்துதல்-
அலகு –3	இலக்கியபிரதியைத் தேர்வுசெய்தல் - இலக்கணவிதிகளைப் பொருத்திப் பார்த்தல் - ஒன்றுபடும் நிலையையும் ,வேறுபடும் நிலையையும் - குறித்துக் கொள்ளுதல் - பகுப்பாய்தல் - முடிவு கூறுதல்.
அலகு – 4	கள ஆய்வு - இருக்கை ஆய்வு – கள ஆய்வுநெறிகள் - கருவிகள் - நேர்காணல் , வினாநிரல் - உற்றுநோக்கல் - சேகரித்தத் தரவுகளதுஉண்மைத்தன்மைகள் - பதிவுகள் - பிற்சேர்க்கைகள்
அலகு – 5	நாளிதழ்களில் வெளியாகும் நூல் மதிப்புரைகள் - திரைப்படவிமர்சனங்கள் - திறனாய்வுகள் - முடிவுகள் - ஐயம் - தெளிவு – துணிவு - முடிவு கூறுதல்

பயில் முறைபயிற்சி:

மாணவர் தன் விருப்பத்திற்கேற்ப ஒரு இலக்கிய நூலை,மதிப்பிட்டு (அ)

இலக்கணவிதியைப் பரிசீலித்து (அ) கள ஆய்வில் குறிப்பிட்ட ஒன்று பற்றிய தரவுகளைச் சேகரித்து நூல் மதிப்புரை (அ) விமர்சனம் (அ) திறனாய்வு செய்து ஐந்து பக்க அளவில் கட்டுரை எழுதிச் சமர்பிக்கவேண்டும். இப்பகுதியில் தேர்வுக்கான வினா எதுவும் கேட்கக் கூடாது. இத்தாள் மாணவர் ஆய்வறிக்கை உருவாக்க உதவும் இலக்கினைக் கொண்டது.		
Course Outcomes		
CO1	• ஆய்வு நெறிகளை அறிதல்	[K2]
CO2	• ஆய்விற்கான தகவல்களைச் சேகரித்தல்	[K3]
CO3	• தலைப்பிற்கு ஏற்பக் கள ஆய்வின் வழி தகவல்களைச் சேகரித்தல்	[K4]
CO4	• தலைப்பிற்கு ஏற்ப இலக்கியங்களின் வழி தகவல்களைச் சேகரித்தல்	[K4]
CO5	• ஆய்வு நெறிகளின்படி ஆய்வறிக்கை உருவாக்குதல்	[K5]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் - வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

VALUE ADDED PROGRAMME

Course Code	P21TAV11	Tamil Computing and Applications கணித் தமிழ் பயன்பாடு	L	T	P	C
SEMESTER - I			2	0	0	2
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டுப் பயிற்சி** **K4: பகுத்தல் - வகைதொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**				
Course Objectives		• தமிழ் மொழியைப் பகுத்து ஆராய கணினியைப் பயன்படுத்துதல் • மொழியியல்சார் பகுப்பிற்குப் பின் தமிழ்த் தரவகத்தை உருவாக்குதல் • இயந்திர மொழிபெயர்ப்பிற்கு உரிய கருவிகளைக் கையாளுதல் • கணித்தமிழ்ச் செயலிகள் உருவாக்கம் பற்றி அறிதல் • கணித்தமிழ்க் கருவிகள் உருவாக்கம் பற்றி அறிதல்				
அலகு – 1		சொல் பொருளியல் பாகுபடுத்திகள் - சொல் பொருளியல் அறிமுகம்- சொல் பொருள் அங்கீகரிப்பு, சொல் பொருள் தடுமாற்றம் அகற்றுதல் - பல சொல் வெளிப்பாடுகள் - சொல் இரட்டைக் கிளவி – தமிழ் கருவிகள்				
அலகு –2		**கணினி வழித் தமிழ் கட்டமைப்பு**				
		• தமிழ் எழுத்துக்கள் (முதல் எழுத்து, சார்பெழுத்து) • தமிழ் ஒலிகள் (குறில், நெடில்)(ஒலி அளவு) • ஒலிக்கும் முறை (வல்லினம், மெல்லினம், இடையினம்) • ஒலியனியல் (வேர்ச்சொல், அடிச்சொல், பகுதி, விகுதி, சாரியை, சந்தி) • உருபனியல் (பெயர்ச்சொல், வினைச்சொல், இடைச்சொல், உரிச்சொல்) (இயற்சொல், திசைச்சொல், திரிசொல், வடசொல்) (பெயரடை)				

அலகு –3	**சொல் பகுப்பி**
	• சொல் அலகுகளைக் கண்டறிதல் • பேச்சின் பகுதிகளைத் தேடிக் கண்டுபிடிப்புகள் • பெயர்தொடர், வினைத்தொடர் தேர்ந்தெடுப்பிகள் • சொல் உட்கூறு கண்டறிவி • சொல் - பொருளியல் பாகுபடுத்திகள் • சொல் - பொருள் தடுமாற்றம் அகற்றுதல் • பல சொல் ஒரு பொருள் பயன்பாடுகள் • இரட்டைக்கிளவி
அலகு – 4	தமிழ்த் தொடர்களைக் கட்டுடைத்துப் பகுக்கும் பாகுபாட்டிகள்- தமிழ் உள்ளடக்கப் பகுப்பாய்வுக் கருவிகள் தொடர்கள் - எளிய தொடர், கூட்டுத்தொடர், கலவைத் தொடர், தெரிநிலை வினைமுற்றுத்தொடர் ∴ குறிப்பு வினைமுற்றுத் தொடர் பெயரெச்சத் தொடர் ∴ வினையெச்சத் தொடர், வினாத்தொடர், பெயர்த்தொடர், தன்வினைத் தொடர் / பிறவினைத் தொடர் செய்வினைத் தொடர் / செயப்பாட்டு வினைத் தொடர்)
அலகு – 5	**தமிழ் கணினியில் ஆய்வறிக்கை உருவாக்குதல்**
	• தமிழ் கணினியில் ஏதேனும் ஒரு பயன்பாட்டு தமிழ் செயலியை உருவாக்குதல்

Book(s) for Reference

1.	Natural Language Understanding: James Allen, Benjamin/ Cummings Publishing Company, 1995
2.	GATE.ac.uk – release/gate-2.0alpha3-build516/doc/userguide.html
3.	NLTK Website: 1. Language Processing and Python (nltk.org)
4.	AU-KBC Tools: http:78.46.86.133:8080/aukbc-nlp/
5.	Search Engine AU-KBC : Searchko : www.searchko.co.in
6.	Machine Translation Systems AU-KBC: Tamil-Malaylam MT system: http://78.46.86.133:8080/tamMalMtSys/
7.	Tamil Virtual Academy Tool: Tamil Computing Tools / தமிழ் இணையக்கல்விக் கழகம் Tamil Virtual Academy (Tamilvu.org)
8.	Book Title : Kaninithamizh Tamil Computing (in Tamil) Author: Prof.IlaSundaram, Publisher: Vikatan, Year: 2016, Price: 230.00
9.	Book Title : Computational Approches to Tamil Linguistics (in English) Author: Prof.VasuRenganathan Publisher: Crea Publications, Year: 2016, Price: 1250.00

10.	Book Title : Speech and Languages Processing (in English) Author: Dan Jurafsky and James H.Martin Publisher: Pearson Education India, Year: 2013, Price: 1100.00
11.	Book Title : Python Programming (in Tamil) Author: Somasundaram Chenrayan Publisher: Amazon Kindle, Year: 2020, Price: 75.00
12.	Book Title : Iyarkai Mozhiyaaivu Tamizh Author: Prof.Subbaiyapillai / கு.சுப்பையா பிள்ளை pages: 140, Year: 2012, Published by: உலகத் தமிழ் ஆராய்ச்சி நிறுவனம்
13.	Book Title : Tamilum Kanipporiyum / தமிழும் கணிப்பொறியும் Author: M.Anto Peter / மா.ஆண்டோ பீட்டர் Year: 2002, Published by: சென்னை கற்பகம் புத்தகாலயம்
14.	Book Title : Valartamil – Ariviyal Enaiyath Tamil / வளர்தமிழில் அறிவியல் இணையத் தமிழ் Author: Prof.Ponavaiko, Prof.Krishna murthi, Prof.Subbaiyapillai Publisher: அனைத்திந்திய அறிவியல் தமிழ்க் கழகம், Year: 2003
15.	Book Title : Kaniporiyil Tamil Author: T.Prakash / த.பிரகாஷ் Publisher: Perikam (நூல் வெளியீடு மற்றும் விற்பனை)36, அசீஸ்முல்க் இரண்டாம் தெரு, ஆயிரம் விளக்கு, சென்னை-6 Language: Tamil / தமிழ், Pages: 112, Year: 2005
16.	Book Title : Recent Trends in Languages and Literature Authors: Dr.L.Darwin, Dr.G.Palanirajan, Dr.Umaraj, Dr.Rajesh, Dr.Akilan, Dr.Kumarasen
17.	Book Title : Natural Language Processing and Information Retrieval Authors: Tanveer Siddiqui and U S Tiwary Publisher: Oxford University Press, New Delhi Year: 2008…Fifth Edition 2015, Pages: 408, Price: 525.00

Course Outcomes

CO1	• தமிழ் மொழியைப் பகுத்து ஆராய கணினியைப் பயன்படுத்துதல்	[K2]
CO2	• மொழியியல்சார் பகுப்பிற்குப் பின் தமிழ்த் தரவகத்தை உருவாக்குதல்	[K3]
CO3	• இயந்திர மொழிபெயர்ப்பிற்கு உரிய கருவிகளைக் கையாளுதல்	[K4]
CO4	• கணித்தமிழ்ச் செயலிகள் உருவாக்கம் பற்றி அறிதல்	[K4]
CO5	• கணித்தமிழ்க் கருவிகள் உருவாக்கம் பற்றி அறிதல்	[K5]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் - வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

Course Code	P21TAV42	ஊடகத் தமிழ்	L	T	P	C
SEMESTER - IV			2	0	0	2

Cognitive Level	**K1: புரிதல்** **K2: அறிவு பெறுதல்** **K3: பயன்பாட்டு பயிற்சி** **K4: பகுத்தல் - வகைத்தொகை செய்தல்** **K5 : மதிப்பீடு** **K6: படைத்தல்**
Course Objectives	• ஊடகத்திற்கு ஏற்ப படைப்பிலக்கியப் பயிற்சி பெறுதல் • ஊடகத்திற்கு ஏற்ப எழுது திறன் பெறுதல் • ஊடகங்களில் கையாளப்படும் தமிழைத் திறனாயும் தேர்ச்சி பெறுதல் • ஊடக நிகழ்ச்சிகளின் நயங்களைப் போற்றுதல் • கருத்து வெளியீட்டு நுட்பங்களை அறிதல்
அலகு – 1	ஊடகங்கள் - மரபு வழி – அச்சு வழி – மின் வழி – ஊடகங்கள் - மொழி வழி தகவல் தொடர்பியல்-ஊடகவியல் - சொற் பொருள் விளக்கம் - வரையறை – அறிஞர்களின் கருத்துக்கள் - ஊடகத் தோற்றம் - வளர்ச்சி – வரலாறு – வகைகள் - பணிகள் - இன்றைய நிலை.
அலகு –2	அச்சு வழி ஊடகம் - அச்சுக்கலை - இதழியல் - செய்தித்தாள் - இதழ்கள் - விளக்கம் - வரையறை –வகைகள் - வார – மாத இதழ்கள் - காலாண்டு – அரையாண்டு – ஆண்டு இதழ்கள் - சிறுவர் - மகளிர் - இளைஞர் - கல்வி – வணிகம் - மருத்துவம் - இலக்கியம் - அரசியல் - திரைப்பட – ஆய்வு இதழ்கள்- இணையத்தில் அச்சு இதழ்கள் - மின் இதழ்கள் - பல்கலைக்கழக மானியக்குழு CARE Listed Journals பட்டியலில் இடம்பெற்றிருக்கும் தமிழ் ஆய்வு இதழ்கள்.
அலகு –3	இதழ்கள் - நாளிதழ்களின் அமைப்பு – உள்ளடக்கம் - செய்தி சேகரிப்பு – செய்திக் களங்கள் - செய்தி அறிக்கை –செய்தி வகைகள் - அரசியல், திரைப்படம், கல்வி, மருத்துவம் - வணிகம் - வேலை வாய்ப்புச் செய்திகள் - நிருபர்கள் - தகுதிகள் - ஆசிரியர்கள் - செய்திக் கட்டமைப்பு – தலைப்பு – முகப்பு – உடல் பகுதி – பக்க ஒருங்கமைப்பு – தலையங்கம்- சிறப்பு நிகழ்வுகள்.
அலகு – 4	விளம்பரம் - இலக்கணம் - வகைகள் - பத்திரிகைச் சட்டங்கள் - இணையச் சட்டங்கள் - பதிப்புரிமை சட்டங்கள் அறிவுச் சொத்துகாப்புரிமைச் சட்டம் - (Intellectual copy Right Act)- காப்பியடித்தல் தடை மென்பொருள் - நெறிகள் - Plagiarism check software - இந்திய – உலகச் செய்தி நிறுவனங்கள் - பத்திரிகை மன்றம்.
அலகு – 5	மின் ஊடகத் தொழில் நுட்ப வளர்ச்சி- அஞ்சல், தந்தி, வானொலி- திரைப்படம்- தொலைவரி – தொலை நகலி – தொலைக்காட்சி- செயற்கைக்கோள்- தகவல் தொழில் நுட்பம்- கணினி இணையம் - வளைத்தளம் - முகநூல் மின் அஞ்சல் -

	அலைபேசி- வலைப்பூக்கள்- பிற சாதனங்கள்.

பயில்முறைப் பயிற்சி

மாணவர் தன் விருப்பத்துக்கேற்ப ஏதேனும் ஒரு ஊடகத் தமிழ் பகுதியைத் தேர்வு செய்து, அதில் கையாளப்படும். தமிழ், தொடரமைப்பு, சொல் அமைப்பு, மொழி நடை, உச்சரிப்பு, பிறமொழிச் சொற்கள், கடன் வாங்கல், புதிய கலை சொற்களை உருவாக்கிய முறை, மொழி பெயர்ப்பு, வடிவம், எழுது வழங்குமுறை குறித்துப் பரிசீலித்து ஐந்து பக்க அளவில் கட்டுரை சமர்ப்பிக்க வேண்டும்.

இதில் தேர்வுக்கான வினா இடம்பெறுதல் கூடாது.

Book(s) for Study

1	மா.பா.குருசாமி - இதழியல் கலை, திண்டுக்கல், குரு தேமொழி பதிப்பகம்.
2	ச.ஈசுவரன், இரா.சபாபதி, தகவல் தொடர்புகளும் நெறிமுறைகளும், சென்னை, சாரதி பதிப்பகம்.
3	அ.ஆலிஸ் - மக்கள் தகவல் தொடர்பியல், கலைச்சொல் அகராதி, திருச்சி, மதுமதி வெளியீடு.
4	அ.சாந்தா – மக்கள் ஊடகத் தொடர்பியல், மதுரை, மீடியா பப்ளிகேஷன்ஸ்

Course Outcomes

CO1	• ஊடகத்திற்கு ஏற்ப படைப்பிலக்கியப் பயிற்சி பெறுதல்	[K6]
CO2	• ஊடகத்திற்கு ஏற்ப எழுது திறன் பெறுதல்	[K6]
CO3	• ஊடகங்களில் கையாளப்படும் தமிழைத் திறனாயும் தேர்ச்சி பெறுதல்	[K5],[K6]
CO4	• ஊடக நிகழ்ச்சிகளின் நயங்களைப் போற்றுதல்	[K5]
CO5	• கருத்து வெளியீட்டு நுட்பங்களை அறிதல்	[K1],[K2]

K1: புரிதல் K2: அறிவு பெறுதல் K3: பயன்பாட்டு பயிற்சி
K4: பகுத்தல் - வகைத்தொகை செய்தல் K5 : மதிப்பீடு K6: படைத்தல்

Mapping of COs with POs & PSOs:

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	3
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	2
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark

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அன்னை தெரசா மகளிர் பல்கலைக்கழகம்

கொடைக்கானல்

தமிழியல் துறை

இளங்கலைத் தமிழ் (பி.ஏ. தமிழ்)

விருப்பம் சார் தெரிவுமுறை (CBCS)

பயன் சார்முறை (OBE)

பொது ஒழுங்குமுறை மற்றும் பாடத்திட்டம்

1. இணையவழி பாடத்திட்ட முதல் குழுக்கூட்ட நாள்: 28.04.2021 (https://meet.google.com/wgs.dvpu.jxx)

2. இணையவழி பாடத்திட்ட இரண்டாம் குழுக்கூட்ட நாள்: 11.06.2021

3. இணையவழி பாடத்திட்ட மூன்றாம் குழுக்கூட்ட நாள்: 12.06.2021 (https://meet.google.com/aex-.nmjy-awj)

கல்விக் குழுக்கூட்ட நாள்: 21.06.2021

2021-2022 கல்வியாண்டு முதல் நடைமுறைப்படுத்துவதற்கு ஒப்புதல் வேண்டிச் சமர்ப்பிக்கப்படுகிறது

Mother Teresa Women's University, Kodaikanal
Department of Tamil Studies
Choice Based Credit System (CBCS)
(2021-2022 onwards)
BA Tamil

1. About The Programme

The Course content of the B.A Tamil, degree programme has been planned carefully to offer students the best possible curricular experience and to mould them into intelligent citizens in the society. The curriculum revision has been premised on the assumption that society requires students, who will serve as its mind, heart and future. Further this course aims to provide employability skills to the graduates after completing the programme successfuly.

2. Programme Educational Objectives (PEOs)

PEO 1	தமிழ் மொழி மற்றும் தமிழ் இலக்கியம் சார்ந்த தகவல்களைப் பெறுவதால் போட்டித்தேர்வினை எதிர்கொள்ள இயலும்
PEO 2	இலக்கியங்களின் உள்ளடக்கத்தைத் தெரிந்து பல இலக்கியங்களைப் படைக்கும் படைப்பாற்றல் பெறுவர்
PEO 3	வாழ்வியல் நெறிமுறைகளைப் படிப்பதன் மூலம் பொருளாதாரத்தை மேம்படுத்தும் திறன் பெறுவர்
PEO 4	இலக்கியங்களைப் படிப்பதன் மூலம் சிறந்த இந்திய குடிமகனாக தெளிவாக சிந்திக்கும் மற்றும் எழுதும் திறன் பெறுவர்
PEO 5	தமிழின் தொன்மையையும் தமிழர்களின் வாழ்வியலையும் அறிந்து கொள்ள முடியும்.

3. Eligibility:

Candidate should have passed the Higher Secondary Examination conducted by the Board of the Higher Secondary Examination. Govt. of Tamil Nadu or any other Examination accepted by the syndicate as equivalent

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** Tamil

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
		Total Marks	**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

B.A TAMIL - இளங்கலைத் தமிழ்

Course code	Course Title	Credits	Hours		Maximum marks		
			L	P	Int	Ext	Total
FIRST SEMESTER / முதல் பருவம்							
U21LTA11	**Tamil - Part- I** General Tamil Ikkala Ilakkiyam **பகுதி – I** பொதுத்தமிழ் இக்கால இலக்கியம்	3	6	0	25	75	100
U21LEN11	English - Part-II	3	6	0	25	75	100
U21TAT11	**CORE I** Samakala Ilakkiyam **முதன்மைப்பாடம் - I** சமகால இலக்கியம்	4	5	0	25	75	100
U21TAT12	**CORE II** Nannool – Eluthathikaram 5 Iyalgal **முதன்மைப்பாடம் - II** நன்னூல் எழுத்ததிகாரம் - ஐந்து இயல்கள்	4	6	0	25	75	100
U21TAA11	**ALLIED I** Tamil Ilakiya Varalaru – I சார்பு பாடம் - தமிழ் இலக்கிய வரலாறு	4	5	0	25	75	100
U21EVS11	Environmental Studies சுற்றுச் சூழலியல்	2	2	0	25	75	100
U21PEPS11	**Professional English- Part I** Course – Add on course **பணித்திறன் சார் ஆங்கிலம் - பகுதி –III –** கூடுதல் பாடம்	4	6	0	25	75	100
	மொத்தம்	**24**	**36**				**700**
SECOND SEMESTER / இரண்டாம் பருவம்							
U21LTA22	**Tamil II-Part-I** General Tamil Idaikala Ilakkiyam **பகுதி – I** பொதுத்தமிழ் - II இடைக்கால இலக்கியம்	3	6	0	25	75	100
U21LEN11	English II- Part-II	3	6	0	25	75	100
U21TAT21	**CORE III** Chitrilakkiyam **முதன்மைப்பாடம் - III** சிற்றிலக்கியம்	4	5	0	25	75	100

U21TAT22	**CORE IV** Nannool Chol Atigara Iyalgal **முதன்மைப்பாடம் - IV** நன்னூல் சொல் அதிகாரம் - ஐந்து இயல்கள்	4	5	0	25	75	100
U21TAA22	**ALLIED II** Ilakiya Thiranaivu **சார்பு பாடம் -II** இலக்கியத் திறனாய்வு	4	5	0	25	75	100
U21VAE21	**Value Education** விழுமியக் கல்வி	3	3	0	25	75	100
U21PEPS22	**Professional English-Part II**	4	6	0	25	75	100
	மொத்தம்	**25**	**36**				**700**
THIRD SEMESTER / மூன்றாம் பருவம்							
U21LTA33	**Part I Tamil III** Kappiya Ilakkiyam பகுதி – I பொதுத்தமிழ் - III காப்பிய இலக்கியம்	3	6	0	25	75	100
U21LEN33	**Part II English III**	3	6	0	25	75	100
U21TAT31	**CORE V** Madurai Maiya Ilakkiyam மதுரை மைய இலக்கியம்	4	5	0	25	75	100
U21TAA33	**ALLIED III** Tamilaga Varalarum Panpadum **சார்பு பாடம் -III** தமிழக வரலாறும் பண்பாடும்	4	4	0	25	75	100
U21TAE311/ U21TAE312	**ELECTIVE – I** Nattupuraviyal **விருப்பப் பாடம் - I** நாட்டுப்புறவியல் (அல்லது) Oolai Chuvadi Vagaigal ஓலைச்சுவடி வகைகள் or MOOC Course	3	4	0	25	75	100
U21CSS31	Job oriented Course – **Paper 1- Language Skill I** – பணிசார் பாடம் **மொழித் திறன் - I** Computer skills for office management	2	3	0	25	75	100
U21TAN311	**Non-Major Elective – I**	2	2	0	25	75	100
U21PEPS33	**Professional English-Part III**	4	6	0	25	75	100
	மொத்தம்	**25**	**36**				**800**
FOURTH SEMESTER/ நான்காம் பருவம்							
U21LTA44	**Part I Tamil IV** Palanthamil Ilakkiyam **பகுதி – I பொதுத்தமிழ் - IV** பழந்தமிழ் இலக்கியம்	3	6	0	25	75	100
U21LEN44	**Part II English IV**	3	6	0	25	75	100

U21TAT41	**CORE VI** Agaporul Ilakkanam (Nambiyagapporul) **முதன்மைப் பாடம் - VI** அகப்பொருள் இலக்கணம் - நம்பி அகப்பொருள்	4	4	0	25	75	100
U21TAT42	**CORE VII** Kappiya Ilakkiyam **முதன்மைப் பாடம் - VII** காப்பிய இலக்கியம்	4	4	0	25	75	100
U21TAA44	**ALLIED IV** Tamil Mozhi Varalaru **சார்பு பாடம் -IV** தமிழ் மொழி வரலாறு	4	4	0	25	75	100
U21TAE421/ U21TAE422	**ELECTIVE - II** Oppiyalilakkiyam விருப்பப் பாடம் - II ஒப்பியல் இலக்கியம் (அல்லது) Tamil Computing (Advanced course) மேம்பட்ட கணினித் தமிழ் or MOOC Course	3	3	0	25	75	100
SBEII	Job Oriented Course – Paper II Managerial Skill	2	2	0	25	75	100
U21TAN42	Non -Major Elective –II	2	2	0	25	75	100
U21PEPS44	**Professional English-Part IV** Course – Add on course பணித்திறன் சார் ஆங்கிலம் - பகுதி –III – கூடுதல் பாடம்	4	6	0	25	75	100
	மொத்தம்	**29**	**37**				**900**
FIFTH SEMESTER/ ஐந்தாம் பருவம்							
U21TAT51	**CORE VIII** Kurinchisar (Malaipaguthi sar Ilakkiyam) முதன்மைப் பாடம் - VIII - குறிஞ்சி (மலைப் பகுதி சார் இலக்கியம்)	4	5	0	25	75	100
U21TAT52	**CORE IX** Bakthi Ilakkiyam முதன்மைப் பாடம் - IX பக்தி இலக்கியம்	4	5	0	25	75	100
U21TAT53	**CORE X** Puraporul- Ilakkanam-Puraporul Venbamalai-Muzhuvathum **முதன்மைப் பாடம் - X** புறப்பொருள் இலக்கணம் -	4	5	0	25	75	100

	புறப்பொருள் வெண்பா மாலை முழுவதும்						
U21TAT54	**CORE XI** Yappilakkanam – Yapperungala Karigai Muzhuvathum **முதன்மைப் பாடம் - XI** யாப்பிலக்கணம் - யாப்பருங்கலக்காரிகை முழுவதும்	4	5	0	25	75	100
U21TAT55	**CORE XII** Introduction to Linguistics and Computational Linguistics **முதன்மைப் பாடம் - XII** மொழியியல் மற்றும் கணினி மொழியியல் - அறிமுகம்	4	5	0	25	75	100
U21TAE531/ U21TAE532	**ELECTIVE –III** Penniyam **விருப்பப் பாடம் - தாள் -III** பெண்ணியம் (அல்லது) Inaiya Tamil Ilakkiyam இணையத் தமிழ் இலக்கியம்	3	4	0	25	75	100
U21TAS511/ U21TAS512	**Skill Based Elective Paper I** Thagaval Thodarpiyal **திறன் சார் விருப்பப் பாடம் - தாள் - 1** Thagaval Thodarbiyal தகவல் தொடர்பியல் (அல்லது) Ilakkiya Kolkaigal இலக்கியக் கொள்கைகள்	2	2	0	25	75	100
	மொத்தம்	**25**	**30**				**700**
SIXTH SEMESTER / ஆறாம் பருவம்							
U21TAT61	**CORE XIII** Sanga Ilakkiyam **முதன்மைப் பாடம் - XIII** சங்க இலக்கியம்	4	5	0	25	75	100
U21TAT62	**CORE XIV** Tamil-Neethiilakiyam **முதன்மைப் பாடம் - XIV** தமிழ் நீதி இலக்கியம்	4	5	0	25	75	100
U21TAT63	**CORE XV** Ani Ilakkanam-Thandiyalangaram Muluvathum **முதன்மைப் பாடம் - XV** அணி இலக்கணம் - தண்டியலங்காரம் முழுவதும்	4	5	0	25	75	100

U21TAT64	**CORE XVI** **முதன்மைப் பாடம் - XVI** Tamilaga Kovil Kalaigal kalvetukal Unarthum Panpaadu தமிழக கோவில் கலைகள் கல்வெட்டுகள் உணர்த்தும் பண்பாடு	4	5	0	25	75	100
U21TAT65	**CORE XVII** படைப்பிலக்கியம்	4	4	0	25	75	100
U21TAE641/ U21TAE642	**ELECTIVE –IV** Thiravida mozhigalin oppilakkanam **விருப்பப் பாடம் - தாள் - IV** திராவிட மொழிகளின் ஒப்பிலக்கணம் (அல்லது) Tamil Kalaisollakka Nerigal தமிழ் கலைச்சொல்லாக்க நெறிகள்	3	4	0	25	75	100
U21TAS61	**Skill Based Elective** கல்வெட்டியல்	3	2	0	25	75	100
U21EAS61	**Extension Activities** விரிவாக்கப் பணிகள்	2	0	0	25	75	100
	Total **மொத்தம்**	**28**	**30**		**-**	**-**	**800**
	Grand Total **மொத்த கூட்டுத் தொகை**	**156**	**205**		**Grand Total** **மொத்த கூட்டுத் தொகை**		**4600**

Non Major Elective

The candidates, who have joined the UG Programme, can also undergo Non Major Elective offered by other Departments.

பிறதுறை விருப்பப் பாடம் - I பணிவாய்ப்புத் தமிழ் - I பிறதுறை விருப்பப் பாடம் - II பணிவாய்ப்புத் தமிழ் - II Mozhi Peyarpiyal பணிசார் பாடம் மொழித் திறன் - II மொழி பெயர்ப்பியல்	பணித்திறன் சார் ஆங்கிலம் - பகுதி –III – கூடுதல் பாடம் - கூடுதல் புள்ளிகள் - 4. – 5 மணிகள்
ஒவ்வொன்றுக்கும் இரண்டு புள்ளிகள் - இவை கூடுதல் புள்ளிகளுக்கான பாடங்கள் - கூடுதல் புள்ளிகளாகச் சேர்க்கப்பட வேண்டும்.	
U21TAO31 - Online Course - Third Semester	**U21TAO31 -** இணைய பாடம் - மூன்றாம் பருவம்
U21TAI41- Internship Training – Fourth Semester	**U21TAI41 -** உள்கட்டப் பயிற்சி – நான்காம் பருவம்
U21TAV51 - Value added programme Journalism	**U21TAV51 -** மதிப்புக் கூட்டுப் பாடம் 1. **U21TAV511 -** இதழியல் 2. **U21TAV512 -** தமிழ் சதக இலக்கியம்

PROGRAMME OUTCOMES (POs)

PO 1	இலக்கிய, இலக்கண வகைமைகளை அறிந்து கொள்ள இயலும்.
PO 2	தமிழ் மொழி அறிவினைப் பெற்று தமிழ் இலக்கியத்தின் வளர்ச்சி நிலையை அறிந்து கொள்ள முடியும்
PO 3	இலக்கணம் கற்பதால் பிழையின்றி பேசவும் எழுதவும் முடியும்
PO 4	பல்வகை இலக்கியங்களை அறிவதோடு மதிப்பிடும் திறனையும் பெறுவர்
PO 5	இலக்கியம் படைக்கும் படைப்பாளர்களை உருவாக்க முடியும்
PO 6	இலக்கண இலக்கிய நெறிமுறைகளை அறிந்து பன்முகப் படைப்பாற்றல் பெறுவர்
PO 7	வேலைவாய்ப்புக்கான திறன்களை பெறமுடியும்

PROGRAMME SPECIFIC OUTCOMES

இந்த பாடங்களைப் படிப்பதன் மூலம் மாணவியர் பெறும் பயன்கள்.

PSO	இந்த பாடங்களைப் படிப்பதன் மூலம் மாணவியர் பெறும் பயன்கள்	PO mapped
PSO1	இக்கால இலக்கிய வகைமைகளாகிய கவிதை, சிறுகதை, புதினம், நாடகம், கட்டுரை ஆகியவற்றைப் படிப்பதுடன், ஊடகத்துக்கேற்ப எழுதுநெறிகளை அறிந்துகொண்டு எழுதுதிறனைப் பெறுவதுடன், போட்டித் தேர்வுகளை எதிர் கொள்ளும் அறிவுச் செழுமை பெறுதல்	PO2 PO5
PSO2	தமிழ் இலக்கண மரபுகளைப் பயில்வதுடன் இன்றைய கணித்தமிழ் அலகுகளாகத் தமிழ் மொழியியல் நோக்குப் பகுத்துப் பரிசீலிக்கும் ஆற்றல் பெறுவதோடு பணிவாய்ப்பு பெறும் பயிற்சி பெறுதல்	PO4 PO7
PSO3	தமிழ் இலக்கியங்கள் நுவலும் வாழ்வியல் விழுமியங்களைத் தெரிந்து கொண்டு, அவற்றை இன்றைய வாழ்வில் பயன்படுத்துவதற்கு ஏற்ற செம்மைப் பண்புகளை ஆராய்ந்து அறிதல்	PO1 PO5
PSO4	காலந்தோறும் தமிழர் வளர்த்த கோயிற்கலை கல்வெட்டியல், இசை, ஓவியம், சிற்பம், கட்டிடம் நடனக்கலை, தமிழரது பண்பாடு, பாரம்பரியம் சிறப்புகளை அறிந்து பேணுதல்	PO3 PO4
PSO5	செம்மொழித் தமிழ் இலக்கியச் செவ்வியல் பண்புகளையும், மனித மேம்பாட்டுச் சிந்தனைகளையும், வாழ்வியல் விழுமியங்களையும் அறிதல்	PO4 PO6

SEMESTER – I

COURSE CODE	U21TAT11	CORE – I : சமகால இலக்கியம்	L	T	P	C
CORE I			5	-	-	4

Cognitive Level	**K1: ஆற்றல்** **K2: புரிதல் அறிவு** **K3: பயன்படுத்தல் அறிவு** **K4: படைத்தல்** **K5: மதிப்பீடு**
Learning Objectives	The course aims at ➢ providing a wide spectrum of literary texts of the great masters of contemporary period for the young minds. ➢ knowing the content of literary pieces in each genre and to be informed and inspired. ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ developing critical and creative attitude in students.

அலகு -1	**கவிதை இலக்கியம்** 1.1 பாரதியார் கவிதைகள் - பாரதி அறுபத்தாறு 1.2. பாரதிதாசன் - பாண்டியன் பரிசு 1.3. வாணிதாசன் - தமிழச்சி (கவிதை நூல்), சென்னை, மலர் நிலையம், 1949
அலகு -2	**புதின இலக்கியம்:** அகல் விளக்கு (சாகித்திய அகாதெமி பரிசு பெற்றுது)(162 பக்கங்கள்)
அலகு - 3	**சிறுகதை இலக்கியம்:** (ஜெயகாந்தன் கதைத் தொகுப்பு – 1) 1. யுக சந்தி 2. இல்லாதது எது? 3. இரண்டு குழந்தைகள் 4. நான் இருக்கிறேன் 5. பொம்மைதேவன் வருவாரா? 6. துறவுபூ 7. உதிரும் குறைப் பிறவி 8. யந்திரம்
அலகு -4	**நாடக இலக்கியம்**: பரிதிமாற் கலைஞர் - ரூபாவதி (வி.கோ.சூரியநாராயண சாத்திரியார்)
அலகு -5	உரைநடை இலக்கியம்
பார்வை நூல்கள்	1. பாரதியார் - பாரதியார் கவிதைகள் 2. பாரதிதாசன் - பாரதிதாசன் கவிதைகள் 3. கி.வா. ஜகநாதன் -அறப்போர், சங்க நூல் காட்சிகள், இலக்கிய கட்டுரைகள், சென்னை, பாரி நிலையம் - 1952. 4. மு.வரதராசன், அகல் விளக்கு (சாகித்திய அகாதெமி பரிசு பெற்றது) 5. வாணிதாசன்- தமிழச்சி (கவிதை நூல்), சென்னை, மலர் நிலையம், 1949 6. ஜெயகாந்தன் கதைத் தொகுப்பு, மதுரை மின்நூல் தொகுப்புத்திட்டம் 7. பரிதிமாற் கலைஞர் - ரூபாவதி (வி.கோ.சூரியநாராயண சாத்திரியார்) மதுரை மின்நூல் தொகுப்புத்திட்டம்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	**CO1**	know the poetic tactics of the modern writers
K1, K2	**CO 2**	understand the notable features of literary geners and flow of writing
K2, K4	**CO 3**	aware of the salient features of texts
K2, K3	**CO 4**	apply and attempt to write creatively
K4,	**CO5**	critically analyze the works of great writers and will be able to create literary pieces on their own

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark-
No Correlation (N) - 0 mark

COURSE CODE	U21TAT12	நன்னூல் எழுத்ததிகாரம் (ஐந்து இயல்கள்)	L	T	P	C
CORE II			6	-	-	4
Cognitive Level		K1: Skill in language K2: Understand K3: give citation K4: Analyse K5: To know the structure				
Learning Objectives		The Course aims to • make students obtainwriting skills with correct usage of grammar. • develop language proficiency • gain rich knowledge about structure of Tamil language through the ages • learn and brighten up their career. • strengthen the language skills through exercises.				

அலகு-1	**நன்னூல்:** நூல் அறிமுகம்- பவணந்தி முனிவர் பற்றிய குறிப்பு – சிறப்பு பாயிரம் பொதுப்பாயிரம்
அலகு-2	எழுத்து அதிகாரம், எழுத்து இயல், பத இயல்
அலகு-3	உயிர் ஈற்றுப் புணரியல்
அலகு-4	மெய் ஈற்றுப் புணரியல்
அலகு-5	உருபு புணரியல்
பாடநூல்:	நன்னூல்- காண்டிகை உரை- திருநெல்வேலி சைவசித்தாந்த நூற்பதிப்புக்கழக வெளியீடு
பயிற்சி:	மாணவர் தனக்கு விருப்பமான நூலின் ஐந்து பக்கங்களில் உள்ள தொடர்களில், வேற்றுமைப்புணர்ச்சி,அல்வழி புணர்ச்சி இடம் பெற்றுள்ள விதத்தை அடிக்கோடிட்டு, நன்னூல் நூற்பாக்களுடன் பொருத்திப்பார்த்து மூன்றுபக்க அளவில் கட்டுரை எழுதிச் சமர்ப்பிக்க வேண்டும். இது பயிற்சிக்காக மட்டுமே. இதில் தேர்வுக்கான வினா ஏதும் கேட்கப்படக் கூடாது.

Course Outcome

At the end of the course, the students will be able to:

K1, K2	CO1	acquire knowledge of linguistic conventions for reading, writing and speaking.
K1, K2	CO2	use targeted grammatical structures appropriately in oral and written production.
K5, K4	CO3	analyse the grammatical structure of sentences in Tamil texts.
K5, K1	CO4	communicate correctly in spoken and written Standard Tamil.
K3	CO5	make inferences and predictions based on comprehension of a text.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S) - 3 marks—42/60
Moderately Correlating (M) - 2 marks—16/60
Weakly Correlating (W) - 2 marks
No Correlation (N) - 0 mark

COURSE CODE	U21TAA11	தமிழ் இலக்கிய வரலாறு	L	T	P	C
ALLIED I சார்பு பாடம்			5	-	-	4
Cognitive Level		**K1: Learning** **K2: Understand** **K3: Apply** **K4 : Analyze** **K5: knowing the background of the literature**				
Learning Objectives		The course aims at ➢ providing a wide spectrum of literature through the ages. ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ understanding the historical background of literature				

அலகு -1	இலக்கிய வரலாற்று மூலங்கள் - தமிழின் தொன்மை – செவ்வியல் பண்புகள் - முச்சங்க வரலாறு - தொல்காப்பியம் - சங்க இலக்கியம் - எட்டுத்தொகை – பத்துப்பாட்டு அமைப்பும் வரலாறும்
அலகு -2	சங்கம் மருவிய காலம் - பதினென் கீழ்க்கணக்கு இலக்கியம் - திருக்குறள் தனித்தன்மை - இரட்டைக் காப்பியங்கள் தமிழில் காப்பியங்கள் - சமண பௌத்தக் காப்பியங்கள் - காப்பியங்களின் வடிவமும், தனித்தன்மைகளும்.
அலகு -3	பக்தி இலக்கியத்தின் தோற்றம் - பன்னிரு திருமுறைகள் - சித்தர் இலக்கியம் – பன்னிரு ஆழ்வார்களது பாசுர நூல்கள் - அவற்றின் உரைகள் - மணிப்பிரவான நடையின் தோற்றம், வளர்ச்சி
அலகு -4	தமிழில் சிற்றிலக்கியங்களின் தோற்றம் வளர்ச்சி, வரலாறு – பரணி – கலம்பகம் பிள்ளைத்தமிழ் - உலா – குறவஞ்சி – பள்ளு – அந்தாதி – கோவை – தூது மடல் - சதகம் - நொண்டி நாடகம் - ஆகியவற்றின் அமைப்பும் இலக்கணமும் கம்பராமாயணம் - வில்லிபாரதம் - அரிச்சந்திர புராணம் - நளவெண்பா புராணங்கள் - தனிப்பாடல்கள் - நிகண்டுகள் - இடைக்கால இலக்கண நூல்கள் - கிறித்தவ இசுலாமியரது தமிழ்த் தொண்டு
அலகு -5	இயல் - இசை – நாடகத்தமிழ் வளர்ச்சி – மரபுக்கவிதை – புதுக்கவிதையின் வகைகள் - சிறுகதை – புதினம் - நாடகம் - உரைநடை ஆகியவற்றின் தோற்றம் - வளர்ச்சி – நோக்கும் போக்கும் - பெண்ணிய, தலித்திய இலக்கிய வளர்ச்சி - இன்றைய நிலை.
நூல்கள்:	மு.வ – தமிழ் இலக்கிய வரலாறு – சாகித்திய அகாதெமி வெளியீடு. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, சென்னை, தமிழ்ப் புத்தகாலயம்.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	**CO1**	know the poetic tactics of the classical works
K1, K2	**CO 2**	understand the difference between classical Tamil literature and modern literature
K2, K4	**CO 3**	aware of the salient features of literature through the ages
K2, K3	**CO 4**	know the trend of literature
K4, K6	**C05**	critically analyze the literature with historical background

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

SEMESTER - II

COURSE CODE	U21TAT21	சிற்றிலக்கியம்	L	T	P	C
CORE III			5	-	-	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல், ஆற்றல் பெறுதல்** **K3: பயன்படுத்தல்** **K4: படைத்தல்** **K5: மதிப்பீடு**				
Learning Objectives		The course aims at ➢ providing a wide outline of literary texts of themedieval period. ➢ knowing the content of literary pieces in each genre and to be informed and inspired. ➢ helping the students imbibe the human and moral values through the study of literature. ➢ developing critical and creative attitude in students.				

அலகு -1	**கலிங்கத்துப்பரணி** காடு பாடியது பகுதி முழுவதும் திருக்குற்றாலக்குறவஞ்சி வசந்தவல்லியின் காதல் என்ற பகுதி முழுவதும் “வசந்தவல்லி வந்தாள்” முதல் கூடாய் கூடலே வரை
அலகு -2	**மதுரை மீனாட்சியம்மை பிள்ளைத்தமிழ்** தாலப்பருவம் முழுவதும் 10 பாடல்கள் நந்திக்கலம்பகம் நந்திவர்மன் வென்ற போர்கள் தெள்ளாற்றுப் போர் பாடல் எண்கள்:19, 23, 28, 33,49, 52, 53, 61, 64, 71, 75, 77, 80,86 கடம்பூர் வென்றது பாடல் எண்கள்: 25,80
அலகு -3	தமிழ்விடுதூது முழுவதும்
அலகு -4	முக்கூடற்பள்ளு- நாட்டுவளம், நகர்வளம் பள்ளியர்ஏசல் பகுதி முழுவதும்
அலகு -5	காரைக்காலம்மையார்- அற்புதத்திருவந்தாதி முழுவதும்.
பாட நூல்கள்	1. கலிங்கத்துப்பரணி- பாவை பப்ளிகேஷன்ஸ், சென்னை. 2. திருக்குற்றாலக் குறவஞ்சி- பாரி நிலையம், சென்னை. 3. மதுரை மீனாட்சியம்மை பிள்ளைத்தமிழ்-முல்லை நிலையம், சென்னை 4. நந்திக்கலம்பகம் -நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை. 5. தமிழ் விடு தூது-நியூ செஞ்சுரி புக் ஹவுஸ், சென்னை 6. முக்கூடற்பள்ளு-பாவை பப்ளிகேஷன்ஸ், சென்னை 7. அற்புதத்திருவந்தாதி- கழக வெளியீடு. 8. சிற்றிலக்கியச் சொற்பொழிவுகள்- கழக வெளியீடு 9. சிற்றிலக்கிய வரலாறு- தா.ஈசுவர பிள்ளை 10. சிற்றிலக்கியச் செல்வங்கள்-ந.வீ.செயராமன்.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the poetic tactics of the medieval writers
K1, K2	CO 2	understand the notable features of literary geners and flow of writing
K2, K4	CO 3	aware of the salient features of texts
K2, K3	CO 4	apply and attempt to appreciate creatively
K4,	C05	critically analyze the works of great writers

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark-
No Correlation (N) - 0 Mark

COURSE CODE	U21TAT22	நன்னூல் - சொல் அதிகாரம் - 5 இயல்கள்	L	T	P	C
CORE IV			5	-	-	4
Cognitive Level		**K1: Skill in language** **K2: Understand** **K3: give citation** **K4: Analyse** **K5: To know the structure**				
Learning Objectives		The Course aims to • make students obtainwriting skills with correct usage of grammar. • develop language proficiency • gain rich knowledge about structure of Tamil language through the ages • learn and brighten up their career. • strengthen the language skills through exercises.				

அலகு -1	பெயரியல்
அலகு -2	வினையியல்
அலகு -3	பொதுவியல்
அலகு -4	இடைச்சொற்கள்
அலகு -5	உரிச்சொல் இயல்
பாட நூல்கள்	நன்னூல்- காண்டிகை உரை – திருநெல்வேலி சைவ சித்தாந்த நூற்பதிப்புக் கழக வெளியீடு
பயிற்சி	மாணவர் இருபது இக்காலப் பெயர்ச்சொற்களைத் தேர்வு செய்து, அவை நன்னூல் பெயரியல் விதிமுறைகளின்படி உள்ளனவா? மாறி உள்ளனவா என்று பொருத்திப் பார்த்துக் கட்டுரை எழுதிச் சமர்ப்பிக்க வேண்டும். பத்துத் தொடர்களைத் தேர்வு செய்து, அவற்றில் உள்ள வினைச்சொற்களின் அமைப்பைக் கண்டறிந்து, அவை நன்னூல் வினையியல் விதிகளின் படி உள்ளனவா? வேறுபட்டுள்ளனவா என்று பொருத்திப் பார்த்துக் கட்டுரை எழுதிச் சமர்ப்பிக்க வேண்டும். மாணவர் பயிற்சிக்காக உள்ளது இப்பகுதி, இதிலிருந்து தேர்வில் வினாக்கள் இடம்பெறக் கூடாது

Course Outcome

At the end of the course, the students will be able to:

K1, K2	**CO1**	acquire knowledge of linguistic conventions for reading, writing and speaking.
K1, K2	**CO2**	use targeted grammatical structures appropriately in oral and written production.
K5, K4	**CO3**	analyse the grammatical structure of sentences in Tamil texts.
K5, K1	**CO4**	communicate correctly in spoken and written Standard Tamil.
K3	**CO5**	make inferences and predictions based on comprehension of a text.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S) - 3 Marks—42/60
Moderately Correlating (M) - 2 Marks—16/60
Weakly Correlating (W) - 2 Marks
No Correlation (N) - 0 Mark

COURSE CODE	U21TAA22	இலக்கியத் திறனாய்வு	L	T	P	C
ALLIED II சார்பு பாடம் -II			5	-	-	4
Cognitive Level		K1: Learning K2: Understanding K3: Applying K4 : Analysing K5: knowing the background of literature				
Learning Objectives		The course aims at ➢ providing an understanding of literature through the ages. ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ understanding the historical background of literature				

அலகு-1	இலக்கியத் திறனாய்வு வகைகள்
அலகு-2	கவிதைத் திறனாய்வு • மரபுக்கவிதை • புதுக்கவிதை
அலகு-3	புதினத் திறனாய்வு புதினக் கரு- மொழிநடை-நிகழ்ச்சிக்கோவைகள்- உத்தி
அலகு-4	சிறுகதைத் திறனாய்வு கதைக்கரு- கதைமாந்தர்கள்- மொழிநடை- உத்தி நாடகத்திறனாய்வு
அலகு-5	இலக்கிய இயக்கங்கள்
பார்வை நூல்கள்:	1. சு.பாலச்சந்திரன்- இலக்கியத்திறனாய்வு 2. அரங்க சுப்பையா- இலக்கியத்திறனாய்வு இசங்கள் கொள்கைகள் 3. மு.வரதராசனார்- இலக்கிய மரபு 4. மு.வரதராசனார்- இலக்கியத்திறன் 5. அ.ச.ஞானசம்பந்தனார்- இலக்கியக் கலை 6. தா.ஏ.ஞானமூர்த்தி- இலக்கியத்திறனாய்வியல் - உலகத்தமிழ் ஆராய்ச்சி நிறுவன வெளியீடு. 7. தி.சு.நடராசன்- திறனாய்வுக் கலை.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the poetic tactics of the writers
K1, K2	CO 2	understand the notable features of literary geners and flow of writing
K2, K4	CO 3	aware of the salient features of texts
K2, K3	CO 4	apply and attempt to appreciate creatively
K4,	C05	critically analyze the works of great writers

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 marks -20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

SEMESTER – III

COURSE CODE	U21TAT31	மதுரை மைய இலக்கியம்	L	T	P	C
CORE V			5	-	-	4
Cognitive Level		**K1: புரிதல்** **K2: அறிவு பெறுதல், ஆற்றல் பெறுதல்** **K3: பயன்படுத்தல்** **K4: படைத்தல்** **K5: மதிப்பீடு**				
Learning Objectives		The course aims at ➢ providing a wide outline of literary texts of Ancient Madurai city over the years. ➢ knowing the content of literary pieces in each genre and to be informed and inspired. ➢ helping the students imbibe the human and moral values through the study of literature. ➢ developing critical and creative attitude in students.				

அலகு –1	**மதுரைக் காஞ்சி** நூலமைப்பும், நுவல் பொருளும் பற்றிய சுருக்க வரைவு	
அலகு –2	**பரிபாடல்** வையை பற்றிய செய்யுட்கள் முத்தொள்ளாயிரம் - பாண்டியனைப் போற்றும் செய்யுட்கள் **சிலப்பதிகாரம்** - ஊர்காண் காதை	
அலகு –3	**குமரகுருபரர்** மதுரைக் கலம்பகம் - நூல் அமைப்பும், மதுரை பற்றிய சுருக்க வரைவும்	
அலகு –4	**குலசேகர பாண்டியன்** மதுராபுரி அம்பிகை மாலை – 30 கட்டளைக் கலித்துறைச் செய்யுட்களும்பாடப்பகுதி	
அலகு –5	**சொக்கநாதப் புலவர்** அழகர் கிள்ளை விடுதூது நூலமைப்பும், நுவல்பொருளும் சுருக்க வரைவு.	
நூல்கள்:	**1. மதுரைக் காஞ்சி** தஞ்சைத் தமிழ்ப் பல்கலைக் கழகத் தொகுப்பு நூல்	தமிழ்ச் செவ்வியல் நூல்கள்
	2. பரிபாடல் தஞ்சைத் தமிழ்ப் பல்கலைக் கழகத் தொகுப்பு நூல்	தமிழ்ச் செவ்வியல் நூல்கள்
	3. திருமுருகாற்றுப்படை தஞ்சைத் தமிழ்ப் பல்கலைக் கழகத் தொகுப்பு நூல்	தமிழ்ச் செவ்வியல் நூல்கள்
	4. **முத்தொள்ளாயிரம்** தஞ்சைத் தமிழ்ப் பல்கலைக் கழகத் தொகுப்பு நூல்	தமிழ்ச் செவ்வியல் நூல்கள்
	5. குமரகுருபரர் மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம்	மதுரைக்கலம்பகம்
	6. **குலசேகர பாண்டியன்** மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம	மதுராபுரி அம்பிகை மாலை
	7. சொக்கநாதப் புலவர் மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம்	அழகர் கிள்ளை விடு தூது

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the poetic tactics of the Tamil writers to highlight the significance of Madurai city which not only serves as the capital of Pandya kingdom but also remains as the seat of Tamil sangam since Sangam Age.
K1, K2	CO 2	understand the notable features of literary geners and flow of writing
K2, K4	CO 3	aware of the salient features of texts
K2, K3	CO 4	apply and attempt to appreciate creatively
K4,	C05	critically analyze the works of great writers

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S)	-	3 Marks -42/60
Moderately Correlating (M)	-	2 Marks -16/60
Weakly Correlating (W)	-	2 Marks-
No Correlation (N)	-	0 Mark

COURSE CODE	U21TAA33	தமிழக வரலாறும், பண்பாடும்	L	T	P	C
ALLIED III சார்பு பாடம் -III			4	-	-	4
Cognitive Level		**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of the literature**				
Learning Objectives		The course aims at ➢ providing a wide spectrum of literature through the ages. ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ understanding the historical background of literature				
அலகு –1		தமிழக நிலவியல் கூறுகள் - வரலாற்று மூலங்கள் - தொல் பழங்காலம் - பண்டைத் தமிழகம் - சிந்து வெளி நாகரீகத் தொடர்பு – தமிழ் மொழியின் தொன்மை – கீழடி அகழ்வாய்வுச் சான்றுகள் - முச்சங்க வரலாறு – சங்க காலத் தமிழகமும், மூவேந்தர் மரபும், குடிகளும், தமிழகத்துக்கும் நந்த மோரியர்களுக்கும், ரோமானிய யவனருக்கும் உள்ள தொடர்புகள், கடல் வணிகம் - சங்க கால மக்கள் வாழ்க்கை, அரசியல், போர்முறை, சமூகம், கல்வி, கலைகள், பொருளாதாரம் - சடங்குகள் - சகுனங்கள் - நம்பிக்கைகள் - திருவிழாக்கள் - வழிபாடுகள்.				
அலகு –2		சங்கம் மருவிய காலம் - களப்பிரர் வருகை – பல்லவர்கள் - முற்கால, இடைக்கால, பிற்காலப் பல்லவர்கள் ஆட்சி – குடைவரைக் கோவில்கள் - தோற்றம் - பக்தி இலக்கிய எழுச்சி – சைவ வைணவ பக்தி இயக்கம் - சமய அரசியல், பொருளாதார நிலை – கோயில் கட்டிடக் கலை வளர்ச்சி,மக்கள் வாழ்வியல் - கல்வி – பண்பாடு				
அலகு –3		சோழர் காலம் - பொற்காலம் - சோழர் சாளுக்கியர் உறவு நிலை - தென் கிழக்கு ஆசிய நாடுகளை வென்றமை – சோழர் ஆட்சி முறை – குடவோலை முறை –சோழர் காலச் சமூகப் பண்பாட்டு, அரசியல் சமயப், பொருளாதார நிலை – கலைகள்- கோயில்கள் தஞ்சைப் பெரிய கோயில் சார் கலைகள் பாண்டியர்களது எழுச்சி – சோழ – பாண்டியர் உறவு – அயல்நாட்டுப் பயணிகள் கண்ட தமிழகம் - நாயக்கர் காலம் - தமிழகத்தில் மாலிக் காபூர் படையெடுப்பு – விசய நகர ஆட்சியின் விளைவு – தஞ்சை மராட்டியர்கள் - கர்நாடக நவாபுகள் ஆட்சியில் தமிழகச் சூழல்				
அலகு –4		ஐரோப்பியர் வருகை – ஆற்காடு, தஞ்சை அரசர்களுடன் ஆங்கிலேயர் கொள்கை – பாளையக்காரர் எழுச்சி – கிழக்கிந்திய கம்பெனி அதிகாரம் - விடுதலைப் புரட்சி – கல்வி முறை – நீதி, நிர்வாக நடைமுறை				
அலகு –5		விடுதலைக்கு முந்தைய தமிழகம் இலக்கிய வளர்ச்சி – பத்திரிக்கை வளர்ச்சி –ஐரோப்பியரது தமிழத் தொண்டு - இந்திய விடுதலை இயக்கத்துக்குத் தமிழகத்தின் பங்கு – சமய, சமூகச் சீர்திருத்த இயக்கங்கள்				

	- இந்திய விடுதலைக்குப் பின் தமிழகம் - மொழி வழி மாநில உருவாக்கம் - தமிழ் இயக்கங்கள் - சமூகப் பொருளாதார மாற்றங்கள் - தமிழ் இலக்கியப் போக்குகள் - தமிழ் இதழ்கள் நாடகக்கலை – திரைப்படங்கள், தமிழ் ஊடகங்கள், தமிழ் இசை எழுச்சி.
பாட நூல்	1. கே. கே. பிள்ளை, தமிழக வரலாறும் பண்பாடும் 2. வே.தி. செல்லம், தமிழக வராலாறும், பண்பாடும்.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the historical background of the literary works
K1, K2	CO 2	understand the difference between classical Tamil literature and modern literature
K2, K4	CO 3	aware of the salient features of literature through the ages
K2, K3	CO 4	know the trend of literature
K4, K6	C05	critically analyze the literature with historical ,political,socio-cultural and economicbackground of Tamilnadu.

<u>Mapping of Cos with POS & PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAE311	நாட்டுப்புறவியல்	L	T	P	C
ELECTIVE – I விருப்பப் பாடம் - I			4	-	-	3
Cognitive Level		K1: Learning K2: Understanding K3: Applying K4 : Analysing K5: knowing the background of literature				
Learning Objectives		The course aims at ➢ providing an understanding of oral literature through the ages. ➢ helping the students to collect oral literature from all parts of the state of Tamilnadu. ➢ understanding the nuances of folkliterature				

அலகு –1	நாட்டுப்புறவியல் விளக்கம் பண்புகள் - நாட்டுப்புற இலக்கிய வகைகள் நாட்டுப்புறப் பாடல்கள் நாட்டுப்புறக் கதைகள் நாட்டுப்புறக் கதைப்பாடல்கள் பழமொழிகள் விடுகதைகள்
அலகு –2	நாட்டுப்புறக் கைவினைப் பொருட்கள் நாட்டுப்புற மருத்துவம் - புழங்கு பொருட்கள்
அலகு –3	நாட்டுப்புற இலக்கியமும், எழுத்து இலக்கியமும் - ஒற்றுமை, வேற்றுமைகள் - பழமொழிகள் - எழுத்திலக்கியத்தில் நாட்டுப்புற இலக்கியத்தின் செல்வாக்கு.
அலகு –4	நாட்டுப்புறக் கலைகள்
அலகு –5	விளையாட்டு, தொழில்கள், சடங்குகள்
பாடநூல்:	சு.சக்திவேல், நாட்டுப்புறவியல் ஆய்வு

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the emotions of common people.
K1, K2	CO 2	understand the notable features of significant events through folk literature.
K2, K4	CO 3	aware of their lifestyle, beliefs and cultural tradition.
K2, K3	CO 4	apply and attempt to know the value of folk tradition.
K4,	CO5	critically analyze the life of people.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60

Moderately Correlating (M) - 2 Marks -20/60

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 Mark

COURSE CODE	U21TAE312	ஓலைச்சுவடி வகைகள்	L	T	P	C
ELECTIVE – I			4	-	-	3
Cognitive Level		**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of literature**				
Learning Objectives		The course aims at ➢ providing an understanding of literature written on palmleaves through the ages. ➢ helping the students to read scripts in the form of palmleaves. through the study of manuscriptology.. ➢ understanding the nuances of manuscriptology				

அலகு –1	தமிழில் ஓலைச்சுவடிகள் - எழுத்தாணியில் எழுதுமுறை – ஓலைச்சுவடி வகைகள் - ஓலைச்சுவடி எழுதுமுறைகள் - கோர்த்தல் - பாதுகாத்தல்
அலகு –2	ஓலைச்சுவடி வாசிப்புப் பயிற்சி – சுவடித் தமிழ் - சுவடிகளில் எழுதும் பயிற்சி – பொருள் தடுமாற்றம் - பாடபேதம் நீக்க அறிஞர்கள் கையாண்ட வழிமுறைகள்
அலகு –3	ஓலைச்சுவடிகள் நூலகம்- அரசினர் கீழ்த்திசைச் சுவடிகள் நூலகம் தஞ்சை சரசுவதி மகால் நூலகத் தமிழ்ச்சுவடிகள் விளக்க அட்டவணைத் தொகுதிகள் . தமிழகச் சுவடிகள் நூலகம் - அயல் நாடுகளில் தமிழ்ச் சுவடிகள் நூலகம் - பிரான்சு - இலண்டன்
அலகு –4	தமிழ்ச் சுவடிகள் பதிப்பியல் வரலாறு – பதிப்பித்த தமிழ்ச் சான்றோர்களின் பங்களிப்பும், இலக்கியக் கொடையும்.
அலகு –5	தமிழ்ச் சுவடிகளில் காணலாகும் பாட வேறுபாடுகள் - பாடத் தெரிவு முறைகள் - விடுபாடு நிரப்புதல் - இடைச்செருகல் - இனம் காணல் - திருத்தம் செய்தல் - சுவடியியல் பதிப்புத் திறன்கள்
நூல்கள்:	1. பூ. சுப்பிரமணியம், சுவடிப் பதிப்புக் கலை, சென்னை. உலகத் தமிழ் ஆராய்ச்சி நிறுவன வெளியீடு. 2. த. கோ.பரமசிவம், சுவடிப் பதிப்பு நெறிமுறைகள் தஞ்சைத் தமிழ்ப் பல்கலைக்கழக வெளியீடு.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the poetic tactics of the writers
K1, K2	CO 2	understand the notable features of literary geners and flow of writing in palmleaves.
K2, K4	CO 3	aware of the salient features of manuscriptology.
K2, K3	CO 4	apply and attempt to edit and print manuscripts.
K4,	CO5	critically analyze the works of great writers

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60

Moderately Correlating (M) - 2 Marks -20/60

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 Mark

SEMESTER - IV

COURSE CODE	U21TAT41	அகப்பொருள் இலக்கணம் - நம்பி அகப்பொருள் முழுதும்	L	T	P	C
CORE V முதன்மைப் பாடம் - VI			4	-	-	4
Cognitive Level		**K1: Skill in language** **K2: Understanding** **K3: giving suitable citation** **K4: Analysing the content** **K5: To know the structure**				
Learning Objectives		**The Course aims to** • make students obtain skills to analse the literary content of ahaporul.. • develop proficiency in content analysis. • gain rich knowledge about structure and content of Tamil Aham poetry. through the ages • learn and brighten up their knowledge about Tamil literary tradition.. • strengthen the language skills through exercises.				
அலகு –1	நம்பியகப் பொருள் - அறிமுகம் - ஆசிரியர் குறிப்பு - காலம் - சிறப்புப் பாயிரம் – நூலமைப்பு – அகத்திணை இயல் - ஒன்று முதல் அறத்தோடு நிலை வரையிலான நூற்பாக்கள் (1 முதல் 54 வரை)					
அலகு –2	அகத்திணை இயல் - 11 கற்பு முதல் காதல் பரத்தையர் வரையிலான நூற்பாக்கள் (55 முதல் 116 வரை)					
அலகு –3	களவு இயல் நூற்பாக்கள் 117 முதல் 170 வரை					
அலகு –4	வரைவு இயல் நூற்பாக்கள் (171 முதல் 199 வரை) கற்பு இயல் நூற்பாக்கள் (200 முதல் 209 வரை)					
அலகு –5	ஒழிபியல் நூற்பாக்கள் 210 முதல் 252 வரை					
பாட நூல்கள்	நம்பியகப் பொருள் - திருநெல்வேலி சைவ சித்தாந்த நூற்பதிப்புக் கழக வெளியீடு					

COURSE OUTCOME

At the end of the course, the students will be able to:

K1, K2	CO1	acquire knowledge of literary conventions of Tamil Aham poetry.
K1, K2	CO2	use targeted Aham content in prescribed form of verses in standard Tamil.
K5, K4	CO3	analyse the Aham content and grammatical structure of standardised Tamil verses..
K5, K1	CO4	assess correctly the Aham content given in Standard Tamil.
K3	CO5	make inferences and predictions based on comprehension of Tamil verses.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S) - 3 Marks—42/60
Moderately Correlating (M) - 2 Marks—16/60
Weakly Correlating (W) - 2 Marks
No Correlation (N) - 0 Mark

COURSE CODE	U21TAT42	காப்பிய இலக்கியம்	L	T	P	C
CORE VII முதன்மைப் பாடம் - VII			4	-	-	4
Cognitive Level		**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of literature**				
Learning Objectives		The course aims at ➢ providing an understanding of Tamil Epic literature through the ages. ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ understanding the historical background of literature				
அலகு – 1	**சிலப்பதிகாரம்** - புகார்க் காண்டம் - 6 காதைகள் இந்திரவிழா ஊர் எடுத்த காதை கடலாடு காதை கானல் வரி வேனில் காதை கனாத்திரம் உரைத்த காதை நாடு காண் காதை					
அலகு – 2	**சிலப்பதிகாரம்** - ஊர் காண் காதை **மணிமேகலை** – 5 காதைகள் மட்டும் பளிக்கறை புக்க காதை மணிமேகலா தெய்வம் வந்து தோன்றிய காதை சக்கரவாளக் கோட்டம் உரைத்த காதை துயில் எழுப்பிய காதை மணிபல்லவத்துத் துயர் உற்ற காதை					
அலகு – 3	**சீவக சிந்தாமணி** விமலையார் இலம்பகம்					
அலகு – 4	**கம்பராமாயணம்** ஆரணிய காண்டம் - 12வது படலம் - சவரி பிறப்பு நீங்கு படலம்					
அலகு – 5	5.1 சீறாப்புராணம். 5.2 ஹிஜிரத்துக் காண்டம் 4வது படலம் - விடமீட்ட படலம்- செய்யுள் 235 – 280 வரை 5.3 தேம்பாவணி மூன்றாம் காண்டம் ஆறாம் படலம் - மீட்சிப் படலம் - மட்டும்					

நூல்கள்	1. ஐம்பெருங்காப்பியங்கள் 2. கம்பராமாயணம் 3. சீறாப்புராணம்	ச.வே.சு.(உ.ரை) மணிவாசகர் பதிப்பகம் ச.வே.சு.(ப.ஆ) மணிவாசகர் பதிப்பகம் மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம்
	சிலப்பதிகாரம் - மதுரை மின்நூல் தொகுப்பு திட்ட நூலகம் தமிழ்	இணையக் கல்விக் கழக நூலகம்
	மணிமேகலை - மதுரை மின்நூல் தொகுப்பு திட்ட நூலகம், தமிழ்	இணையக் கல்விக் கழக நூலகம்
	கம்பராமாயணம் - மதுரை மின்நூல் தொகுப்பு திட்ட நூலகம், தமிழ்	இணையக் கல்விக் கழக நூலகம்
	திருவிளையாடல் புராணம்- மதுரை மின்நூல் தொகுப்பு திட்ட நூலகம் தமிழ்	இணையக் கல்விக் கழக நூலகம்
	சீறாப்புராணம் - மதுரை மின்நூல் தொகுப்பு திட்ட நூலகம், தமிழ்	இணையக் கல்விக் கழக நூலகம்
	இரட்சணிய யாத்திரிகம்- மதுரை மின்நூல் தொகுப்பு திட்ட நூலகம், தமிழ்	இணையக் கல்விக் கழக நூலகம்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the trend analysis of growth of Tamil Epic literature
K1, K2	CO 2	develop critical thinking of literary genres and content handled in Tamil epic tradition
K2, K4	CO 3	will get knowledge about the growth of Tamil Epic literature.
K2, K3	CO 4	analyze and interpret epics written in Tamil.
K4,	CO5	critically analyze the works of great writers

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark-
No Correlation (N) - 0 Mark

COURSE CODE	U21TAA44	தமிழ் மொழி வரலாறு	L	T	P	C
ALLIED IV சார்பு பாடம் -IV			4	-	-	4
Cognitive Level		K1: Learning K2: Understanding K3: Applying K4 : Analysing K5: knowing the background of the literature				
Learning Objectives		The course aims at 1. providing a wide spectrum of usage of Tamil language through the ages. 2. helping the students to know the structure of Tamil language through literature, inscriptions and other written sources. 3. understanding the changes occurred in Tamil language with historical background of the society.				

அலகு – 1	தமிழ் மொழி வரலாற்று மூலங்கள்
அலகு – 2	தொல் தமிழ் வரலாறு – தொல்காப்பியத் தமிழ் சங்கத் தமிழ் வரலாறு
அலகு – 3	களப்பிரர் காலத் தமிழ் பல்லவர் காலத் தமிழ் சோழர் காலத் தமிழ்
அலகு – 4	நாயக்கர் காலத் தமிழ் மராட்டியர் காலத் தமிழ் ஆங்கிலேயர் காலத் தமிழ்
அலகு – 5	இக்காலத் தமிழ் ஊடகத் தமிழ் தமிழ் வரி வடிவ வரலாறு செந்தமிழ் - கொடுந்தமிழ் உலக வழக்கு – செய்யுள் வழக்கு இயல்பு வழக்கு –தகுதி வழக்கு வட்டார வழக்கு – கிளை மொழிகள் காலந்தோறும் சொல் பொருள் மாற்றம் கடன் வாங்கல் கடன் தருதல் கல்வெட்டுத் தமிழ் - செப்பேட்டுத் தமிழ் மெய்கீர்த்தித் தமிழ் - இன்றைய ஆட்சித்தமிழ்
நூல்கள்	தெ.பொ.மீனாட்சி சுந்தரனார், தமிழ் மொழி வரலாறு – சைவ சித்தாந்த நூற்பதிப்புக் கழக வெளியீடு

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	identify the changes occurred in Tamil language
K1, K2	CO 2	develop critical thinking of language structure over the ages
K2, K4	CO 3	recognize the growth of language
K2, K3	CO 4	become proficient about the growth of Tamil script
K4, K6	CO5	know the trend and coherence of language and literature over a period of time.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAE421	ஒப்பியல் இலக்கியம்	L	T	P	C
ELECTIVE - II விருப்பப் பாடம் - II			3	-	-	3
Cognitive Level		K1: Learning K2: Understanding K3: Applying K4 : Analysing K5: knowing the background of the literature				
Learning Objectives		The course aims at ➢ providing a wide spectrum of literature through the ages. ➢ helping the students to know about the base for comparative literature. ➢ enable them to study the master pieces of literature of different languages. ➢ understanding the similar background of literature of two different languages.				

அலகு – 1	ஒப்பியலின் தத்துவங்கள் (ப. 1 - 22 வரை)
அலகு – 2	தமிழில் ஒப்பியல் ஆய்வு (ப. 23 - 47 வரை)
அலகு – 3	தமிழ் வீரயுகப் பாடல்கள் (ப. 48 - 60 வரை)
அலகு – 4	இரு கோட்பாடுகள்
அலகு – 5	பெரும் பெயர் உலகம்
பாட நூல்கள்	கா. கைலாசபதியின் 'ஒப்பியல் இலக்கியம் (இலக்கியக் கட்டுரைகள் – முதல் ஐந்து கட்டுரைகள் மட்டும்)மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the historical background of the literary works of Tamil and other languages..
K1, K2	CO 2	understand the difference between classical Tamil literature and modern literature
K2, K4	CO 3	aware of the salient features of literature through the ages: and Develop critical thinking of literary genres of Tamil and other languages..
K2, K3	CO 4	know the trend of literature of Tamil and other languages
K4, K6	CO5	critically analyze the literature Interpret and appreciate the format and purpose of literature at different periods of same language and also in different languages..

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAE422	Tamil Computing (Advanced course) - மேம்பட்ட கணினித் தமிழ்	L	T	P	C
ELECTIVE - II விருப்பப் பாடம் - II			3	-	-	3
Cognitive Level		K1: Learning K2: Understanding K3: Applying K4 : Analysing K5: knowing the background of Tamil computing				
Learning Objectives		The course aims at ➢ providing a wide spectrum of Computer programming languages. ➢ helping the students to know the base of Tamil language for computing.. ➢ enable them to study the Data base system and its relevance to Tamil languageparsing techniques. ➢ understanding the process of shallow parsing and deep parsing and natural language processing.				

அலகு – 1	கணினி நிரலாக்கம் - அறிமுகம் - கணினி நிரலாக்க வரையறை– கணினி நிரலாக்க மொழிகள் – கணினி நிரல் தொடர் எழுதுதல் – கணினி நிரலாக்க மொழிகளாகிய எச் டி எம் எல் (HTML) சி எஸ் எஸ் (CSS) ஜாவா (JAVA) ஆகிய மொழி வடிவங்களில் தமிழின் பயன்பாடு.
அலகு – 2	பைதான் கணினி நிரலாக்கமொழி குறித்த அறிமுகம் - அடிப்படைகள் - செயல்பாடுகள் - தரவு தளக் கோவை – மாறிகளின் நிலைபாடு – நிரலாக்க நெறிகள், பைதான் அடிப்படைகள் மாறிகள், செயற்கூறுகள், கட்டுப்பாட்டு அமைப்புகள், செயல்கள், இழைகள் மற்றும் இழை உருவகிப்பு. ஊப்ஸ் கருத்தாக்கங்கள்: நவீன தொழில்நுட்பம் மற்றும் ஊப்ஸ்: பட்டியல்கள் வெளியேறுதல், கணங்கள், அகராதி, வகைகள் மற்றும் பொருட்கள்.
அலகு – 3	பைதான் மற்றும் தரவு தள இணைப்பு : டி பி எம் எஸ் (DBMS) தரவு தள நிர்வாக அமைப்பு மற்றும் ஆர் டி பி எம் எஸ் (RDBMS) கருத்தாக்கங்கள், வடிவமைக்கப்பட்ட வினா மொழி (எஸ் க்யு எ இல், மை எஸ் க்யு எல், பைதான் மற்றும் மை எஸ் க்யு எல், பைதான் மற்றம் சி எஸ் வி கோப்புகள்) பான்டாஸ், நம்பி தளங்களில் தரவு கையாளுதல்: பான்டாஸ் தரவு சட்டக உருவாக்கம், பான்டாஸில் பூலியன் அட்டவணைப்படுத்தல், பான்டாஸில் செயல்பயன்பாடுகள், தரவு காட்சிப்படுத்துதல், மெட்லாட்லிப் பயன்படுத்தி தரவு காட்சிப்படுத்துதல், தரவு காட்சிப்படுத்துதல் அவற்றின் பயன்கள், மெட்பிலாட்லிப் பைதான் நூலகம் - கோட்டு விளக்கப்படம், பரவல் வரைபடம், பட்டை வரைபடம், சதுர வரைபடம், பெட்டி வரைபடம்
அலகு – 4	தொடரைப் பாகுபடுத்தல் - ஆழமற்ற சொல் தொடர் பாகுபடுத்தல் - ஆழமான சொல் தொடர் பாகுபடுத்தல் - பேச்சுக் கூறுகளைப் பகுத்தல் - ஒலியியல் எழுத்துக்குறி அங்கீகரிப்பு (ஓ சி ஆர்) - இயற்கை மொழி ஆய்வின் பல்வேறு பயன்பாடு - இயந்திர மொழிபெயர்ப்பு – தேடுபொறிகள்

அலகு – 5	தமிழ்க் கணினியியல் ஆய்வுக்கூடப் பயிற்சிப் பணி - தமிழ் கட்டற்ற மென்பொருள் கருவிகள் மற்றும் ஆங்கில மொழி ஆய்வுக் கருவிகள் (கட்டற்ற இயற்கை மொழி ஆய்வு , GATE மற்றும்; NLTK) கையாளும் பயிற்சி பெறல்
பாடநூல்கள்	1. Learning WebDesign: A Beginner's Guide to HTML, CSS, Javascript and Web Graphics Fourth Edition; by Jennifer Robbin, O'Reily;2012 2. HTML and CSS: Design and Build Website Paperback-Illustrated, Jon Duckett; 2011 3. Phython Programming(in Tamil); SomasundaramChenrayan; Amaxon Kindle; 2020 **4.** Phython Pocket Reference 5ed: Phython in Your Pocket (Pocket Reference (O'Reilly); Mark Lutz 2014
பார்வை நூல்கள்	1. கணிப்பொறியில் தமிழ், த. பிரகாஷ்இ சென்னை, பெரிகாம் நூல் வெளியீடு, 2005 2. இயற்கை மொழி ஆய்வு தமிழ் - Prof.கு. சுப்பையா பிள்ளை உலகததமிழ் ஆராய்ச்சி நிறுவனம் 2012 3. GATE Website: Gate.ac.UK – releases/gate-2.0alpha3-build516/doc/userguide.html 4. NLTK Website: 1.Language Processing and Phython(nltk.org) 5. AU-KBC Tools: http;//78.46.86.133:8080/aukbc-nlp/ 6. Search Engine AU-KBC: Searchko: www.searchko.co.in 7. AU-KBC Machine Translation Systems: Tamil-Malayalam MT System: http:/78.48.86.133:8080/tamMalMtsys/ 8. Tamil Virtual Academy Tool: Tamil Computing Tools (tamilvu.org)

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	get an exposure to computer programming languages HTML, CSS, JAVA, PYTHON
K1, K2	CO 2	get expertise in Tamil Computing. As per the requirements of Digital sphere..
K2, K4	CO 3	know thefundamentals of python language and writing programme. Trend analysis of growth of tamil literature with other languages
K2, K3	CO 4	apply the parsing techniques.
K4, K6	CO5	acquire skill to do Natural language processing

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

SEMESTER –V

COURSE CODE	U21TAT51	குறிஞ்சிசார் (மலைப் பகுதி சார் இலக்கியம்)	L	T	P	C
CORE VIII			5	-	-	4

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of literature**
Learning Objectives	The course aims at ➢ providing an understanding of Tamil classical literature to Modern literature which posess background on hilly region called kurinchi ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. understanding the historical background of kurinchi literature

அலகு – 1	கபிலர் - குறிஞ்சிப்பாட்டு – சுருக்க வரைவு நல்லந்துவனார் - பரிபாடல்	
அலகு – 2	பெருங்கௌசிகனார் - மலைபடுகடாம் - சுருக்க வரைவு	
அலகு – 3	திருஞானசம்பந்தர் - திருக்குற்றாலப் பதிகம் - திருகூடராசப்பக் கவிராயர் - திருக்குறும்பலாப் பதிகம்	
அலகு – 4	திரிகூடராசப்பக் கவிராயர் - திருக்குற்றாலக் குறவஞ்சி – நூலமைப்பும், நுவல்பொருள் சுருக்க வரைவும்	
அலகு – 5	முத்துக் கறுப்பண்ணன் - பழனியாண்டவர் காவடிச் சிந்து	
நூல்கள்	1. குறிஞ்சிப்பாட்டு	சைவ சித்தாந்த நூல் பதிப்புக் கழக வெளியீடு
	2. மலைபடுகடாம்	சைவ சித்தாந்த நூல் பதிப்புக் கழக வெளியீடு
	3. திருக்குற்றாலப் பதிகம்	மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம்
	4. திருக்குறும்பலாப் பதிகம்	மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம்
	5. திருக்குற்றாலக் குறவஞ்சி	சைவ சித்தாந்த நூல் பதிப்புக் கழக வெளியீடு
	6. பழனியாண்டவர் காவடிச் சிந்து	மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the poetic tactics of the writers
K1, K2	CO 2	understand the notable features of literary geners and kurinchi
K2, K4	CO 3	aware of the salient features of texts based on hilly region
K2, K3	CO 4	apply and attempt to analyse the life style of people at hilly region through literature
K4,	CO5	critically analyze the works of great writers

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60

Moderately Correlating (M) - 2 Marks -20/60

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 Mark

COURSE CODE	U21TAT52	பக்தி இலக்கியம்	L	T	P	C
CORE IX முதன்மைப் பாடம் -IX			5	-	-	4
Cognitive Level		**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of literature**				
Learning Objectives		The course aims at ➢ providing an understanding of Tamil devotional literature to Modern age which posess background on Tamil Deities ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ understanding the historical background of devotional literature				

அலகு -1 **சைவ இலக்கியம்**

1.1. திருஞான சம்பந்தர் மூன்றாம் திருமுறை – திரு ஆலவாய் – 3339-3349 வரை. "செய்யனே திரு ஆலவாய் மேவிய" எனும் பாடல் முதல் "அப்பன் ஆலவாய் ஆதி அருளினால்" எனும் பாடல் வரை – 10 செய்யுட்கள்.

1.2. திருநாவுக்கரசர் - ஐந்தாம் திருமுறை – திரு இன்னம்பர் -10 செய்யுட்கள் 5433 முதல் 5442 வரை "என்னில் ஆரும் எனக்கு இனியாரில்லை" எனும் பாடல் முதல் "சனியும், வெள்ளியும், திங்களும், ஞாயிறும்" எனும் பாடல் வரை.

1.3. சுந்தரர் - ஏழாம் திருமுறை – திருக்கடவூர் - 7503 முதல் 7512 வரை பொடியார் மேனியனே புரிநூல் ஒருபால் பொருந்த எனும் பாடல் முதல் 'காராரும் பொழில்சூழ் கடவூர் எனும் பாடல் வரை - 10 செய்யுட்கள்.

1.4. மாணிக்க வாசகர் - சிவபுராணம் மட்டும்.

1.5. காரைக்காலம்மையார் புராணம் மட்டும். சேக்கிழார் - பெரியபுராணம் - 30 காரைக்கால் அம்மையார் - 1722 முதல் 1787 வரையுள்ள செய்யுட்கள்.

1722 – மானம் மிகு தருமத்தின் வழி நின்று வாய்மையினில் முதல்
1787 – ஆதியோடு அந்தம் இல்லான் அருள்நடம் ஆடும் போது வரை

1.6 அருணகிரிநாதர் - திருப்புகழ் - மூன்றாம் தொகுதி - மூன்றாம் படை வீடு – பழநி (திருஆவினன் குடி) பகுதியில் வரும்
"நாத விந்து கலாதீ நமோ நம!" (இரண்டாம் பாடல்)
"வேத மந்திர சொரூபா நமோ நம
போதகம் தரு கோவே! நமோ நம!" (இரண்டாம் பாடல்)
நீதி தங்கிய தேவா நமோ நம!
வாரணம் தனை நேரான ------(மூன்றாம பாடல்)

	ஆகிய மூன்று பாடல்கள் மட்டும். (தமிழ் இணையக் கல்விக்கழக நூலகம், கிருபானந்தவாரி உரையுடன்)
அலகு -2	**வைணவம்** 3.1 பெரியாழ்வார் - ஒன்பதாம் திருமொழி – 202 முதல் 212 வரை "வெண்ணெய் விழுங்கி வெறும் கலத்தை" முதல் "வண்டு களித்து இசைக்கும" எனும் பாடல் வரை - 11 செய்யுட்கள். 2.2. ஆண்டாள் - இரண்டாம் திருமொழி – 514 முதல் 523 வரை "நாமம் ஆயிரம் ஏத்த நின்ற நாராயணா" முதல் "சீதை வாய் அமுதம் உண்டாய", எங்கள் சிற்றில் சிதையேல் வரை – 10 பாடல்கள். 2.3. திருப்பாணாழ்வார் - அமலன் ஆதி பிரான் - 927-936 வரை உள்ள 10 பாசுரங்கள் அமலன் ஆதிபிரான் என்று தொடங்கும் பாடல் முதல் கொண்டல் வண்ணனைக் கோவலனாய் எனும் பாடல் வரை. 2.4. பேயாழ்வார் - மூன்றாம் திருவந்தாதி – 2315 முதல் 2324 வரை – 10 பாசுரங்கள் "அன்று இவ்வுலகம் அசைந்த அசைவே கொல் பாடல் முதல" சினமாமத களிற்றின் திண்மருப்பைச் சாய்த்து பாடல் வரை. 2.5. திருமங்கை ஆழ்வார் -இரண்டாம் திருமொழி – 1358 முதல் 1367 வரை "தாம் தம் பெருமை அறியார் என்ற பாடல் முதல்" காவிப் பெருநீர் வண்ணன் கண்ணன் என்ற பாடல் வரை – 10 பாசுரங்கள 2.6. நம்மாழ்வார் - இரண்டாம் திருவாய்மொழி – 3128 – 3138 வரை. "பொலிக பொலிக பொலிக" எனும் பாடல் "முதல் கலியுகம் ஒன்றும் "எனும் பாடல் வரை 11 பாடல்கள்.
அலகு – 3	கம்பராமாயணம் - 6 – யுத்த காண்டம் - 39 வது படலம் - திருமுடி சூட்டுப்படலம்
அலகு – 4	சீறாப்புராணம் முதல் காண்டம் - விலாதத்துக் காண்டம் நான்காவது படலம் - தலைமுறைப் படலம் (செய்யுள் - 99 -165 வரை)
அலகு – 5	தேம்பாவணி இரண்டாம் காண்டம் - ஏழாவது படலம் - பாலை புகு படலம் - (1759-1842 வரை உள்ள 83 செய்யுட்கள்). அலகு 5:2 இராமலிங்க வள்ளலாரின் திருவருட்பா - மூன்றாம் திருமுறை - மூன்றாம் தொகுதி-12 சிவக்குமார் வணக்கம் - 2353-2360 வரை. "மண்ணாலும், மண்ணுற்ற வாழ்க்கையினாலும்" என்று தொடங்கும் 2353வது பாடல் முதல் "ஏற்றவிட்டார் கொடி கொண்டோய் விளக்கினை ஏற்ற எண்ணும்" 2360வது என்ற பாடல் வரையிலான 8 பாடல்கள் மட்டும். (தமிழ் இணையக் கலவிக்கழக நூலகம், கிருபானந்தவாரி உரையுடன்) (தமிழ் இணையக் கல்விக்கழக நூலகம், ஔவை.சு. துரைசாமி பிள்ளை உரையுடன்)
நூல்கள்	1. ச.வே. சு. (ப.ஆ) பன்னிறு திருமுறை, மணிவாசகர் பதிப்பகம் 2. நாலாயிரத் திவ்விய பிரபந்தம் (நான்கு பகுதிகள்), ஆதித்யா ஸ்ரேயா

	பதிப்பகம், சிதம்பரம் 3. ச. வே.சு. (ப.ஆ) கம்பராமாயணம், மணிவாசகர் பதிப்பகம். 4. சீறாப்புராணம் - மதுரை மின் நூல் தொகுப்புத் திட்ட நூலகம். 5. தேம்பாவணி - மதுரை மின் நூல் தொகுப்புத் திட்ட நூலகம். 6. அருணகிரிநாதர் - திருப்புகழ் - மூன்றாம் தொகுதி - மூன்றாம் படை வீடு – பழநி - 7. தமிழ் இணையக் கலவிக்கழக நூலகம், கிருபானந்தவாரி உரையுடன் 8. இராமலிங்க வள்ளலாரின் திருவருட்பா - மூன்றாம் திருமுறை - மூன்றாம் தொகுதி-12 9. சிவக்குமார் வணக்கம் தமிழ் இணையக் கல்விக்கழக நூலகம், ஔவை.சு. துரைசாமி பிள்ளை உரையுடன்.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the poetic tactics of saints of different religions
K1, K2	CO 2	understand the notable features of literary geners of devotion
K2, K4	CO 3	aware of the salient features of texts based on different religion
K2, K3	CO 4	apply and attempt to analyse the life style of people at a given point of time through literature
K4,	CO5	critically analyze the works of great writers

<u>Mapping of Cos with POS & PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAT53	புறப்பொருள் இலக்கணம் புறப்பொருள் வெண்பா மாலை முழுவதும்	L	T	P	C
CORE X முதன்மைப் பாடம் - X			5	-	-	4
Cognitive Level		**K1: Skill in language** **K2: Understanding** **K3: giving suitable citation** **K4: Analysing the content** **K5: To know the structure**				
Learning Objectives		The Course aims to • make students obtain skills to analse the literary content of puraporul. • develop proficiency in content analysis. • gain rich knowledge about structure and content of Tamil puram poetry through the ages • learn and brighten up their knowledge about Tamil literary tradition. • strengthen the language skills through exercises.				

அலகு – 1	கடவுள் வாழ்த்து சிறப்பு பாயிரம் வெட்சிப் படலம் கரந்தைப் படலம் வஞ்சிப் படலம்
அலகு – 2	காஞ்சிப்படலம் நொச்சிப் படலம் உழிஞைப் படலம்
அலகு – 3	தும்பப் படலம் வாகைப் படலம்
அலகு – 4	பாடாண் படலம் பொது இயல் படலம்
அலகு – 5	கைக்கிளைப்படலம் பெருந்திணைப்படலம்
பாடநூல்	புறப்பொருள் வெண்பா மாலை – திருநெல்வேலி சைவ சித்தாந்த நூற்பதிப்புக் கழக வெளியீடு.

COURSE OUTCOME

At the end of the course, the students will be able to:

K1, K2	CO1	acquire knowledge of literary conventions of Tamil puram poetry.
K1, K2	CO2	use targeted puram content in prescribed form of verses in standard Tamil.
K5, K4	CO3	analyse the puram content and grammatical structure of standardised Tamil verses.
K5, K1	CO4	assess correctly the puram content given in Standard Tamil.
K3	CO5	make inferences and predictions based on comprehension of Tamil verses.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S) - 3 Marks—42/60
Moderately Correlating (M) - 2 Marks—16/60
Weakly Correlating (W) - 2 Marks
No Correlation (N) - 0 Mark

COURSE CODE	U21TAT54	யாப்பிலக்கணம் - யாப்பருங்கலக் காரிகை முழுவதும்	L	T	P	C
CORE XI முதன்மைப் பாடம் - XI			5	-	-	4
Cognitive Level		**K1: Skill in language** **K2: Understanding** **K3: give citation** **K4: Analysis** **K5: To know the structure of Tamil verses**				
Learning Objectives		The Course aims to • make students obtainwriting skills with correct usage of grammar. • develop language proficiency • gain rich knowledge about structure of Tamil verses through the ages • learn and brighten up their capacity to write classical verses • strengthen the poetry writing skills.				

அலகு – 1	**உறுப்பியல்** சிறப்புப்பாயிரம் முதல் தளை வரையிலான நூற்பாக்கள் (1 முதல் 11 வரை)
அலகு – 2	**உறுப்பியல்** அடி முதல் தொடை விகற்பம் வரையிலான நூற்பாக்கள் (12 முதல் 20 வரை)
அலகு – 3	செய்யுளியல் பாக்களின் அடியும் ஓசையும் முதல் • வெளிவிருத்தம் • வெண் தாழிசை • வெண்துறை வரையிலான நூற்பாக்கள்(21 முதல் 27 வரை)
அலகு – 4	செய்யுளியல் நால்வகை ஆசிரியப்பாக்கள் முதல் மருட்பா வரை (28 முதல் 35 வரை)
அலகு – 5	ஒழிபியல் எழுத்துக்குப் புறனடை (36 முதல் 44 வரை)
நூல்:	யாப்பருங்காலக் காரிகை – திருநெல்வேலி சைவசித்தாந்த நூற்பதிப்புக் கழக வெளியீடு

COURSE OUTCOME

At the end of the course, the students will be able to:

K1, K2	CO1	acquire knowledge of poetic conventions of Tamil literature
K1, K2	CO2	use grammatical structures of Tamil verses.
K5, K4	CO3	analyse the grammatical structure of verses in Tamil texts.
K5, K1	CO4	analyse the format of verses written in Standard Tamil.
K3	CO5	make inferences and predictions based on comprehension of a text.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S) - 3 Marks—42/60
Moderately Correlating (M) - 2 Marks—16/60
Weakly Correlating (W) - 2 Marks
No Correlation (N) - 0 Mark

COURSE CODE	U21TAT55	மொழியியல் மற்றும் கணினி மொழியியல் - அறிமுகம் Introduction to Linguistics and Computational Linguistics	L	T	P	C
CORE XII முதன்மைப் பாடம் - XII			5	-	-	4

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of Tamil computing for machine translation**
Learning Objectives	The course aims at ➢ providing a wide spectrum of Tamil Linguistics components and Structure of Tamil language with a focus on corpus development ➢ helping the students to know corpus linguistics ➢ enable them to study the Data needed to create corpus for Lexicography ➢ understanding the process computational Linguistics

அலகு- 1	மொழியியல் அடிப்படைகள் - ஒலியியல் - ஒலியனியல் - உருபனியல் - தொடரியல் - பொருளியல் - (தமிழ் மொழியில் இருந்து சான்றுகள் தந்து அடிப்படைக் கருத்தாக்கங்கள் அறிமுகப்படுத்தப்பட்டு விளக்கப்பட வேண்டும்) மொழிபெயர்ப்பு – மொழிபெயர்ப்பு சார்ந்த மொழியியல் கொள்கை – கைப்பட மொழிபெயர்த்தலும் அதில் எதிர்கொள்ளும் சிக்கல்களும் - ஆங்கிலத்திலிருந்து தமிழில் மொழிபெயர்த்தல் - தமிழில் இருந்து ஆங்கிலத்தில் மொழிபெயர்த்தல் - செய்தித்தாள் - தொழில்நுட்ப எழுத்தாக்கம் - இலக்கியம் (வகுப்பறை பயிற்சிகள், திட்டக் கட்டுரைகள்)
அலகு- 2	மொழியியல் தரவகம் - மொழியியல் தரவக அறிமுகம் - தரவுகள் சேகரிப்பு, தரவுகள் நிர்வகிப்பு, மொழித் தரவுகள் சேகரிப்பு முறைகள் - இணையத்திலிருந்து சேகரித்தல் - கைப்பட சேகரித்தல் – மின் நூலகம் பற்றி அறிமுகம், தமிழ்த் தரவுகளைத் தொடரியல், பொருளியல் வகைகளாகப் பகுப்பாய்வு செய்தல்
அலகு- 3	அகராதி – அகராதி பற்றிய அறிமுகம் - அகராதி உருவாக்கம் - மின் அகராதி உருவாக்கமும் கூட - சொல்வலை – சொல்களஞ்சியம் - விக்கிப்பீடியா போன்ற தளங்களில் தமிழ் நுவல் பொருளை பயன்படுத்தும் பல்வேறு முறைகள் - மொழி கற்பித்தல் - முதல் மொழி, இரண்டாம் மொழி கற்பித்தல் - மொழி பயிற்றுவித்தலில் பல்வேறு முறைகள். வரலாற்று மொழியியல் - தமிழ் மொழி தமிழ் எழுத்து வரி வடிவம், தோற்றம், வளர்ச்சி, பேச்சுமொழி, எழுத்து மொழி, வேறுபாடு, வட்டார வழக்கு மொழிகள்
அலகு- 4	கணினி மொழியியல் - கணினி மொழியியல் விளக்க வரையறை - இயற்கை மொழி ஆய்வு - விளக்க வரையறை – கணினி மொழியியலின் பல்வேறு பரிமாணங்கள். தமிழ்க் கணினியியல் - விளக்க வரையறை - தமிழ்க் கணினியியல் கருவிகள் - பல்வேறு தமிழ்க் கணினியியல் கருவிகள் குறித்த அறிமுகமும் விளக்கமும் - சொல் தொடர் பிரித்தல் - சொல் பகுப்பாய்வில் உருபனியல் பகுப்பாய்வில் பேச்சு கூறுகளைப் பகுத்தல்- பெயர்த்தொடர், வினைத்தொடர், மரபுத்தொடர் கண்டறிதல் - பெயர்க்கூறுகளை அங்கீகரித்தல்

அலகு- 5	தமிழ் - விசைப்பலகை – கணினி அச்சு செய்தல். தமிழ் விசைப்பலகை, கணினி அச்சு செய்தல் குறித்த அறிமுகம் - மொழி உள்ளீட்டு முறைகள் மற்றும் எழுத்துருக்கள், தமிழ் ஒருங்குறி (Tamil Unicode) (UTFS) தமிழ் தகவல் பரிமாற்ற எழுத்துக் குறியீடு (Tamil Script code for Information Interchange (TSCII) தேடு பொறிகளில் தமிழ்த் தேடல் (Search in Tamil in Search Engines) விக்கிபீடியா கட்டமைப்பு –விக்கிபீடியாவில் தமிழ் நுவல்பொருளை உருவாக்குதல் - விக்கிப் பீடியாவில் தமிழ் உள்ளடக்கத்தை எழுதிப் பதிவேற்றுதல் - பதிவேற்றியதைச் சீரமைத்தல்
Books:	1. Modern Linguistics: An Introduction:Verma S.K.(Author),Krishnassamy N. oxford University Press India: 1997 2. Fundamentals of Linguistics; Raj Kumar Sharma; Atlantic Publihers and Distributors Pvt. Ltd – 2019 3. An Introduction to Language and Linguistics: Ralph Fasold And Jeff Connor-Linton; Cambridge University Press; 2006 4. An_introduction_to_Language_and_Linguistics.pdf(bbg.ac.id) 5. Linguistic Theory of Translation: J C Catford; Oxford University Press, 1963 6. a-linguistic-theory-of-translation.pdf(wordpress.com) 7. Corpus Liguistics: An introduction Kindle Edition; Author : NiladriSekharDash; Pearson; 1st edition;2007 8. An introduction to Corpus Linguistics; Author-Graeme Kennedy; Routledge:1998 9. PALink: A high-end tool for sybtatic and semantic annotation for Tamil 10. Text:Customized by bAU-KBC; To download: http://78.46.86.133/PALinkA.tar.gz 11. Introduction : Lexicography in the Internet era (Introduction to The Routledge Handbook of Lexicograpohy) Pedro A.Fuertes-Olivera; October 2017 12. (3) (PDF) Introduction: Lexicography in the Internet era (Introduction to The Routledge Handbook of Lexicography)(researchgate.net) 13. Lexicography: An Introduction; Howard Jackson: The Routledge, 2002 14. Dictionary development (e-dictionary development also), Wordnet, Thesaurus; Corpus Development in Tamil: Content Development usig various methods such as Computational Approaches to Tamil Linguistics (in English) Author: Prof.VasulRenganatan; Crea Publications; 2016 15. Speech and Language Processing (in English); Dan Jurafsky and James H.Martin; Pearson Education India; 2013 16. Natural Language Processing and Information Retrieval; Tanvar Siddiqui and US Tiwary; Oxford University Press, New Delhi; 2018 .. Fifth Edition 2015 17. Kaninithamizh Tamil Computing (in Tamil); Prof.Ila.sundaram; Vikatan; 2016 18. valartamil-ariviyalinaiyatamil/வளர்தமிழில் அறிவியல்இணையத் தமிழ்;Prof Ponnavaiko, Prof.Krishna Murthi, Prof. Subbaiyapillai; அனைத்திந்திய அறிவியல் தமிழ்க்கழகம்; 2006 19. Iyarkai Mozhiyaaivu Thamizk;Prof. Subbaiyapillai / கு. சுப்பையாபிள்ளை

	உலகத்தமிழ்ஆராய்ச்சிநிறுவனம் 2012 20. Tamil Virtual Academy Tool: Tamil Computing Tools | தமிழ் இணையக் கல்விக் கழகம் TAMIL VIRTUAL AVADEMY (tamilvu.org) 21. AU-KBC tools 22. Search engines – AU-KBC	
Extra Reading	1. A course in Modern Lingisctics; Charles F Hockett; Oxford and IBH Publishing Co: 1958 2. (99+_PDF A course in modern linguistics by Hockett | HasanAmanj-Academia.edu	
நூல்கள்	1. தமிழும், கணிப்பொறியும் மா. ஆண்டோ பீட்டா	சென்னை, கற்பகம் புத்தகாலயம் 2002
	2. தமிழ் இணையம், தமிழ் வலைத்தளங்கள் பங்களிப்பும் , பயன்பாடுகளும், ம.செ. இரபிசிங்	சென்னை, நர்மதா பதிப்பகம் 2009
	3. தமிழ்க் கணினி இணையப் பயன்பாடுகள், துரை. மணிகண்டன	தஞ்சாவூர்,கமலினி பதிப்பகம்,2012
	4. தமிழும் கணினியும் இராதா செல்லப்பன்	திருச்சி, கவிதை அமுதம் வெளியீடு, 2011
	5. கணினித் தமிழ், இல. சுந்தரம்	சென்னை, விகடன் பிரசுரம்,2015
	6. ரெபிடெக்ஸ், கம்யூட்டர் கோர்ஸ், இ. இராமநாதன்	ரெபிடெக்ஸ்,புதுதில்லி,2011
	7. கணிப்பொறியில் தமிழ், த. பிரகாஷ்	சென்னை, பெரிகாம் நூல் வெளியீடு, 2005
	8. கணிப்பொறி அறிவியல், தகவல் தொடர்பு தொழில்நுட்பம். மு. பொன்னவைக்கோ	தமிழ் வளர்ச்சிக் கழகம், சென்னைப் பல்கலைக்கழகம்
	9. கி.கருணாகரன், வ.ஜெயா மொழியியல், கோயம்புத்தூர்	

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	get an exposure to Tamil computing for the creation of Lexicography and corpus development
K1, K2	CO 2	get expertise in Tamil Linguistics and computational Linguistics
K2, K4	CO 3	know the fundamentals of Tamil Linguistics, traditional Tamil language structure with a focus on computational Linguistics
K2, K3	CO 4	apply the parsing techniques for usage of syntactic and semantic annotation for Tamil
K4, K6	CO5	acquire skill in Natural language processing and computational Linguistics

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21TAE531	பெண்ணியம்	L	T	P	C
ELECTIVE –III விருப்பப் பாடம் - தாள் -III			4	-	-	3
Cognitive Level		**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of literature**				
Learning Objectives		The course aims at ➢ providing an understanding of literature through the ages with feminist point of you. ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ understanding the historical background of literature ➢ knowing the status of women through the portrayal of literature				

அலகு- 1	பெண்ணியம் – விளக்க வரையறை – பெண்ணியத் தோற்றம், வளர்ச்சி, வரலாறு - இன்றைய நிலை – நோக்கும் - போக்கும
அலகு- 2	மேலைநாட்டுப் பெண்ணியவாதிகள் - அவர்களது எழுத்தாக்கங்கள் - இந்தியப் பெண்ணிய வாதிகள் - இந்தியச் சமூகச் சீரமைப்பு இயக்கங்களும் பெண் மேம்பாட்டிற்கான செயல்பாடுகளும் - தமிழகத்துப் பெண்ணியவாதிகளும் அவர்களது இலக்கிய ஆக்கங்களும்.
அலகு- 3	சங்க கால மகளிர் நிலை – பணிப் பகிர்வு – மனைவாழ்க்கை – விருந்தோம்பல் - உழத்தி - ஆயமகளிர், பூவிலைப் பெண்டிர், அரச மகளிர் - புலமை நலமிக்க பெண்புலவர்கள் - உமட்டியர் - சிறு.குறு தொழில் புரியும் மகளிர் - புறவாழ்வில் மகளிர் பங்கு – ஆடை, அணிகலன்கள்,ஒப்பனைகள், கலைத்துறை நாட்டம் - மகப்பேறு – வாழ்வியல் அறங்கள் - பண்பாடு போற்றல்.
அலகு- 4	பாரதியாரின், பெண் விடுதலை சார் கட்டுரைகள் பத்து மட்டும்
அலகு- 5	பெண் நலவாழ்வு சார் சட்டங்களும், பெண் நலம் பேணும் அரசின் கொள்கைகளும், செயல் திட்டங்களும் - மகளிரை மேம்படுத்துவதில் இக்காலத் தமிழ் இலக்கியங்களின் பங்கு
நூல்கள்:	1. பெண்ணியம், இரா. பிரேமா, சென்னை, தமிழ்ப் புத்தகாலயம். 2. பெண்ணியல், அன்னை தெரசா மகளிர் பல்கலைக்கழக வெளியீடு. 3. பாரதியார் கட்டுரைகள

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the status of women through literature.
K1, K2	CO 2	understand the notable features of feminist writing.
K2, K4	CO 3	aware of the salient features of feminist concepts.
K2, K3	CO 4	apply and attempt to appreciate through feminist point of view.
K4,	CO5	critically analyze the works of great writers

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark-
No Correlation (N) - 0 Mark

COURSE CODE	U21TAE532	இணையத் தமிழ் இலக்கியம் Inaiya Tamil Ilakkiyam	L	T	P	C
ELECTIVE –III விருப்பப் பாடம் - தாள் -III			4	-	-	3

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of Tamil computing and Tamil literature in cyber space**
Learning Objectives	The course aims at ➢ providing a wide spectrum of Tamil literature in cyber space ➢ helping the students to know the base of Tamil language for computing and downloading the needed Tamil font ➢ enable them to study Tamil literature from digital library, Wikipedia and Tamil electronic journals. ➢ understanding the process of searching for Tamil content via Tamil search engines.
அலகு- 1	இணையத்தில் தேடுபொறிகள் - தமிழ் எழுத்துரு பதிவிறக்க முறைகள் - தமிழ் வழி இணையத்துள் புகுதல்
அலகு- 2	தமிழ் விக்கிப்பீடியா – தமிழ் விக்சனரி – தமிழ் உள்ளடக்கப் பதிவிறக்கம் - பதிவேற்ற விதிகள்
அலகு- 3	தமிழில் மின்னஞ்சல் அனுப்புதல் - தமிழில் மின்னஞ்சல் பெறுதல் - இணையத் தமிழ்த் தளங்கள் பத்தினைக் கண்டறிதல் - அவற்றின் அமைப்பு, இலக்கு, பயன் குறித்து ஒவ்வொன்றுக்கும் இரண்டு பக்க அளவில் எழுதிச் சமர்ப்பித்தல்
அலகு- 4	இணைத்தில் தமிழ் மின் இதழ்கள் ஐந்தினைப் பார்வையிடல் - அவ்விதழ்களின் உள்ளடக்கம், பின்னூட்ட நெறிகள் - நோக்கம் -பயன்பாடு குறித்து ஐந்து பக்கங்களுக்குள் எழுதிச் சமர்ப்பித்தல்
அலகு- 5	தமிழ் இணைய மின் நூலகங்கள் ஐந்தினை அறிதல்- தமிழ் இணைய நூலகங்களில் இருந்து ஒரு தமிழ் நூலைத் தேடிக் கண்டறிந்து பதிவிறக்கம் செய்ய அறிந்திருத்தல்
நூல்	டாக்டர். இராதா. செல்லப்பன், தமிழும் கணிப்பொறியும், திருச்சி, கவிதை அமுதம் வெளியீடு

Course Outcomes

Upon completion of this course the students will be able to

K1, K2	CO1	get an exposure to Tamil Literature through Tamil web sites
K1, K2	CO 2	get expertise in Tamil Computing. As per the requirements of Digital sphere.
K2, K4	CO 3	know thefundamentals of Tamil content development and publishing in web space
K2, K3	CO 4	apply the mechanics of writing for digital medium
K4, K6	C05	acquire skill to do Natural language processing

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAS511		L	T	P	C
SBE- I திறன் சார் விருப்பப் பாடம் - தாள் - 1		தகவல் தொடர்பியல் Thagaval Thodarbiyal	2	-	-	2
Cognitive Level		**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the art of writing for media**				
Learning Objectives		The course aims at ➢ providing a wide spectrum of media formats and content for Tamil media ➢ helping the students to know the growth of communication media in Tamilnadu. ➢ understanding the changes needed in the mechanics of writing for media.				

அலகு – 1	கணினிவழித் தகவல் தொடர்பு – புரொட்டோகால் (Protocal)- மேலிருந்து கீழ் - கீழிருந்து மேல் அணுகுமுறை 1.1 கம்பியில்லாத் தகவல் தொடர்பு 1.2 அலைபேசித் தொடர்பு முறை – 2ஜி, 3ஜி, 4ஜி, 5ஜி அலைகற்றை 1.3 உணரித் தொடர்புமுறை • தகவல் அலகுகளின் இணைப்பு (IOT) • இணையக் கல்வித் தொடர்பு (IOE)
அலகு – 2	வானொலித் தமிழ், தொலைக்காட்சித் தமிழ், தகவல் தொடர்பியலில் தமிழ்
அலகு – 3	தொலைத் தகவல் தொடர்பியலும் தமிழ் கருத்துப் பரவலும் - சமூக மாற்றங்கள் - தமிழ் கற்றல் - கற்பித்தல் முறைகள்
அலகு – 4	மின்னூடகத் தகவல் தொடர்பியலில் தமிழ் - தமிழ்த் தகவல் பரவல் - தரப்படுத்தல் - தகவல் பாதுகாப்பு முறைகள் - சமூக ஊடகங்களில் தமிழ் - விளைவுகள்
அலகு – 5	தகவல் தொடர்பு ஊடகங்களில் தமிழ் பயன்பாட்டுப் பயிற்சி நெறிமுறைகள் • கணித் தமிழ் பயிற்சிகளுக்கான தேவை • இணையத்தமிழ் பயிற்சிகளுக்கான தேவை இன்றியமையாமை – வழிமுறைகள் - செயற்படுத்தல்
பாடநூல்	1. க.அபிராமி – தகவல் தொழில்நுட்பம் - சென்னை, தமிழ்ப் புத்தகாலயம் 2. வெ. நல்லதம்பி – மக்கள் தகவல் தொடர்பியல்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	identify the changes in the usage of Tamil language as per the media for communication
K1, K2	CO 2	develop critical analysis of language structure adopted for media communication
K2, K4	CO 3	recognize the growth of media technology over the decades
K2, K3	CO 4	become proficient in the skill of writing for different media
K4, K6	C05	know the trend and coherence of language and literature over a period of time through communication media and the impact on society.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAS512	இலக்கியக் கொள்கைகள் Ilakkiya Kolkaigal	L	T	P	C
SBE- I திறன் சார் விருப்பப் பாடம் - தாள் - 1			2	-	-	2

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background and identifying the theoretical base of literature**
Learning Objectives	The course aims at ➢ providing an understanding of literary theories ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ understanding the historical background of literature and theories directed literary format and content over the years

அலகு – 1	இலக்கியக் கொள்கை – விளக்கம் - வரையரை – வகைகள் - வரலாறு – நோக்கும் - போக்கும் - இன்றைய நிலை
அலகு – 2	தமிழ் இலக்கியக் கொள்கைகள் 2.1. தொல்காப்பியரின் இலக்கிய கொள்கைகள் 2.2 சங்க இலக்கியய் கொள்கைகள் 2.3. தொல்காப்பியம் கூறும் தமிழ் இலக்கிய வகைமைகள் - நூல் - உரை – பிசி – வாய்மொழி – மந்திரம் - முதுமொழி) – குறிப்பு என்பன.
அலகு – 3	தமிழ்க் காப்பியக் கொள்கைகள் 3.1. தமிழ் நீதி இலக்கிய கொள்கைகள்
அலகு – 4	பக்தி இலக்கியக் கொள்கைகள் 4.1. சைவ இலக்கியக் கொள்கைகள் 4.2. வைணவ இலக்கிய சரணாகதிக் கொள்கைகள் 4.3. சமண இலக்கிய நிலையாமைக் கொள்கைகள் 4.4. பௌவுத்த இலக்கிய அவா அகற்றல் கொள்கைகள் 4.5. கிறித்தவ சமூக சேவைக் கொள்கைகள் 4.6. இசுலாமிய தீன் நெறி கொள்கைகள்
அலகு – 5	இக்கால இலக்கியக் கொள்கைகள் 5.1. புதுக்கவிதைக் கொள்கைகள் 5.2. தமிழ் சிறுகதைக் கொள்கைகள் 5.3. தமிழ் புதினக் கொள்கைகள் 5.4. தமிழ் நாடகக் கொள்கைகள் 5.5. தமிழ் உரைநடைக் கொள்கைகள்
நூல்கள்	1. அரங்க,சுப்பையா, இலக்கியத் திறனாய்வு - இசங்கள் - சென்னை, பாவை பதிப்பகம்.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	**CO1**	know the literary base and poetic tactics of writers
K1, K2	**CO 2**	understand the notable features of different literary theories and flow of writing
K2, K4	**CO 3**	aware of the salient features of principles of literature.
K2, K3	**CO 4**	apply and to appreciate literature from theratical perpectives
K4,	**CO5**	analyze the works of great writers and postulated theories

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -33/60
Moderately Correlating (M) - 2 Marks -26/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

SEMESTER-VI

COURSE CODE	U21TAT61	சங்க இலக்கியம் Sanga Ilakkiyam	L	T	P	C
CORE XIII முதன்மைப் பாடம் - XIII			5	-	-	4

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of literature**
Learning Objectives	The course aims at ➢ providing an understanding of Tamil classical literature of Ancient period. ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ understanding the historical background of literature

அலகு -1	1.1 நற்றிணை – 7 பாடல்கள் - ஔவையார் பாடியன. பாடல் எண் - 129 – பெருநகை கேளாய்! 187 – நெய்தல் கூம்ப நிழல் 295 – முரிந்த சிலம்பின் 371 – காயாங் குன்றத்துக் கொன்றை 381 – அருந்துயர் உழத்தலின் 390 – வாளை வாயின் பிறழ 394 – மரந்தலை புணர்ந்த..... 1.2 குறுந்தொகை – 5 பாடல்கள் அறிவுடை நம்பி - 1 பாடல் பாடல் எண் - 230 – அம்ம வாழி தோழி கொண்கன் கோப்பெருஞ்சோழன் பாடிய 4 பாடல்கள் பாடல் எண் - 20 – அருளும், அன்பும் நீக்கி பாடல் எண் - 53 – எம் அணங்கினவே மகிழ்ந! பாடல் எண் - 129 – எலுவ! சிறாஅர் ஏமுறு நண்ப! பாடல் எண் - 147 – வேனில் பாதிரிக் கூன்மலர் அன்ன! 1.3. ஐங்குறுநூறு கபிலர் பாடிய குறிஞ்சி - குறிஞ்சி 21 – அன்னாய் வாழிப்பத்து – 10 பாடல்கள் அன்னாய் வாழி வேண்டு அன்னை முதல் தணிதற்கும் உரித்து அவள் உற்ற நோயே என்று முடியும் பாடல் வரை
அலகு – 2	கலித்தொகை – 5 பாடல்கள் நல்லந்துவனார் பாடிய நெய்தல் கலி – பாடல் எண் - 141 – கண்டோர் கூற்று – அரிதினின் தோன்றிய யாக்கையுள் பாடல் எண் - 142 - கண்டோர் கூற்று – பிரிவுண்ட புணர்ச்சி புல் ஆரா பாடல் எண் - 143 - கண்டோர் கூற்று –அகல் ஆங்கண், இருள் நீங்கி பாடல் எண் - 144 - கண்டோர் கூற்று – நன்னுதா ல்! காண்டை, நினையா

	பாடல் எண் - 148 - தொல் இயல் ஞாலத்து
அலகு – 3	3.1 அகநானூறு – 5 பாடல்கள் மதுரைக் கூல வாணிகன் சீத்தலைச் சாத்தனார் பாடியன. பாடல் எண் - 53 - அறியாய் வாழி தோழி! பாடல் எண் - 134 – வானம் வாய்ப்பக் கவினி பாடல் எண் - 229 – பகல்செய் பல்கதிர்ப் பரிதி பாடல் எண் - 306 – பெரும்பெயர் மகிழ்ந! பேணாது அகன்மோ! பாடல் எண் - 320 – ஓங்குதிரைப் பரப்பின் வாங்குவிசை. 3.2. பரிபாடல் - 3 பாடல் கடுவன் இளவெளியினனார் - செவ்வேள் - பாடல் எண் - 5 – பாய்இரும் பனிக்கடல் கடுவன் இளவெளியினனார் - திருமால் - பாடல் எண் - 4- ஐந்து இருள் அறநீக்கி நல்லந்துவனார் - வையை – பாடல் எண் - 6 – நிறைகடல் முகந்து உராய்
அலகு – 4	4.1 புறநானூறு – 10 பாடல்கள் பெருஞ்சித்திரனார் பாடல்கள் பாடல் எண் - 158 – முரசு கடிப்பு இகுப்பவும், வால் வளை துவைப்பவும். பாடல் எண் - 159 – வாழும் நாளோடு, யாண்டு பல உண்மையின் பாடல் எண் - 160 – உருகெழு ஞாயிற்று, ஒண்கதிர் மிசைந்த பாடல் எண் - 161 – நீண்டு ஒலி அழுவம் குறைபட பாடல் எண் - 162 - இரவலர் புரவலை நீயும் அல்லை பாடல் எண் - 163 – நின் நயந்து உறைநர்க்கும், நீ நயந்து பாடல் எண் - 207 – எழு இனி, நெஞ்சம், செல்கம், யாரோ, பாடல் எண் - 208 – குன்றும், மலையும், பல பின் ஒழிய பாடல் எண் - 237 – நீடு வாழ்க! என்று யான் நெடுங்கடை குறுகி பாடல் எண் - 238 – கவி செந்தாழிக் குவிபுறத்து இருந்த 4.2 பதிற்றுப்பத்து – ஐந்தாம் பத்து – 5 பாடல்கள் இடல் பிறக்கோட்டிய செங்குட்டுவனைப் பரணர் பாடியது பாடல் எண் - 42 – தசும்பு துளங்கு இருக்கை பாடல் எண் - 45 – ஊன் துவை அடிசில் பாடல் எண் - 44 – நோய் தபு நோன்தொடை பாடல் எண் - 48 – போர் எழில் வாழ்க்கை பாடல் எண் - 49 – செங்கை மறவர்
அலகு – 5	பட்டினப்பாலை முழுவதும்
நூல்கள்	1. தமிழ்ச் செவ்வியல் நூல்கள் - தஞ்சைத் தமிழ்ப் பல்கலைக்கழக வெளியீடு 2. தமிழ்ச் செவ்வியல் நூல்கள் - ச.வே.சு.(ப.ஆ) மணிவாசகர் பதிப்பகம் 3. தமிழ் நூலை இணையைவழித் தேடி பெறுவதற்குரிய நெறிமுறைகள் - பதிவிறக்கம் செய்தல் - விலைக்குப் பெறுதல் வணிகக் கடிதம் எழுதுதல் இரண்டு பக்க அளவில் சிறுகதை எழுதுதல் பதினைந்து அடிகளில் புதுக்கவிதை எழுதுதல் இப்பகுதி மாணவியருக்குப் பயிற்சி தருவது. இதிலிருந்து தேர்வுக்கான வினாக்கள் கேட்கக் கூடாது

பாட நூல்கள்	சங்க இலக்கியம் - மூலமும், உரையும்	ச.வே. சுப்பிரமணியம், சென்னை, மணிவாசகர் பதிப்பகம், 2014
	பத்துப்பாட்டு, மூலமும், உரையும்	ச.வே. சுப்பிரமணியம், சென்னை, மணிவாசகர் பதிப்பகம், 2014
	செவ்வியல் நூல்கள்(தொ.நூ)	தஞ்சைத் தமிழ்ப் பல்கலைக்கழகம்
	தமிழ் இலக்கிய வரலாறு	மு.வரதராசன் சாஹித்திய அகாதெமி பப்ளிகேஷன்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the poetic tactics of the ancient writers
K1, K2	CO 2	understand the notable features of literary geners and flow of writing at sangam age.
K2, K4	CO 3	aware of the salient features of classical texts
K2, K3	CO 4	attempt to appreciate the nuances of ancient literatures
K4,	CO5	critically analyze the works of great writers

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAT62	தமிழ் நீதி இலக்கியம்	L	T	P	C
CORE XIV முதன்மைப் பாடம் - XIV		Tamil-Neethiilakiyam	5	-	-	4

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of literature**
Learning Objectives	The course aims at ➢ providing an understanding of Tamil ethical literature of Ancient period. ➢ helping the students imbibe the abiding human and moral ➢ values through the study of ethical literature. understanding the historical background of Tamil ethics handled in literature through the ages

அலகு – 1	திருக்குறள் - 10 அதிகாரங்கள் - (அறத்துப்பால் -1) அதிகாரம் 4 அறன் வலியுறுத்தல் அதிகாரம் 8 அன்பு உடைமை அதிகாரம் 10 இனியவை கூறல் அதிகாரம் 12 நடுவு நிலைமை அதிகாரம் 20 பயனில் சொல்லாமை அதிகாரம் 21 தீவினை அச்சம் அதிகாரம் 25 அருள் உடைமை அதிகாரம் 30 வாய்மை அதிகாரம் 31 வெகுளாமை அதிகாரம் 32 இன்னா செய்யாமை
அலகு – 2	நாலடியார் - 4 அதிகாரங்கள் - 40 செய்யுட்கள் மேன்மக்கள் -10 பெரியாரைப் பிழையாமை -10 நல் இனம் சேர்தல் -10 பெருமை -10
அலகு – 3	**பழமொழி – 15 செய்யுட்கள்** பாடல் எண் -15 அம் கண் விசும்பின் அகல் நலாப் பாரிக்கும் --- பாடல் எண் - 29 – முழுதுடன் முன்னே வகுத்தவன் எனும் பாடல் வரை **3.1 இன்னா நாற்பது** – 3 செய்யுட்கள் பாடல் எண் - 15 – புல் ஆர் புரவி மணி இன்றி ஊர்வு இன்னா பாடல் எண் - 16 – உண்ணாது வைக்கும் பெரும் பொருள் வைப்பு இன்னா பாடல் எண் - 17 – ஆன்று அவிந்த சான்றோருள் பேதை புகழ் இன்னா **3.2 இனியவை நாற்பது** - 3 செய்யுட்கள் பாடல் எண் - 17 நட்டாக்கு நல்ல செயல் இனிதே பாடல் எண் - 18 மன்றன் முதுமக்கள் வாழும் பதி இனிதே பாடல் எண் - 19 நட்டார்ப்புறம் கூறான் வாழ்தல் நனிஇனிதே
அலகு – 4	சிவப்பிரகாசர் - நன்னெறி – முதல் 30 பாடல் மட்டும்
அலகு – 5	அதிவீரராம பாண்டியர் - வெற்றி வேற்கை ஔவையார் - ஆத்திசூடி

	முன்சீப் வேதநாயகம் பிள்ளையின், 'நீதிநூல்' அதிகாரம் - 44 'விலங்கினத்துக்கு இடர் செய்யாமை' என்பதில் வரும் 'விலங்கினங்கட்கு வாக்கும், வினை உணர் ஞானத்தோடும்' என்று தொடங்கும் முதல் பாடல்	
நூல்	1. திருக்குறள்	பரிமேலழகர் உரை
	2. நாலாடியார்	தமிழ் இணையக் கல்விக் கழக மின் நூலகம
	3. பழமொழி	தமிழ் இணையக் கல்விக் கழக மின் நூலகம்
	4. இன்னா நாற்பது	மின் நூலகம்
	5. இனியவை நாற்பது	மின் நூலகம்
	6. நன்னெறி	மின் நூலகம்
	7. வெற்றி வேற்கை	மின் நூலகம்
	8. ஆத்திசூடி	மின் நூலகம்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the values adhered by people all through the life for moral well-being
K1, K2	CO 2	understand the noble ethics taught through literature.
K2, K4	CO 3	aware of the values and ethics upholded by Tamil socity through Literature
K2, K3	CO 4	attempt to appreciate the suitability of values insisted by ancient scholars
K4	CO5	critically analyze the works of great writers

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAT63	அணி இலக்கணம் - தண்டியலங்காரம் முழுவதும்	L	T	P	C
CORE XV முதன்மைப் பாடம் - XV		Ani Ilakkanam-Thandiyalangaram Muluvathum	5	-	-	4
Cognitive Level		**K1: Skill in poetics** **K2: Understanding** **K3: give citation** **K4: Analysis** **K5: To know the structure of Tamil verses**				
Learning Objectives		The Course aims to • make students obtain writing skills with correct usage of grammar. • develop poetic proficiency • gain rich knowledge about simily, metaphor and other beauty components of Tamil verses through the literature • learn and brighten up their capacity to write classical verses • strengthen the poetry writing skills.				

அலகு-1	பொது அணி இயல். 1.1 தற்சிறப்புப் பாயிரம் முதல் புறனடை வரையிலான 26 நூற்பாக்கள்
அலகு-2	பொருள் அணி இயல் -1 காப்பு முதல் விபாவனை அணி வரையிலான நூற்பாக்கள்(27 முதல் 51 வரை)
அலகு-3	பொருள் அணி இயல் -2 ஒட்டு அணி முதல் அவநுதி அணி வரையிலான நூற்பாக்கள்(52 முதல் 75 வரை)
அலகு -4	பொருள் அணி இயல் மற்றும் சொல் அணி இயல் சிலேடை அணி முதல் சித்திரகவி வரையிலான நூற்பாக்கள் (76 முதல் 98 வரை)
அலகு -5	சொல் அணி இயல் தொடர்ச்சி வழுக்களின் வகை முதல் புறனடை வரையிலான நூற்பாக்கள (99 முதல் 126 வரை)
நூல்கள்	தண்டியலங்காரம் - திருநெல்வேலி சைவ சித்தாந்த நூற்பதிப்புக் கழக வெளியீடு

COURSE OUTCOME

At the end of the course, the students will be able to:

K1, K2	CO1	acquire knowledge of poetic beauty of Tamil literature
K1, K2	CO2	use grammatical structures of Tamil verses.
K5, K4	CO3	analyse the grammatical structure of verses in Tamil texts and know the impact of sanskrit literature
K5, K1	CO4	analyse the format of verses written in Standard Tamil.
K3	CO5	make inferences and predictions based on comprehension of a text.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S) - 3 Marks—42/60
Moderately Correlating (M) - 2 Marks—16/60
Weakly Correlating (W) - 2 Marks
No Correlation (N) - 0 Mark

COURSE CODE	U21TAT64	தமிழக கோவில் கலைகள் கல்வெட்டுகள் உணர்த்தும் பண்பாடு Tamilaga Kovil Kalaigal kalvetukal Unarthum Panpaadu	L	T	P	C
CORE XVI முதன்மைப் பாடம் - XVI			5	-	-	4
Cognitive Level		K1: Learning K2: Understanding K3: Applying K4 : Analysing K5: knowing the background of temple arts				
Learning Objectives		The course aims at ➢ providing a wide spectrum of culture through the ages by temple architect, arts and inscriptions. ➢ helping the students to appreciate temple arts and culture. ➢ understanding the historical background and messages conveyed through inscriptions.				

அலகு – 1	தமிழகக் கோவில்கள் - சங்ககாலக் குறிப்புகள் - பல்லவர் காலக் குடைவரை கோயில்கள் - கற்றளிகள் - சோழர் காலக் கோயில்கள் - விமானங்கள் - நாயக்கர் காலக் கோபுரங்கள் - திருச்சுவர் – திருச்சுற்று – பிரகாரங்கள் - பிற்காலக் கோயில்கள் - கோயில்களின் அமைப்பு முறை வரலாற்று நோக்கு
அலகு – 2	கோவில்சார் கலைகள் - சிற்பக்கலை – கட்டடக்கலை – ஓவியக் கலை இசைக் கலை – வாத்தியக்கலை – நடனக்கலை – நாடகக்கலை - பிறகலைகள்
அலகு – 3	கோவில் கல்வெட்டுகள் - தமிழகக் கோவில்களில் கல்வெட்டுகள் - கோவில் கொடைகள் - நிபந்தங்கள் - திருப்பணிகள் சார் கல்வெட்டுகள் - வரலாறு
அலகு – 4	தமிழகக் கோவில்கள் சமுதாயக் கூடங்களாகத் திகழ்ந்தமை – மக்களின் வழிபாட்டுக் கூடங்கள் - மக்கள் சேவை மையங்கள் - கூட்டு வழிபாட்டு நெறிகள் - உணவளிக்கும் அறச்சாலைகள்
அலகு – 5	தமிழகக் கோவில்களும் பண்பாடும் - கோவில் திருவிழாக்கள் - ஊரார் பங்கேற்பு- பணி கொடை – பணிப்பகிர்வு – நம்பிக்கைகள் - தமிழகப் பண்பாட்டு வரலாற்றில் கோயில்கள் - பெறுமிடம்
நூல்	1. இ.கா.பெருமாள், தமிழகக் கோயில்கலைகள், கல்வெட்டுகள் உணர்த்தும் பண்பாடு தமிழகக் கோவில்கள், கல்வெட்டுகள் - பிபிசி சிறப்புக்கட்டுரை 2. முனைவர். பாக்கியமேரி, காலந்தோறும் தமிழர்கலைகள், அறிவுப் பதிப்பகம், சென்னை 2008. 3. மயிலை சீனி. வேங்கடசாமி, நுண்கலைகள், 2011 4. மயிலை சீனி. வேங்கடசாமி, தமிழர் வளர்த்த அழகுக்கலைகள், சென்னை பாவை பப்ளிகேசன், 1998 5. முனைவர்.ஆறு.இராமநாதன், நாட்டுப்புறக் கலைகள், சிதம்பரம், மெய்யப்பன், தமிழ் ஆய்வகம் 6. பொ.இராஜேந்திரன், சொ.சாந்தலிங்கம், கோயிற்கலை, சென்னை, 2014, நியூ செஞ்சுரி புக் ஹவுஸ்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the historical background of the temple arts
K1, K2	CO 2	understand the growth of temple architecture from time to time.
K2, K4	CO 3	aware of the salient features of temple culture through inscriptions
K2, K3	CO 4	know the trend of culture
K4, K6	CO5	critically analyze the inscriptions and aware of cultural, historical, political, social and economic background of Tamil society

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21TAT65	படைப்பிலக்கியம்	L	T	P	C
CORE XVII முதன்மைப் பாடம் - XVII			4	-	-	4
Cognitive Level		**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the art of writing**				
Learning Objectives		The course aims at ➢ providing an understanding of Tamil creative literature ➢ helping the students to know the art of writing with moral and human values. ➢ understanding the historical background of Tamil literature and gain confidence in writing on their own.				

அலகு – 1	மரபுக்கவிதை எழுதச் செய்தல் - ஈற்றடி தந்து எழுதச் செய்தல் (அ) முதல் சொல் தந்து எழுதச் செய்தல்.
அலகு – 2	புதுக்கவிதை – குறுங்கவிதை – துணுக்குப்பா எழுதச் செய்தல் - தலைப்பு தந்து எழுதச் செய்தல் - உணர்வுகள் - சூழல்கள் சொல்லப்பட்டு எழுதச் செய்தல்.
அலகு – 3	தலைப்பு தந்து மூன்று பக்க அளவில் சிறுகதை எழுதச் செய்தல் - மையக்கரு தந்து எழுத வைத்தல்
அலகு – 4	தலைப்பு தந்து ஓரங்க நாடகம் எழுதச் செய்தல்
அலகு – 5	சிறுவர் இலக்கியம் படைத்தல் - குழந்தை பாடும் வகையில் எளிய பாடல்கள் எழுதச் சொல்லல்- குழந்தைகளுக்கான கதைகள் எழுதுதல் உங்களுக்குத் தெரியுமா? சிறு விளக்க உரைகள் - துணுக்குகள் - நகைச்சுவைக் கட்டுரை எழுதுதல்.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the values to be handled in creative writing for people to live happily
K1, K2	CO 2	understand the noble ethics taught through literature and develop an attitude towards creative writing.
K2, K4	CO 3	aware of the values and ethics upholded by Tamil socity and have them in their writing
K2, K3	CO 4	attempt to appreciate the suitability of values insisted by ancient scholars and decide to go in that path or to do something innovvatively
K4	CO5	critically analyze the works of great writers and Have those works as models for their writing

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAE641	திராவிட மொழிகளின் ஒப்பிலக்கணம்	L	T	P	C
ELECTIVE –IV விருப்பப் பாடம் - தாள் - IV		Thiravida mozhigalin oppilakkanam	4	-	-	3
Cognitive Level		**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of Dravidian languages.**				
Learning Objectives		The course aims at ➢ providing a wide spectrum of Dravidian languages in India. ➢ helping the students to know about the base for Dravidian languages. ➢ enable them to study the similarities between protodravidian language and Tamil language ➢ understanding the place of Tamil in relation to other languages of Dravidian family.				

அலகு – 1	மொழிக் குடும்பம் - வரையறை – உலக மொழிக் குடும்பங்கள் - திராவிட மொழிக் குடும்பங்கள் - அவற்றின் தனித்தன்மைகள்
அலகு – 2	திராவிடம் என்பதன் பொருள் - மூலத் திராவிடம் - தொல் திராவிடம் - அதன் இயல்புகள் - அது தமிழுடன் ஒத்து இருத்தலைப் பரிசீலித்தல்.
அலகு – 3	திராவிட மொழிகளின் வகைபாடுகள் - தென் திராவிட மொழிகள் - அவற்றின் பொதுமைப் பண்புகள்
அலகு – 4	நடு திராவிட மொழிகள் - அவற்றின் பண்புகள் - வழங்குமிடம் - வழக்கு நிலை
அலகு – 4	வட திராவிட மொழிகள் - அவற்றின் பொதுமைக் கூறுகள் - தனித்துவப் பண்புகள்.
பாட நூல்கள்	கால்டுவெல் - திராவிட மொழிகளின் ஒப்பிலக்கணம் சைவ சித்தாந்த நூற்பதிப்புக் கழக வெளியீடு.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	Know the historical background of the languages spoken in Deccan and other parts of India.
K1, K2	CO 2	understand the differences between Dravidian and Indo-Aryan languages in India.
K2, K4	CO 3	Aware of the salient features of Dravidian languages and Develop critical thinking of place of Tamil with other languages of Dravidian origin
K2, K3	CO 4	Know the trend of changes occured in language of Dravidian family
K4, K6	C05	Critically analyze the Dravidian languages at different periods of time.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAE642	தமிழ் கலைச்சொல்லாக்க நெறிகள் Tamil Kalaisollakka Nerigal	L	T	P	C
ELECTIVE –IV விருப்பப் பாடம் - தாள் - IV			4	-	-	3

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the art of coining new words in Tamil for new technical terms**
Learning Objectives	The course aims in ➢ providing the basics of translation and coining new terms in Tamil for new ideologies of science and technology ➢ helping the students to know the techniques of Translation. ➢ enable them to coin new words to denote new equipments in Tamil languages and its relevance be assessed and standardised ➢ understanding the process and rules of framing new technical terms.

அலகு 1	கலைச்சொல் - விளக்க வரையறை – புதுச்சொற்களை உருவாக்குவதன் அவசியம் - மொழி பெயர்ப்பும் துறைசார் கலைச்சொல்லாக்கமும் - நைடாவின் மொழிபெயர்ப்பு விதிகள்
அலகு 2	தமிழ் கலைச்சொல்லாக்க முறைகள் - கருத்தாக்க விரிவு – சொல்லாக்கச் செறிவு - இரண்டனுக்கும் இடையிலான சமன்மை – பல் வகைச் சொற்கள் உருவாக்கம் - தரப்படுத்த நெறிகள்
ஆலகு 3	**3.1** அறிவியல் கலைச் சொல்லாக்க விதிமுறைகள் அனைத்துலகக் கலைச் சொல் உருவாக்க நெறிகள் 3.2 கலைத்துறைக் கலைச்சொல்லாக்க விதிமுறைகள் 3.3 கலைச்சொல்லாக்கத்தில் பயன்படுத்தப்படும் • ஒலிபெயர்ப்பு முறைகள் • இருமொழி கையாளல் • கணிதக் குறியீடுகள் • பன்மொழிப் பயன்பாடு சார் நெருடல்கள்
அலகு 4	ஊடகங்களும் தொழில் நுட்பத் தமிழும் - அச்சு ஊடகம் - மின் ஊடகம் - வானொலி – தொலைக்காட்சி – திரைப்படம் - தொலைவரி – தொலைநகலி – செயற்கைக் கோள் கணினி - இணையம் - வலைதளம் - முகநூல் - மின்னஞ்சல் - கைபேசி – பிற சாதனங்கள்.
அலகு 5	பாடத்துறை சார்ந்த பத்துத் தொழில் நுட்பச் சொற்களுக்குத் தக்க தமிழ்க் கலைச்சொற்களை உருவாக்குதல்
நூல்	முனைவர். இராதா செல்லப்பன், கலைச்சொல்லாக்கம், திருச்சி, கவியமுதம் வெளியீடு

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the translation tactics of framing new terms for new devices and concepts
K1, K2	CO 2	understand the notable features of new ideologies of different disciplines and found appropriate terms in source and target language
K2, K4	CO 3	aware of the salient features of translating texts with their cultural features.
K2, K3	CO 4	apply and attempt to solve problems in translation
K4,	CO5	critically analyze and coin new terminology for the translation of advanced science and technology

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 marks -20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21TAS61	கல்வெட்டியல்	L	T	P	C
SBE-I திறன்சார் விருப்பப் பாடம்			2	-	-	3

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the art of reading Inscriptions.**
Learning Objectives	The course aims at ➢ providing a wide spectrum of messages engraved in Inscriptions through the ages. ➢ helping the students to read Inscriptions. ➢ understanding the historical background of messages conveyed through inscriptions.

அலகு -1	கல்வெட்டுக்கள் - நடுகல் - கல்வெட்டுக்களின் வகைகள் - நோக்கம் - தமிழ்க் கல்வெட்டுக்களின் தோற்றம், விளக்கம் வரலாறு
அலகு -2	கல்வெட்டுத் தமிழ் - பிராமிக் கல்வெட்டு – குகைக் கல்வெட்டுகள் - செப்பேடுகள் - சாசனங்கள் - மெய்க்கீர்த்திகள் - பதிவு செய்யும் செய்திகள்
அலகு -3	பழங்காலக் கல்வெட்டுச் செய்திகள்
அலகு -4	சோழர் காலக் கல்வெட்டுச் செய்திகள்
அலகு -5	பிற்காலக் கல்வெட்டு ஆவணங்கள் - தமிழ்க் கல்வெட்டியல் - துறை வெளியீடுகள்.
நூல்	தமிழகக் கல்வெட்டியல் துறை ஆவண வெளியீடுகள்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the historical background of the Inscriptions.
K1, K2	CO 2	understand the growth of Inscriptions in temples from time to time.
K2, K4	CO 3	aware of the salient features of temple culture through inscriptions
K2, K3	CO 4	know the trend of culture
K4, K6	CO5	critically analyze the inscriptions and aware of cultural, historical, political, social and economic background of Tamil society

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

NON MAJOR ELECTIVE – NME

COURSE CODE	U21TAN42	மொழி பெயர்ப்பியல்	L	T	P	C
SEMESTER - IV			2	-	-	2

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the fundamentals TamilTranslation**
Learning Objectives	The course aims at ➢ providing the basics of translation ➢ helping the students to know the techniques of Translation. ➢ enable them to study the Machine language translation and its relevance to Tamil languageparsing techniques. ➢ understanding the process of shallow parsing and deep parsing and natural language processing.

அலகு – 1	**மொழிபெயர்ப்பு** - மூலமொழி - இலக்கு மொழி – மொழிபெயர்ப்பின் தேவையும், பயனும் - மொழிபெயர்ப்பாளர் தகுதிகள் - தமிழ் மொழி பெயர்ப்பின் வரலாறு
அலகு – 2	**மொழிபெயர்ப்பு வகைகள்** - முழுநிலை மொழிபெயர்ப்பு பகுதி நிலை மொழிபெயர்ப்பு சொல் நேர் மொழிபெயர்ப்பு கட்டில்லா மொழிபெயர்ப்பு தழுவல்
அலகு – 3	படைப்பிலக்கிய மொழிபெயர்ப்பு – கவிதை, கதை, கட்டுரை அறிவியல் மொழிபெயர்ப்பு – மருத்துவ நூல்கள் மொழிபெயர்ப்பு
அலகு – 4	மொழிபெயர்ப்பு முறைகள் - மொழிபெயர்ப்புக் கருவிகள் - மொழிபெயர்ப்புச் சிக்கல்கள்
அலகு – 5	மொழிபெயர்ப்புப் பயிற்சி – உரைநடை, கதை ஐந்து வாக்கியங்கள் தந்து தமிழிலிருந்து ஆங்கிலத்துக்கு மொழி பெயர்க்கச் செய்தல் ஐந்து வாக்கியங்கள் தந்து ஆங்கிலத்திலிருந்து தமிழுக்கு மொழி பெயர்க்கச் செய்தல்
பாடநூல்கள்	1. வளர்மதி, மொழிபெயர்ப்பியல் 2. சு. சண்முக வேலாயுதம், மொழிபெயர்ப்பியல் 3. கா. பட்டாபிராமன் - மொழிபெயர்ப்புக் கலை 4. சேதுமணி மணியன் - மொழிபெயர்ப்பியல் கோட்பாடு 5. நா. முகமது செரிப் - மொழிபெயர்ப்பு வழிகளும் வாய்ப்புகளும்

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the translation tactics of literature
K1, K2	CO 2	understand the notable features of literary geners and flow of writing in source and target language
K2, K4	CO 3	aware of the salient features of translating texts with their cultural features.
K2, K3	CO 4	apply and attempt to solve problems in translation
K4,	CO5	critically analyze and coin new terminology for the translation of advanced science and technology

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

VALUE ADDED COURSE

COURSE CODE	U21TAV511	இதழியல்	L	T	P	C
SEMESTER - V			-	-	-	2

Cognitive Level	**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the art of writing for media**
Learning Objectives	The course aims at ➢ providing a wide spectrum of media formats and content for Tamil media ➢ helping the students to know the growth of communication media in Tamilnadu. ➢ understanding the changes needed in the mechanics of writing for media.
அலகு – 1	இதழியல் - தோற்றம் - வகைகள் - வளர்ச்சி இன்றைய நிலை - இந்திய இதழ்கள் - தமிழ் இதழ்கள் - வளர்ச்சி வரலாறு – தமிழ் இதழாளர்கள் - திரு.வி.க,- அறிஞர் அண்ணா – பெரியார் - சி.பா. ஆதித்தனார் - ஏ.என் சிவராமன் - கி.வா. ஜகந்நாதன் - கல்கி – ஏ.எஸ். அண்ணாமலை – வாசன் - தமிழ்வாணன் தமிழ் இலக்கிய இதழாளர்கள்.
அலகு – 2	செய்தி மூலங்கள் - செய்தி சேகரித்தல் - செய்தி நிறுவனங்கள் - நிருபர்கள் - தகுதிகள் - கடமைகள்
அலகு – 3	செய்தி கட்டமைப்பு – தலைப்பு – முதல் பத்தி – உடல் பகுதி – தலையங்கம் - செய்தி வகைகள் - பக்க அமைப்பு
அலகு – 4	பதிப்பாசிரியர் - ஆசிரியர் குழு - இதழ் நிர்வாகம் - விளம்பரங்கள் - விற்பனை – வாசகர் கடிதம்
அலகு – 5	இதழியல் சட்டங்கள் - இதழியல் சுதந்திரம் - இந்திய விடுதலைக்கு இதழ்களின் பங்கு - இன்றைய தமிழ் இதழ்களின் நோக்கும் போக்கும்.
பாடநூல்	1. மா.பா.குருசாமி - இதழியல் கலை 2. மா.சு.சம்பந்தன் - தமிழ் இதழியல் வரலாறு

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	identify the changes in the usage of Tamil language as per the media for communication
K1, K2	CO 2	develop critical analysis of language structure adopted for media communication by eminent media personalities.
K2, K4	CO 3	recognize the growth of media technology over the decades
K2, K3	CO 4	become proficient in the skill of writing for different media
K4, K6	CO5	know the trend and coherence of language and literature over a period of time through communication media and their impact on society.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks- 39/60
Moderately Correlating (M) - 2 Marks—20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21TAV512	தமிழ் சதக இலக்கியம்	L	T	P	C
SEMESTER - V			-	-	-	2
Cognitive Level		**K1: Learning** **K2: Understanding** **K3: Applying** **K4 : Analysing** **K5: knowing the background of Sathagam literature**				
Learning Objectives		The course aims at ➢ Providing an understanding of Tamil Sathagam literature. ➢ Helping the students imbibe the abiding human and moral values through the study of great pieces of Sathagam literature. ➢ Understanding the historical background of Sathagam literature and know the life style of people portrayed through Sathagam literature.				

அலகு -1	தொண்டைமண்டல சதகம் - நூலமைப்பு – நுவல்பொருள் சுருக்க வரைவு – வரலாற்றுப் பதிவுகள் - சமூக, பண்பாட்டு, வாழ்வியல் அரசியல் சார் குறிப்புகள் - நூலின் நயங்கள் - வரலாற்றுப் பயன்பாடு
அலகு -2	சோழ மண்டல சதகம் - நூல் வரலாறு – காலம் - நூலாசிரியர் வரலாறு – நூலமைப்பு - நூல் பொருள் சுருக்கம்- நூலமைப்பு -
அலகு -3	பாண்டிய மண்டல சதகம் - நூல் தோன்றிய சூழல் - காலப் பன்னை – வரலாறு – நூலாசிரியர் குறிப்பு – நூலமைப்பும், நுவல் பொருளும் இலக்கிய நயங்கள் - வரலாற்றுப் பதிவுகள்
அலகு -4	தமிழ் நாவலர் சரிதை – நூல் அமைப்பும் வரலாறும்-கருப்பொருள் சுருக்க வரைவு – நூல் ஆசிரியர் வரலாறு – காலப் பின்னணி – வரலாற்று நோக்கிலும். இலக்கிய நோக்கிலும், அணுகி ஆராய்தல்
அலகு -5	தண்டலையர் சதம் - நூலமைப்பும், நுவல் பொருளும் - இலக்கிய நயங்கள் - தனிச்சிறப்புக்கள் – பொதுமைக் கூறுகள் - இலக்கியப் பனுவல்களை வரலாற்று ஆவணங்களாகக் கொள்வதில் நேரும் சிக்கல்கள், தீர்வுகள்
நூல்கள்	1. தொண்டை மண்டல சதகம், மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம். 2. சோழ மண்டல சதகம், மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம். 3. பாண்டிய மண்டல சதகம், மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம். 4. தமிழ் நாவலர் சரிதை, மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம். 5. தண்டலையர் சதகம், மதுரை மின்நூல் தொகுப்புத் திட்ட மின் நூலகம்.

COURSE OUTCOMES

Upon completion of this course the students will be able to

K1, K2	CO1	know the historical information given by the writers of Tamil Sathagam literature.
K1, K2	CO 2	understand the notable information about social history of Tamil Society given through Sathagam Literature.
K2, K4	CO 3	aware of the salient features of Sathagam texts of different regions.
K2, K3	CO 4	attempt to appreciate the nuances of Sathagam literature
K4,	CO5	critically analyze the works of writers of Sathagam Literature.

Mapping of Cos with POS & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks -39/60
Moderately Correlating (M) - 2 Marks -20/60
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

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Department of English

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

DEPARTMENT OF ENGLISH

M.PHIL ENGLISH

SYLLABUS TO BE IMPLEMENTED FROM THE ACADEMIC YEAR 2021-2022

(CHOICE BASED CREDIT SYSTEM)

SYLLABUS, REGULATION AND SCHEME OF EVALUATION

Name of M.Phil. Programme: English
Eligibility: Master's degree in the relevant discipline with 55% marks

Common Entrance Exam: University conduct a Common Entrance Test (CET) for M.Phil. admission

Structure of M.Phil.

No	Paper Code	Course Title	Hours	Credits	Continuous Internal Assessment (CIS)	End Semester Exam (ESE)	Total
		Semester I					
1.	M21ENT11	Core I (Theory)- Rhetoric, Stylistic and Mechanics of Research Writing	10	4	40	60	100
2.	M21ENT12	Core II Literary Theory and Criticism	10	4	40	60	100
3.	M21PST13	Core III (Theory)- Common Paper Professional Skills	10	4	40	60	100
		Total	30	12			300
		Semester II					
4.	M21ENT21	Core IV (Theory)- Area Paper	10	4	40	60	100
5.	M21END21	Dissertation + Viva-voce	20	14(12+2)	-	-	200
		Total	**30**	**18**			**300**
		Total	**60**	**30**			**600**

The M.Phil course consists of four theory papers. Paper III is common for all the programmes. Area Paper (IV) is pertaining to the area of specialization chosen by the candidate with the approval of guide. Area paper is purely internal (framing syllabus, question setting and evaluation) whereas the external exam will also be conducted for area paper.

Each candidate will submit a dissertation on a topic in the relevant discipline after carrying out the project work under the supervision of a guide. The duration of the project work will be for six months.

The dissertation will be evaluated by an external examiner and viva voce will be conducted for the candidate.

The examination will be for 100 marks in each of the theory papers. The question paper will cover the entire syllabus. The duration of the examination is 3 hours.

RHETORIC, STYLISTIC AND MECHANICS OF RESEARCH WRITING

Credits: 4 **Hours: 10**

COURSE OUTCOMES

After successful completion the scholar will

- Identify the research gaps
- Become a competent researcher
- Acquire the language of research
- Able to apply critical tools in her research
- Will be methodological

UNIT I Rhetoric and Types Of Writing
What is Research? Types of Research-Quantitative and Qualitative; Literary Review; Working Bibliography; Identifying Research gap; Selecting a topic; Collecting sources; Identifying a Research problem; Forming the thesis statement; Outlining; Drafting; How to use digital space for Research, Web sources-Grammarly, Orkund

UNIT II Stylistics and Mechanics of Research Writing
Mechanics of Writing; Language and style; Abbreviations; Quotations; Ellipses; Parenthesis; Tables; Appendices; Work Cited (MLA 8th Edition)

UNIT III Methodology
The Forms of Discourse and the Main Intention – Exposition and its Methods – Argument – Description – Narration – Diction – Sentence – Paragraph – Coherence

UNIT- IV Methodology
Parenthetical documentation, footnotes, end notes, author-date system, number system, citations-books, non-periodical, articles, online publications, miscellaneous print and online sources.

UNIT-V Methodology
Layout of a Thesis: Title Page – Certificate – Abstract – Preface or Acknowledgements – Contents – Introduction – Body of a Thesis – Summation – Appendix - Works Cited or consulted.

Thesis Typing: Paper – Margin and Spacing – Pagination. Mechanics of Writing: Punctuation, Spelling, Grammar; Plagiarism; Revising; Abbreviation; Proof Reading.

References:

1. Bateson, F. W. The Scholar Critic. Abingdon: Routledge&Kegan Paul Books;1972.
2. Joseph GibaldiM L A Hand Book VII and VIII Ed. New Delhi: MLA of America, 2009.
3. Tracy Bowell and Gary Kemp Critical Thinking: A Concise Guide
4. Thorpe, J. Aims and Methods of Scholarship in Modern Languages and Literature. New

York: MLA of America, 1963.
5. Wellek and Warren. Theory of Literature. Penguin Books,1949.
6. William Campbell. Form and Style in Thesis Writing. New York. Houghton Mifflin Company, 1978.
7. Williamson, Karp & Others. The Research Craft: An Introduction to Social Research Methods.Glenview, Ill. : Scott, Foresman, 1982.
8. Wilfred Guerin A Handbook to Critical Approaches to Literature

S.No	Course Outcomes	Levels
CO1	Identify the research gaps	Level - 1
CO2	Extent a competent researcher	Level - 3
CO3	Acquire the language of research	Level - 1
CO4	Ability to apply critical tools in her research	Level - 3
CO5	(Analyse)Will be methodological	Level - 4

CO - PO MATRIX

S.No	Cos	POs	PSOs
CO1	Identify the research gaps	2,3,5,6	2,3,5
CO2	Extend a competent researcher	2,3,5,6	2,3,5
CO3	Acquire the language of research	2,3,5,6	2,3,5
CO4	Ability to apply critical tools in her research	2,3,5,6	2,3,5
CO5	(Analyse)Will be methodological	2,3,5,6	2,3,5

COMPUTATION OF CO-PO / PSO ATTAINMENT

	Programme Outcomes							Programme Specific Outcomes				
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		2	2		2	3			3	2		3
CO2		3	3		1	2			3	3		3
CO3		2	2		2	3			2	2		3
CO4		2	3		2	2			2	3		3
CO5		2	3		2	3			3	2		3
AVG		2.2	2.6		1.8	2.6			2.6	2.4		3
WA		2	3		2	3			3	2		3

LITERARY THEORY AND CRITICISM

Credits: 4 **Hours: 10**

COURSE OUTCOMES:

After successful completion of the course the scholars will be able to

- Apply theory to literary works
- Distinguish between theory and application
- Understand the methodological framework
- Evaluate theoretical terminology

UNIT I Critical Terms

Ambiguity, Affective fallacy, Connotation, Comparative Literature, Denotation, Existentialism, Expressionism, Humanism, Hermeneutics Impressionism, Intentional Fallacy, Irony, Objective Correlative, Platonism, Phenomenology, Realism, Stream of Consciousness, Surrealism, Semiotics, Stylistics

UNIT II Criticism

Deconstruction, Postmodernism, Psychoanalytic Criticism, Marxist Criticism, New Historicism, Postcolonial criticism, Narratology

UNIT III Linguistics, Meaning, Reader-response theory, Structuralism

Roman Jakobson	:	"Linguistics and Poetics"
I.A. Richards	:	"Four Kinds of Meaning"
Roland Barthes	:	"The Death of the Author"
Jacques Derrida	:	"Structure, Sign and Play in the Discourse of the Human Sciences"

UNIT IV Feminism

Elaine Showalter	:	"Towards a Feminist Poetics"
Virginia Woolf	:	"A Room of One's Own"

UNIT V Reader-Response Criticism, Eco-Criticism

Stanley Fish	:	"Is there a Text in This Class?"
William Rueckert	:	"Literature in Ecology: An Experiment in Eco Criticism"
Barbara Christian	:	"Race for Theory"

References:

1. Guerin, Wilfred L. A Handbook of Critical Approaches to Literature. New York: Harper & Row, 1966. Print.
2. Leitch, Vincent B The Norton Anthology of Theory and Criticism, W.W.Norton& Company, 2001.
3. Lodge, David. Modern Criticism and Theory: A Reader. London: Longman, 1988.

4. Nagarajan, M S. English Literary Criticism and Theory: An Introductory History.

5. Scott, Wilbur S. Five Approaches of Literary Criticism; an Arrangement of Contemporary Critical Essays. New York: Macmillan, 1963.
6. Sethuraman, V.S. Contemporary Criticism: An Anthology. S.G. Wasani for Macmillan India Limited, 1989.

S.No	Course Outcomes	Levels
CO1	Apply theory to literary works	Level –3
CO2	Distinguish between theory and application	Level - 4
CO3	Understand the methodological framework	Level - 1
CO4	Evaluate theoretical terminology	Level - 5
CO5	demonstrate the awareness of evolution theory of language by varied culture	Level - 3

CO - PO MATRIX

S.No	Cos	POs	PSOs
CO1	Apply theory to literary works	3,4,5,7	2,4,5
CO2	Distinguish between theory and application	3,4,5,7	2,4,5
CO3	Understand the methodological framework	3,4,5,7	2,4,5
CO4	Evaluate theoretical terminology	3,4,5,7	2,4,5
CO5	demonstrate the awareness of evolution theory of language by varied culture	3,4,5,7	2,4,5

COMPUTATION OF CO-PO / PSO ATTAINMENT

	Programme Outcomes							Programme Specific Outcomes				
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1			2	3	2		2		2		3	2
CO2			2	3	1		2		2		3	2
CO3			2	3	2		1		2		3	2
CO4			1	2	1		2		2		3	1
CO5			2	3	2		3		3		3	2
AVG			1.8	2.8	1.6		2		2.2		3	1.8
WA			2	3	2		2		2		3	2

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MOTHER TERESA WOMEN'S UNIVERSITY

M.A. ENGLISH

REGULATIONS & SYLLABUS

(from 2021-2022)

Curriculum Framework and Syllabus for

M.A. ENGLISH

(For the candidates to be admitted from the academic year 2021-2022)

(UNDER CHOICE BASED CREDIT SYSTEM- CBCS)

Mother Teresa Women's University
Department of English & Foreign Languages

Choice Based Credit System (CBCS)

(2021-2022 onwards)

M.A. English

1. About the Programme

A degree in English language and literature is designed to get students reading books, analyzing theories, critiquing prose and verse, and taking a more critical look at the signs and words surrounding us every day. The aim is to get students thinking creatively and analytically about the English language; this differs from other modern language degrees as it is intended for students already proficient in written and spoken English. A course with a focus on English literature typically allows students to study literary texts from throughout history. The programme modules cover a diverse range of literature from different periods. The programme enables students to study and analyze passages, relating texts to their cultural, social, historical and political contexts.

An English language-focused degree will train students to analyze the workings of the English language outside of literature, including language-based communication in all kinds of forms and contexts. This could include analysis of casual spoken conversation, text speak, advertising methods or the uses of language in specialized legal and medical discourse.

2. Programme Educational Objectives

PEO1	To educate the students in both the artistry and utility of the English language through the study of literature and other contemporary forms of culture.
PEO2	To provide them with the critical faculties necessary in an academic environment, on the job, and in an increasingly complex, interdependent world.
PEO3	To graduate them who are capable of performing research, analysis, and criticism of literary and cultural texts from different historical periods and genres.
PEO4	To assist students in the development of intellectual flexibility, creativity and cultural literacy so that they may engage in life-long learning.
PEO5	To provide students with the critical faculties necessary in an academic environment, and in the complex and interdependent world.

3. Eligibility

A candidate who has passed and secured 50% in any UG degree courses of this University or any other University accepted by the syndicate is eligible for admission to the M.A. Programme. A relaxation of 5% in the total percentage will be given to SC, ST candidates.

4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	13	25	13	25
External	38	75	38	75

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	A	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	B	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	C	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 90**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance less than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

M.A ENGLISH

Sl. No	Course Code	Course Title	Credits	Hours		(CIA)	(ESE)	Total
				L	P			
Semester I								
1.	P21ENT11	Core I: Indian Writing in English	4	5	-	25	75	100
2.	P21ENT12	Core II: Chaucer and the Elizabethan Age	4	6	-	25	75	100
3.	P21ENT13	Core III: The Augustan and the Romantic Age	4	6	-	25	75	100
4.	P21ENT14	Core IV: Children's Literature	4	6	-	25	75	100
5.	P21ENT15	Core V: Women's Writings	4	5		25	75	100
6.	P21ENS11	**Skill-based Supportive Course -I**Technology in Teaching English	2	2		25	75	100
		Total	**22**	**30**		**-**	**-**	**600**
Semester II								
7.	P21ENT21	Core VI: Indian Literature in English Translation	4	4	-	25	75	100
8.	P21ENT22	Core VII: The Victorian Age	4	4	-	25	75	100
9.	P21ENT23	Core VIII: The Contemporary Literature	4	4	-	25	75	100
10.	P21ENT24	Core IX: Subaltern Literature	4	5	-	25	75	100
11.	P21ENT25	Core X: Literary Criticism – I	4	5	-	25	75	100
12.		**Non Major Elective**	4	4	-	25	75	100
13.	P21CSS22	**Supportive Course- II:** Computer Skills for Web Designing and Video Editing	2	-	4	25	75	100
		Total	**26**	**30**		**-**	**-**	**700**
Semester III								
14.	P21ENT31	Core XI: Post-colonial	4	5	-	25	75	100

		Literature						
15.	P21ENT32	Core-XII: Eco-Literature	4	5	-	25	75	100
16.	P21ENT33	Core-XIII: Translation – Theory and Practice	4	5	-	25	75	100
17.	P21ENT34	Core-XIV: Literary Criticism – II	4	5	-	25	75	100
18.	P21ENT35	Core-XV: Research Methodology	4	4	-	25	75	100
19.	P21ENT36	Core-XVI: Intensive Study of an Author	4	4	6	25	75	100
20.	P21WSS33	**Skill-based Supportive Course III** - Women Empowerment	2	2	-	25	75	100
		Total	**26**	**30**				**700**
Semester IV								
21.	P21ENE411 / P21ENE412	Elective I* English for Careers/Presentations Skills/Any MOOC Course$	4	4	-	25	75	100
22.	P21ENE421 / P21ENE422	Elective II* English Grammar and Usage / English Language Teaching/ Any MOOC Course$	4	4	-	25	75	100
23.	P21ENR41	Project	8		22	25	75	100
		Total	**12**	**30**				**300**
Total			**90**	**120**				**2300**

Non-Major Elective

The candidates, who have joined the PG Programme, can also undergo Non-Major Elective offered by other Departments.

Non-Major Elective (NME) offered by the Department of English and Foreign Languages

NME P21ENN211-Writing Skills/P21ENN212-Art of Public Speaking

*Those who have CGPA 9 and want to do the project in industry/institution during 4th semester., these two paper can be opted in third semester

$The students can also take either one 4-credit course or two 2-credit courses in MOOC, with the approval of Departmental Committee.

Short-term and Value-added courses offered by the department to all PG students

Code	Title	Credit	Semester
P21ENV11	Media Writing (Value added Course)	2	First
S21SET21	Short Term Course in Spoken English	2	Second
P21ENO31	Online Course – MOOC	2	Third
S21FRT31	Short Term Course in French	2	Third
P21ENV42	Appreciation of Films- Value Added Courses	2	Fourth
P21ENI21	Internship/Industrial Training	2	End of Second Semester

Outside Class Hours (Attendance compulsory)

- Health, Yoga and Physical fitness.
- Library information access and utilisation
- Employability Training.
- Students Social Responsibility.

PROGRAMMEOUTCOMES(POs)

On successful completion of the M.A., (Eng. Lit) Degree Programme, the learners of the course would have attained:

PO1	Mastery of English language skills and forms to be used in explicitly meaningful contexts through literature and criticism.
PO2	Linguistic competence to be mastered in various real-life situations.
PO3	Appreciation and evaluation of the components, organizations, and structure of academic texts.
PO4	Capability to become full-fledged literary critics with a good attitude towards objective criticism and unbiased conclusions.
PO5	Integrated human values to become respectful humans and law-abiding citizens.
PO6	Managerial skills to work independently and in groups so that they could transform themselves into job-ready candidates and achieve their career goals
PO7	Widened perspective to face the literary and artistic challenges and incorporate ICT skills to clear competitive examinations like NET, SET, UPSC, TNPSC etc.

PROGRAMMESPECIFICOUTCOMES(PSOs)

Upon completion of the M.A., Degree Programme, the students must be able to

PSO1	gainknowledge of modern literature and technical aspects.
PSO2	prepareresearch articles and write creatively.
PSO3	acquirecompetency over the subjects learnt.
PSO4	scorewell in competitive and qualifying examinations.
PSO5	imbibehuman values in making model citizens.

SEMESTER - I

Course Code	P21ENT11	INDIAN WRITING IN ENGLISH	L	T	P	C
CORE- I			5	-	-	4
Cognitive Level	K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create					
Learning Objectives	**The course aims to** • analyze poetic techniques and themes in Indian writing in English • distinguish strategies and topics in Indian English Literature from that of Western models • assess literature as a kind that portrays the country with specific accentuation on postcolonial Indian experience of the country, its set of experiences, governmental issues and the job of memory • evaluate current composition as a portrayal of India's varietyintegrate writing and society discussing the social construction of Indian culture and Human Rights issues.					

Unit – I: Poetry

Nissim Ezekiel - Goodbye Party for Miss Pushpa T.S
A.K.Ramanujan - A River
Extended Family
Kamala Das - A Hot Noon in Malabar
An Introduction
Sarojini Naidu - Palanquin Bearers

Unit – II: Prose

R.K.Narayan – Headache
In the Confessional
Jawaharlal Nehru - For the Light that Shone in this Country was No Ordinary Light
The Role of Youth in Modern India
GowriRamnarayan - The Patriarch of Carnatic Music

Unit – III: Short Story

Mulk Raj Anand - The Terrorist
Anita Desai - Circus Cat, Alley Cat
Kushwant Singh - The Portrait of a Lady

Unit – IV: Drama

GirishKarnad - The Fire and the Rain

Unit – V: Novel

AravindAdiga - The White Tiger

Books for Reference:

1. Bharat, Meenakshi (ed.). Desert in Bloom: Contemporary Indian Women's Fiction in English. Pencraft International, 2004.
2. De Souza, Eunice. Talking Poems: Conversations with Poets. OUP, 1999.
3. Khair, TabishBabu. Fictions:Alienation in Contemporary Indian English Novels. OUP, 2001.
4. King, Bruce (ed.). Modern Indian Poetry in English. OUP, 2001.
5. Needham, AnuradhaDingwany. Using Master's Tools: Resistance and the Literature of the African and South Asian Diasporas. St. Martin's Press, 2000.
6. Mehrotra, Arvind Krishna (ed.). An Illustrated History of Indian Literature in English. Permanent Black, 2003.
7. Mukherjee, Meenakshi. The Perishable Empire: Essays on Indian Writing in English. OUP, 2000.
8. Sanga, Jaina C. Salman Rushdie's Postcolonial Metaphors: Migration, Translation, Hybridity, Blasphemy, and Globalization. Greenwood Press, 2001.
9. Lau, Lisa and E. Dawson Varughese, Indian Writing in English and Issues of Visual Representation.Macmilliam. 2010.
10. Mukherjee, Upamanyu. Postcolonial Environments: Nature, Culture and the Contemporary Indian Novel in English. Palgrave Macmillan. 2010.

E- Reference :

1. https://books.google.co.in/books?id=oWSqCQAAQBAJ&lpg=PP1&ots=HFajB8hmQh&dq=indian%20writing%20in%20english%20books&lr&pg=PP1#v=onepage&q&f=false
2. https://books.google.co.in/books?id=kFOCDAAAQBAJ&lpg=PP1&ots=G3T6bsyAhM&dq=indian%20writing%20in%20english%20literature%20books%20published%20after%202010&lr&pg=PP1#v=onepage&q&f=false

Course Outcomes:

At the end of the course, the students will be able to:

K1, K2	**CO1**	distinguish strategies and topics in Indian English Literature from that of Western models
K1, K2	**CO2**	analyze poetic techniques and themes in Indian writing in English
K5, K4	**CO3**	assess literature as a kind that portrays the country with specific accentuation on postcolonial Indian experience of the country, its set of experiences, governmental issues and the job of memory
K5, K1	**CO4**	evaluate current composition as a portrayal of India's variety
K6, K3	**CO5**	integrate writing and society discussing the social construction of Indian culture and Human Rights issues.

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code	P21ENT12	CHAUCER AND THE ELIZABETHAN AGE	L	T	P	C
CORE- II			6	-	-	4

Cognitive Level	K1:Knowledge K2: Understand K3: Apply K4 Analyze K5 Evaluate K6 Create
Learning Objectives	The course aims to • introduce the great masters of the early period such as Chaucer, Spencer, Shakespeare, Marlowe and Donne. • introduce students to the seminal practitioners of English Literature and laying the foundation for contextualising specific texts against definite historical backdrops. • introduce the music and quaintness of the English sounds and vocabulary of the earliest period in English literary history to the students to enable them to have a historical perspective of the developments over the centuries.

Unit – I:Poetry

Geoffrey Chaucer – 'The Squire', 'The Parson', 'The Prioress' and 'The Host' in "The General Prologue" from The Canterbury Tales

Edmund Spenser – Epithalamion

Shakespeare's Sonnets and Poems:

Sonnet – 1 (From fairest creatures we desire increase)

Sonnet – 18 (Shall I compare thee to a summer's day?)

Sonnet – 33 (Full many a glorious morning have I Seen)

Sonnet – 73 (That time of year thou mayst in me behold)

The Phoenix and the Turtle

Unit – II: Prose

Francis Bacon – Essays

Of Studies

Of Great Place

Of Travel

Of Wisdom for Man's Self

Unit – III: Drama

Christopher Marlowe - Tamburlaine

Ben Jonson – Volpone

Unit – IV: Drama

Shakespeare – 1.Antony and Cleopatra
2. Hamlet

Unit – V: Fiction

John Webster - The Duchess of Malfi
AphraBehn – Oroonoko

Books for Reference:

1. Broadbent, John. Milton: An Introduction. Cambridge: Cambridge University Press, 1973.
2. Cunningham, Valentine, ed. Victorian Poets: A Critical Reader features a collection of critical essays focusing on various aspects of Victorian-era poetry from the 1830s to the 1890s. New Jersey: Wiley-Blackwell, 2014.
3. Gardner, Helen, ed. The Metaphysical Poets. New Delhi: Rupa and Co., 1980.
4. Hammond, Gerald. Elizabethan Poetry: Lyrical and Narrative - A Selection of Critical Essays.UK: Palgrave Macmillan, 1984.
5. Higgins, Michael, Clarissa Smith, John Storey. ed. The Cambridge Companion to Modern British Culture. Cambridge: Cambridge University Press, 2010.
6. Persson, James and Watson.R. Robert. Encyclopedia of British Poetry 1900 to the Present. Facts on File. 22 April 2015.

E- Reference:

1. https://books.google.co.in/books?id=KJ1bAgAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false Cronin, Richard. Reading Victorian Poetry. Wiley. 21 December 2015.
2. https://books.google.co.in/books?id=gFl_BwAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false

Course Outcomes:

At the end of the course, the students will be able to:

K1, K2	**CO1**	gain in-depth knowledge of the variety of writers and genres of the Elizabethan era
K1, K2	**CO2**	comprehend the literary merits of the writers of this period
K5, K4	**CO3**	approach the texts with the knowledge of the socio-economic background of the period
K5, K1	**CO4**	analyze the works of the poets and dramatists of the age
K6, K3	**CO5**	understand and apply the creative writing ability by contextualizing the ideas of the writer

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Course Code	P21ENT13	THE AUGUSTAN AND THE ROMANTIC AGE	L	T	P	C
CORE- III			6	-	-	4
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4 Analyze K5 Evaluate K6 Create				
Learning Objectives		The course aims to • make them understand the religious, political, literary, and social problems as reflected in the literature of these periods • help students appreciate the seminal works of prominent writers of these periods • enable students to understand the characteristics of the Metaphysical poetry • enhance the students' understanding of the literary conventions followed during these periods • highlight the salient features of Comedy of Manners				

Unit – I:Poetry

John Donne - The Canonization
Andrew Marvell - The Garden
John Milton – Paradise Lost Book - IX (Lines 473 – 531, 550 – 610, 677 – 695, 745 - 784)

Unit – II: Poetry

Alexander Pope - Canto III in "The Rape of the Lock"
John Dryden - Mac Flecknoe
Thomas Gray - Elegy Written in a Country Churchyard
William Wordsworth - Resolution and Independence
John Keats - Bright star, would I wrested fast as thou art
S.T.Coleridge - The Eolian Harp
P.B.Shelley–Ozymandias

Unit – III: Prose

Jonathan Swift – "The Spider and Bee Episode" from The Battle of the Books
Joseph Addison – Sir Roger at Church
Richard Steele – "Trumpet Club" from TheCoverley Papers
Charles Lamb – In Praise of Chimney Sweepers
William Hazlitt – On the Difference between Writing and Speaking

Unit – IV: Fiction

Johnathan Swift - Gulliver's Travels
Oliver Goldsmith - She Stoops to Conquer

Unit – V: Fiction

Daniel Defoe - Moll Flanders
Jane Austen – Emma

Books for Reference:

- Bloom, Harold. How to Read and Why. New York: Simon & Schuster, 2001.
- Di Mauro, Laurie. Modern British Literature. Detroit: St. James Press, 2000.
- Gross, John. The New Oxford Book of English Prose. Oxford: OUP, 2000.
- Knott, William C. The Craft of Non-Fiction. Reston Publishing Company, 1974.
- Lewin, Gerald. Prose Models. Harcourt Brace Jovanovich, 1964.
- Mayne, Andrew and John Shuttleworth. Considering Prose. Hodder&Stongton, 1988.
- Minto, William. A Manual of English Prose Literature. Atlantic Publishers, 1995.

Cognitive Domain:

K1 / Knowledge = Remember
K2 / Comprehension = Understand
K3 / Application = Apply
K4 / Analysis = Analyze
K5 / Evaluation = Evaluate
K6/ Synthesis = Create

COURSE OUTCOMES

Upon completion of this course, the students will be able to

K1, K2	**CO1**	gain thorough knowledge of the contribution of the writers of this period
K1,K2	**CO2**	understand and apply the judicious outlook on the notable writers of this age
K2,K3	**CO3**	analyze critically the construction of a text
K5, K2,K3	**CO4**	appreciate the aspects of literary texts by the writers of this age
K6, K3	**CO5**	evaluate different themes, strategies and techniques employed by the writers of this age

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	S	S	M	S	S	M	S	M
CO2	S	M	S	M	S	S	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	S	S	M
CO4	S	M	S	S	S	S	M	S	S	S	S	M
CO5	S	M	S	M	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Course Code	P21ENT14	CHILDREN'S LITERATURE	L	T	P	C
CORE- IV			6	-	-	4
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4 Analyze K5 Evaluate K6 Create				
Learning Objectives		The course aims to • provide an overview of the history of children's literature from its origins as oral literature intended for adults to written literature encompassing all major genres • indicate historical shifts in the purposes for children's literature: as didactic literature intended to provide moral instruction, or as literature intended to stimulate the imagination or provide useful information in interesting ways • show how different purposes are related to different ways of viewing childhood • examine the history and characteristics of the various genres of children's literature • examine the work of major illustrators of the nineteenth and twentieth century and how illustrations in a picture book convey meaning				

Unit – I: Poetry

S.T. Coleridge - A Child's Evening Prayer
T.S. Eliot – Macavity, the Mystery Cat
Jacqueline Woodson – A Girl named Jack
R.L. Stevenson - From a Railway Carriage
A.A. Milne - Buckingham Palace
Roald Dahl - Little Red Riding Hood
Hilaire Belloc – Matilda

Unit – II: Short Stories

Grimm Brothers – The Juniper-Tree
Rudyard Kipling – Rikki-Tikki-Tavi
Beatrix Potter – The Tale of Peter Rabbit
Nathaniel Hawthorne - The Snow Image
Hans Christian Anderson - The Snowqueen
Brothers Grimm - Rapunzel
James Baldwin - Androcles and the Lion

Unit – III: Drama
Terence Patrick Hughes – Lines
Holly Groome - Henry, the Monster

Unit – IV: Fiction
Lewis Caroll – Alice in the Wonderland
Suzanne Collins - The Hunger Games

Unit - V: Fiction
Patrick Ness - A Monster Calls
C.S. Lewis - The Lion, the Witch and the Wardrobe

Books for Reference:
Russell, D.L. (2015). Literature for Children: A Short Introduction, 8th Ed. Pearson ISBN-10:0-13-352226-1.

COURSE OUTCOMES
Upon completion of this course, the students will be able to

K1, K2	**CO1**	gain knowledge of literary texts meant for children
K1, K2	**CO2**	understand and demonstrate the knowledge of diverse value systems
K2,K3	**CO3**	analyze the moral and cultural values of the works
K5, K2,K3	**CO4**	make a collection of works for children from the traditions
K6, K3	**CO5**	create works of the same sort for children of their region

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	S	S	M	S	S	M	S	M
CO2	S	M	S	M	S	S	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	S	S	M
CO4	S	M	S	S	S	S	M	S	S	S	S	M
CO5	S	M	S	M	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code	P21ENT15	WOMEN'S WRITING	L	T	P	C
CORE- V			5	-	-	4
Cognitive Level		K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		**The Course aims to** • make students understand Gender and Women's Studies as an academic field of study • be familiar with its major concepts, history, assumptions, and theories/theorists, and recognize its epistemological and methodological diversity and character. • analyze the ways in which societal institutions and power structures impact the material realities of women's lives. • evaluate information derived from various women's writing. • interpret information from a variety of sources including Print and electronic media, film, video, and other information technologies and Cater to the needs of women in Society proactively.				

Unit – I: Poetry:
Judith Wright – Woman to Child, Legend
Maya Angelou – Phenomenal Woman
Elizabeth Barrett Browning –How do I love thee?
Anne Finch – How shall I woo thegentlest
P.K. Page – Adolescence

Unit – II: Prose:
Virginia Woolf – A Haunted House
Meena Alexander – Fault Lines
Bessie Emery Head – Heaven is not closed

Unit – III: Drama:
Charlotte Keatley – My Mother said I never should

Unit – IV: Fiction:
Miles Franklin – My Brilliant Career

Unit – V: Criticism:

Simon de Beauvoir –The Second Sex – "History" from Volume – I
John Stuart Mill – On the Subjection of Women

Books for Reference:

1. Kuumba, M. Bahati. (2003). "Gender and Social Movements". Rawat Publications, New Delhi.
2. Peterson.H. Linda. The Cambridge Companion to Victorian Women's Writing. Cambridge University Press. 2015.

E- Reference:

https://books.google.co.in/books?id=_72TCgAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false

COURSE OUTCOME

On successful completion of the course, the students will be able to

K1,K2	**CO1**	gain knowledge of the literary texts across genres, historical periods and cultural contexts
K1,K2	**CO2**	understand the range of feminist perspectives, towards the gender issues
K3,K4	**CO3**	analyze the common and particular challenges that women face
K4,K5	**CO4**	evaluate the standards of the society and the result of them on the womenfolk
K3,K6	**CO5**	become creative writers and voicing out their views

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	M
CO5	S	S	S	S	S	S	M	S	S	S	S	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 Marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 Mark

Course Code	P21ENS11	TECHNOLOGY IN TEACHING ENGLISH	L	T	P	C
SUPPORTIVE SKILLS - I			2	-	-	2
Cognitive Level		K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives:		The main objective of this course is to • acquaint participants with technology tools, learn to implement network-related programs with concepts of Web Developing. • integrate these tools into their English language teaching. • enhance English language teaching professionals around the world acquire and maintain basic knowledge and skills in technology for professional purposes. • help participants utilize technology in lesson planning, materials development, feedback, and assessment. Practice different phases of software/system development. • facilitate professional communication, collaboration, and efficiency improvement by participating in online discussions .Students will be able to demonstrate adequate skills in oral and written communication for technical English language, actively participate in group discussions and interviews and exhibit evidence of vocabulary building				

Unit I: Definition -Virtual- Learning Environment:
Meaning- Web-Based Learning Environment, Virtual- Learning Environment
Web Tools, Effective Web Tools in Teaching, and Classroom Tools

Unit II: Webpage Development:
How to develop a webpage, Hostingthe Web page, Meta Data Development.
Content Writing, Creating Ads
Wikipedia Development: How to develop and edit Wikipedia.

Unit III:Computational Linguistics:
Introduction to speech recognition (SR) systems, text-to-speech (TTS) synthesizers, Interactive voice response (IVR) systems, search engines, text editors and language instruction materials.

Unit IV—Lexicography
Introduction to Lexicography, Dictionary Development (e- Dictionary), WorldNet, Thesaurus.
Language Teaching: First Language and Second Language Teaching,
Various methods ofLanguage Teaching.

Unit V: E-Learning
Asynchronous E-Learning Vs Synchronous E-Learning of Language
E-Learning Challenges and Solutions.
Application: Machine Translation.

Reference Books:

1. Anderson, T. (ed.) The Theory and Practice of Online Learning Athabasca AB: Athabasca University Press, 2008.
2. Bates, A. and Sangrà, A. Managing Technology in Higher Education San Francisco: Jossey–Bass/John Wiley and Co, 2011.
3. Butcher, N. and Wilson-Strydom, M.) A Guide to Quality in Online Learning Dallas TX: Academic Partnerships, 2013
4. Batson, T., & Bass, R. Teaching and learning in the computer age.Change, Mar-Apr., 1996.

Course Outcomes:
Upon completion of this course, the students will be able to

K1, K2	**CO1**	understand the digital system, its organization and architecture
K1, K2	**CO 2**	identifyneeds and aspirations on a broader spectrum, Able to recognize the evolving role of Digital Technologies.
K2, K4	**CO 3**	discusshow technology affects language learning and teaching today.
K2, K6, K3	**CO 4**	usestrategies to teach vocabulary growth through social media. convertsource code for a novel language into machine code for a novel computer.
K4, K6	**CO5**	identifyappropriate grammar activities that include opportunities for learners to discover, analyze, and produce English grammar during language interactions.

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	M
CO5	S	S	S	S	S	S	M	S	S	S	S	S

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 Marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 Mark

SEMESTER – II

Course Code	P21ENT21	INDIAN LITERATURE IN ENGLISH TRANSLATION	L	T	P	C
CORE- VI			4	-	-	4
Cognitive Level		K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		**The Course aims to** • create awareness among the students of the rich and diverse literary cultures of ancient India • introduce students to the major literary works of Indian classical dramatist. • understand the importance of devotion and dedication in human life. • enable the students to appreciate the Indian classical literature and to realize its value in practical aspects of life. • understand the didacticism and ethical value contained in Indian classical literature.				

Unit -I: Poetry

Kabir – Songs – 91, 112
Ghalib – Temple Lamp
G. M. Muktibodh – The Void
Mirabai – No one knows my invisible life

Unit -II: Prose

Thiruvalluvar – Thirukkural – (i) The Power of Righteousness
(ii) Gratitude
V. M. Bashir – 'My Darling' from Hunger
Prem Chand – The Shroud
IsmatChugtai – The Quilt
Suresh Joshi – On Interpretation

Unit -III: Drama

Kalidasa – Sakuntala

Unit -IV: Drama

Mohan Rakesh – Halfway House

Unit – V: Fiction

Bama – Sangati
G. KalyanRao – Untouchable Spring

Course Outcomes:
Upon completion of this course, the students will be able to

K1, K2	**CO1**	attain accessibility to regional literary genres
K1, K2	**CO 2**	develop a comparative perspective in the study and analysis of the texts
K2, K4	**CO 3**	feel sensitized to the philosophical, cultural and social reinforcement of people across India
K2, K6, K3	**CO 4**	gain an understanding of the Indianness in the pieces of literature of different regions
K4, K6	**CO5**	practice the ability to translate literature in Indian languages

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	M
CO5	S	S	S	S	S	S	M	S	S	S	S	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code	P21ENT22	THE VICTORIAN AGE	L	T	P	C
CORE VII			4	-	-	4
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4:Analyze K5: Evaluate K6: Create				
Learning Objectives		The course aims at • providinga wide spectrum of literary exuberance of the great masters of The Victorian Age for the young minds to revel in the luxury of representative literary pieces in each genre and to be informed and inspired. • helpingthe students imbibe the abiding human and moral values through the study of great pieces of literature. • developingcritical and creative faculties in students.				

Unit – I: Poetry

Alfred Lord Tennyson - Tithonus
Robert Browning - Andrea delSarto
Matthew Arnold - The Scholar Gipsy
G.M. Hopkins - The Windhover

Unit – II: Prose

John Ruskin - Of Queen's Garden (Part – II) from Sesame and Lilies
Thomas Carlyle – On History

Unit – III: Drama

John Galsworthy - The Silver Box
Oscar Wilde - The Importance of Being Earnest

Unit -IV: Fiction

Charlotte Bronte - Jane Eyre
Henry Fielding – Tom Jones

Unit – V: Fiction

Charles Dickens - Nicholas Nickleby
Thomas Hardy - Tess of d'Urbervilles

Books for Reference:

1. Brown, John Russell. The Oxford Illustrated History of Theatre. UK: Oxford University Press, 2001.
2. Long, William J. English Literature: Its History and Its Significance for the English-Speaking World. New Delhi: Rupa, 2015.
3. Watson, G.J. Drama. London: Macmillan Education, 1983.
4. Wiggins, Martin and Catherine Richardson. British Drama, 1533-1642: 1609-1616.

E-Reference:

1. Oxford University Press. 2012. https://books.google.co.in/books?id=3B_uCgAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false
2. Killick, Tim. British Short Story Fiction in the Early Nineteenth.Century: The Rise of the Tale.Britain:Ashgate Publishing company, 2008.
3. Bentley, Nick Ed. British Fiction of the 1990s. Taylor & Francis. 2007. https://books.google.co.in/books?id=iTx-AgAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false

Course Outcomes

Upon completion of this course, the students will be able to

K1,K2	**CO1**	gain knowledge of literary texts produced by various literary personalities of this age
K1,K2	**CO2**	understand and appreciate the intense emotional, and intellectual response in the literary texts of the age
K2,K3	**CO3**	analyzecritically the literary quality of the texts
K5,K2,K3	**CO4**	evaluate the works of the poets, prose writers and novelists of this age
K6, K3	**CO5**	develop imaginative and creative writing by following the literary style of the writers

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	S	S	M	S	S	M	S	M
CO2	S	M	S	M	S	S	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	S	S	M
CO4	S	M	S	S	S	S	M	S	S	S	S	M
CO5	S	M	S	M	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code	P21ENT23	THE CONTEMPORARY LITERATURE	L	T	P	C
CORE- VIII			4	-	-	4
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4 Analyze K5 Evaluate K6 Create				
Learning Objectives		The course aims the students to • apply key concepts, terminology and methodologies in the analysis of contemporary works • identifycontemporary literary works, historical, social, political, cultural and aesthetic contexts. • articulatehow literary works respond to and influence societies and cultures, ethically, politically and historically. • engage with literary works through other media: e.g. film, drama, concerts, lectures or readings				

Unit – I: Poetry

T.S.Eliot - The Waste Land
W.H.Auden - Shield of Achilles
Dylan Thomas - Light Breaks Where No Sun Shines
Ted Hughes - The Thought-Fox
Philip Larkin - MCMXIV
Carol Ann Duffy – The Last Post

Unit – II: Prose

George Orwell – Shooting an Elephant
G.K. Chesterton – The Worship of the Wealthy
Robert Lynd - In Praise of Mistakes
Aldous Huxley – Pleasures
Katrina Best – Bird Eat Bird

Unit – III: Drama

T.S. Eliot - Murder in the Cathedral
Harold Pinter - Birthday Party

Unit – IV: Fiction

James Joyce - A Portrait of the Artist as a Youngman
William Golding – Lord of the Flies

Unit – V: Fiction

Iris Murdoch – The Sea, the Sea
Angela Carter – The Bloody Chamber

Books for Reference:

1. Bradbook, M.C. Themes and Conventions of Elizabethan Literature. Cambridge: OUP, 1935. Browne, E. Martin. The Making of T.S. Eliot's Plays: The Critic. London: Cambridge University Press, 1969.
2. Birch, Dinah and Hooper Katy. Oxford Concise Companion to English Literature. Great Britain: Oxford.University Press, 2012.
3. Cross. L. Wilben.The Development of the English Novel. Ludhiana: Lyall Bool Depot, 1968.
4. Draper, R.P. Hardy. The Tragic Novels. London: Macmillan, 1987.
5. George Hahn, Behm Carl. The Eighteenth-Century British Novel and its Background. USA: Scarecrow Press,1985.

Course Outcomes

Upon completion of this course, the students will be able to

K1,K2	**CO1**	gain knowledge of new concepts in modern British Literature
K1,K2	**CO2**	comprehend the literary merits of the writers of this period
K2,K3	**CO3**	analyzethe various perspective as reflected in the literary texts
K5,K2,K3	**CO4**	assess the literary texts concerningthe social life of this age
K6, K3	**CO5**	compare and contrast the literary texts of the modern age with those of the other periods

<u>Mapping of COs with POs& PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	S	S	M	S	S	M	S	M
CO2	S	M	S	M	S	S	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	S	S	M
CO4	S	M	S	S	S	S	M	S	S	S	S	M
CO5	S	M	S	M	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code	P21ENT24	SUBALTERN LITERATURE	L	T	P	C
CORE IX			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Course aims to • have a wider knowledge of the trials and tribulations endured by downtrodden people • enhance their ability to read text analytically to understand the social discrimination • cultivate ability to analyze the elements and strategies of various genres • comprehend literary writing as a platform for recording the voice of the voiceless • evaluate the power of creative writing as a means to recover and to redeem one to get better job.				

Unit - I: 20th Century

John Betjeman-A Subaltern's Love Song
Gabriel Okara -Once upon a Time
MervynGooneratne -There was a Country
Langston Hughes-The Negro Speaks of Rivers

Unit - II: Middle Age

Chinua Achebe- "The Trouble with Nigeria" (pp. 22 – 64) from An Image of Africa
Homi.K. Bhabha -The Location of Culture
DipeshChakraborty-A Small History of Subaltern Studies: 2000 from Habitation of modernity: Essays in the Wake of Subaltern Studies. (pp3-19)
Nadine Gordimer - Once Upon a Time
BaburaoBagul– Mother

Unit - III: Drama

George Ryga -The Ecstasy of Rita Joe

Unit – IV: Fiction

BapsiSidhwa -The Crow Eaters

Unit - V: Postcolonial Age

GayathriSpivak - Can the Subaltern Speak?
Richard Wright - Blue Print for Negro Writing

Reference:

1. Deivasigamani. T. Subaltern Discourses. MJP Publisher. 2019.
2. Morris, Rosalind. Can the Subaltern Speak?: Reflections on the History of an Idea. Columbia University Press. 2010.

E-Reference:

1. https://books.google.co.in/books?id=TzmbDwAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false
2. https://books.google.co.in/books?id=cXInuU4BUDYC&lpg=PP1&pg=PP1#v=onepage&q&f=false

Course Outcomes

Upon completion of this course, the students will be able to

K1,K2,K4	**CO1**	gain knowledge of the marginalized, oppressed and exploited on the cultural, political, social and religious grounds
K3,K4,K5	**CO2**	comprehend the themes such as oppression, marginalization, gender discrimination, subjugation of lower and working classes
K2,K4,K3	**CO3**	analyzethe condition of the third world countries and the marginalized groups in the society
K1,K2,K3,K4	**CO4**	evaluate the political and cultural autonomy of the people who were subdued in colonial domains, as reflected in literature
K4,K5, K6	**CO5**	imbibe social consciousness of the plight of the underprivileged people and working for their welfare

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code	P21ENT25	LITERARY CRITICISM - I	L	T	P	C
CORE X			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Course aims to • introduceto the basics of Literary Criticism Widens the knowledge of literary and focuses on their importance • helpto write a critical appreciation • providean insight of practical criticism • ingrainthe mind towards creative writing, appreciation, critical thinking and critical • analyseand accentuate expression of thoughts and views for critical appreciation and judgmental reviews				

Unit – I:Classical Period
Longinus
Plato
Aristotle
Ben Johnson
Philip Sidney

Unit – II:Age of Dryden and Pope
John Dryden
Joseph Addison
Alexander Pope
Dr. Johnson

Unit – III: Romantic Age
William Wordsworth
S.T. Coleridge

Unit – IV:Modern Age
Walter Pater
T. S. Eliot
I.A. Richards
F.R. Leavis

Unit – V:Practical Criticism:
Analysing a work of art, by applying the critical standards of the above-said writers.

Books for Reference:

1. Prasad. A Background to English Criticism, Macmillan Publications.1965.
2. Goulimari, Pelagia. Literary Criticism and Theory: From Plato to Postcolonialism. Taylor &Francis. 2014.
3. Vaughan, Charles. English Literary Criticism. Good Press. 2019.

Web Sources:

1. https://books.google.co.in/books?id=IiODBAAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false
2. https://books.google.co.in/books?id=PtfCDwAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false

Course Outcomes

Upon completion of this course, the students will be able to

K1,K2,K4	**CO1**	gain knowledge of the basic critical concepts and the evolution of criticism
K3,K4,K5	**CO2**	apply the critical theories to works of literature and testify their standard
K2,K4,K3	**CO3**	analyzethe various forms of literature from the perspective of a literary critic
K1,K2,K3,K4	**CO4**	gain the ability to discriminate the different standards of literature
K4,K5, K6	**CO5**	be motivated to know about the forth-coming critical theories and approaches

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 Marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 Mark

Course Code	P21ENN211	WRITING SKILLS	L	T	P	C
NME-I			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Course Objectives		Course aims to • introduce the students to the structure, mechanics, vocabulary and different modes of writing. • master the structure of Language • prepare the students for Competitive Exams. • enable the students to write error-free English error-free on various topics				

Unit I: Sentence Structure
Examples with exercises
Kinds of Sentence structure
Prepositional Phrase
Verbs and Verbal Phases

Unit II: Signal Words
Examples with Exercises
Conjunction and Preposition
Giving Reasons: as, because of, etc.,

UnitIII :Mechanics of Writing
Examples with Exercises
Definition, Types and functions and importance of Punctuation
Essential Elements of Writing: Unity, Coherence, Completeness

Unit IV: Vocabulary
Examples with Exercises
Types of Vocabulary: Listening, Speaking, Reading and Writing Vocabulary
Importance of Vocabulary in Writing and Ways to Expand Vocabulary
Commonly misspelt words

Unit V: Writing

Examples with Exercises
Prewriting
Identifying the purpose of writing
Organizing information
Writing the first draft
Editing

Reference Books:

1. Warneir, John E. English Composition and Grammar (I Course) Chicago: Harcourt Brace Jovanovich Publishers, 1998.
2. Hewings, Martin. A Remedial Grammar for Advanced Students, New Delhi: CVP, 2004

Course Outcomes:

Upon completion of this course, the students will be able to

K1	**CO1**	gain knowledge of the various modes of writing
K2	**CO2**	comprehend the types of writing depending on the occasion
K3	**CO3**	apply the acquired styles of writing and practising them
K6	**CO4**	develop a style of writing of their own and becoming better writers
K6	**CO5**	market the skill of writing to fix themselves in better jobs

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code	P21ENN212	ART OF PUBLIC SPEAKING	L	T	P	C
NME-II			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Course Objectives		Course aim • toenrich the knowledge of English Oral Communication skill. • tospeak error-free English confidently. • toprepare the students for Competitive Exams. • to enable the students to speak and write in English fluently on various topics				

Unit I :Elements of Public Speaking
Characteristics of Voice, Quality, Pitch, Volume, Body Language _ Personal Appearance, Posture, Gestures and Eye Contact

Unit II : Mastering Public Speaking
1. Organization of Speech - Planning and Developing
2. Beginning and Ending of Speech – Delivery

Unit III: Ceremonial Speaking
Speeches for Special Occasions –Excerpts
a. "Chicago" – Swami Vivekananda
b. " I Have a Dream" – Martin Luther King.
c. "Blood Toil and Tears" – Churchill

Unit IV :Competitive Speaking
Extemporary Speeches, Agreeing and Disagreeing.

Unit V: Speech Writing
Principles of Speech Writing: Choosing the Topic, Analysing the Audience, Sourcing the Information and Outlining and organising the speech Content.
Drafting a Speech (Practical for Internal Assessment)

Reference Books:

1. Krishan Mohan and N.P Singh "Speaking English Effectively" 2nd Edition. Macmillan India. 2009.

E- Reference:

1. https://www.myperfectwords.com ›
2. https://www.lovelearningtutors.com

Course Outcome

Upon completion of this course, the students will be able to

K1	**CO1**	plan and prepare speeches that inform, persuade, or fulfil the needs of a special occasion.
K2	**CO2**	use presentation aids to enhance your speeches.
K3	**CO3**	conduct meaningful research on a variety of topics.
K6	**CO4**	analyze your audience and design speeches to reflect your analysis.
K6	**CO5**	evaluate speeches based on a variety of verbal and non-verbal criteria.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

SEMESTER – III

Course Code	P21ENT31	POST-COLONIAL LITERATURE	L	T	P	C
CORE- XI			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Course Objectives		The courseaims to • introducethe elements of Post-colonial literature. • introducecreative writing in English from countries formerly colonised by Britain. • makethe students understand the texts about postcolonial theory. • offerthe ideas of nuances handled by the authors of different regions. • providethe picture of different landscapes				

Unit – I: Poetry

Langston Hughes - I, Too, Sing America
Pablo Neruda - Tonight I can Write the Saddest Line
Derek Walcott – Omeros
Allen Curnow - Time
Richard Nitru - The Shapes of Fear

Unit – II: Short Story

NagibMahfuz - The Answer is No
Chinua Achebe - Girls at War
Bessie Head - The Collector of Treasure
Albert Wundt - A Resurrection
NardineGordimer - Six Feet of the Country

Unit – III: Drama

George Ryga - The Ecstasy of Rita Joe

Unit – IV: Drama

Wole Soyinka - The Strong Breed

Unit – V: Novel

V.S.Naipaul - A House for Mr.Biswas

Books for Reference:

1. Ashcroft; et al.. Postcolonial Studies: the key concepts, 3rd ed. Routledge. 2013.
2. Loomba, Ania.Colonialism/Postcolonialism. Random House, 1997
3. Huddart, David. "Homi K. Bhabha", Routledge Critical Thinkers, 2006
4. Mullaney, Julie. Postcolonial Literatures in Context. Continuum. 2010.
5. Rushdie, Salman. Imaginary Homelands: Essays and Criticism 1981-1991. London: Granta Books. 1991.
6. W. Said, Edward. Culture and Imperialism (1st Vintage Books ed.). New York: Vintage Books.1994.
7. Loh, Lucienne, and Malcolm Sen. Postcolonial Literature and Challenges for the New Millennium.Taylor & Francis. 2017.

E- Reference:

1. https://books.google.co.in/books?id=kmFQDwAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false

Course Outcomes

Upon completion of this course, the student will be able to

K2, K1	**CO1**	identify the key postcolonial authors and texts in their historical and cultural contexts
K3,K4	**CO2**	examine central concepts, questions and debates in postcolonial studies
K4,K2	**CO3**	analyze the colonial and indigenous cultural traditions
K5,K4	**CO4**	engage with relevant critical discourse
K6,K5	**CO5**	identify the key postcolonial authors and texts in their historical and cultural contexts

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code	P21ENT32	ECO-LITERATURE	L	T	P	C
CORE-XII			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		The course aims • to analyse creative representations of human relationships with the non-human world • to compare environmental literary texts from a range of periods, with attention to their contexts and their formal qualities • to consider issues of environmentalism and sustainability from cultural, historical, and ethical perspectives • to recognise how the present-day landscapes and cultures of the British and Irish islands have been shaped by long- term ecological and political processes				

Unit -I: Poetry

W. B. Yeats – Wandering of Oisin
William Bryant – A Forest Hymn
Ted Hughes – The Thought Fox
Sarojini Naidu – Summer Woods

Unit -II: Prose

Emerson – Nature
Roald Dahl – Taste
Raymond Williams – The Green Language

Unit -III: Drama

John Heywood – The Play of the Weather

Unit – IV: Fiction

AmitavGhosh – The Hungry Tide

Unit – V: Criticism

R.L. Stevenson – "The Biosphere" from Mankind and Mother Earth

Books for Reference:

1. Glotfelty, Cheryll& Harold Fromm. The Ecocriticism Reader. Athens: The U of Georgia P, 1996. Print

2. Bate, Jonathan. Romantic Ecology: Wordsworth and the Environmental Tradition. London: Routledge, 2013. Print
3. Devall, Bill and George Sessions. Deep Ecology: Living as if Nature Mattered. Salt Lake City, Utah: Peregrine Smith, 1985.
4. Garrard,Greg.Ecocriticism: New Critical Idiom Series. London: Routledge2004. Print
5. Zapf, Hubert. Literature as Cultural Ecology. Bloomsbury Publishing. 2016.

E- Reference:

1. https://books.google.co.in/books?id=_F93CwAAQBAJ&lpg=PP1&pg=PP1#v=onepage&q&f=false

COURSE OUTCOMES

Upon completion of this course, the student will be able to

K2, K1	**CO1**	gain knowledge of ecology and its relationship with mankind
K3,K4	**CO2**	comprehend the difference between ecology and environmentalism
K4,K2	**CO3**	apply the theories of eco-criticism and analyzing the literary texts
K5,K4	**CO4**	synthesize the learning of eco-consciousness with real life
K6,K5	**CO5**	imbibe the importance of protection of flora and fauna

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 Marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 Mark

No Correlation (N) - 0 mark

Course Code	P21ENT33	TRANSLATION – THEORY AND PRACTICE	L	T	P	C
CORE-XIII			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		The course aims to make students • understandthe evolution of the translation studies as an academic discipline. • recognizemajor milestones in the history of translation. • gain an in-depth awareness of the theoretical under pinning of translation as cross-linguistic endeavour • translatedifferent types of text in both source and target languages. • evaluate translations on the basis of select criteria				

Unit – I: Introduction
History of Translation
The Concept & the Definition of Translation
Theories of Translation

Unit – II: Procedures, Types and Trends in Translation:
Translation Procedures
Types of Translation

- Administrative, Commercial, Computer and Economic Translation
- Financial, General, Legal and Literary Translation

Trends in Translation

- Machine Translation, Computer-assisted Translation and Cultural Translation

Unit-III:Trends in Translation
Machine Translation, Computer-assisted Translation and Cultural Translation

Unit – IV: Translated Texts:
Poetry:
Tiruvalluvar - Tirukkural (Translated by G. U. Pope)

- Chapter-8: The Possession of Love
- Chapter-11: Gratitude
- Chapter-40: Learning

SubramaniaBharathi - Much Adored Face is Forgotten
There is no fear
Mu. Mehta - Charge Sheet

AdavanTheetchanya - Self-Realization

Prose:

The Bhagavad Gita - Chapters - III, IV, XII

The Bible - Sermon on the Mount – Chapters V, VI, VII

The Quran - Women

Short Stories:

Leo Tolstoy - Two Hussars

U. R. Anantha Murthy - A Horse for the Sun

Vaikom Muhammad Basheer- Walls

Ambai (C.S.Lakshmi) - Gifts

Fiction:

SundaraRamaswamy - Tamarind History

Drama:

GirishKarnad - Nagamandala

Unit –V: (Practice)

Translation of Statements, Proverbs, Headlines

Translation of Paragraphs

Translation of Official Letters

Translation of Articles

Translation of Literary Articles

Translation of Religious Texts

Books for Reference:

1. Bassnett, Susan: Translation Studies, 3rd ed. London: Rutledge Newmark, 2002.
2. Newmark, Peter: Approaches to Translation, Oxford. Pergaman Press, 1982
3. Bassnett, Susan &Lefevere Andre: Translation, History and Culture, Pinter Publishers, 1990.
4. Nida, E. The Theory and of Practice of Translation. Leiden:E.J.Brill,1969
5. Steiner, G. After Babel: Aspects of Language and Translation. Oxford: Oxford University Press, 1978.

COURSE OUTCOMES

Upon completion of this course, the student will be able to

K2, K1	**CO1**	acquire knowledge about various aspects and nuances of translation.
K3,K4	**CO2**	identify different text types, the problems of the translator and ways of overcoming those problems
K4,K2	**CO3**	gain skill in the comparison and evaluation of translations.
K5,K4	**CO4**	identify cultural differences with an impact on the target language of translation and ways to overcome such difficulties
K6,K5	**CO5**	gain hands-on training in various forms of Translations

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 Marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

Course Code	P21ENT34	LITERARY CRITICISM - II	L	T	P	C
CORE-XIV			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Course aims to • Introduce to the basics of Literary Criticism • Widen the knowledge of literary and focuses on their importance • Help to write a critical appreciation • Provide an insight of practical criticism • Ingrain the mind towards creative writing, appreciation, critical thinking and critical • Analyse and accentuate expression of thoughts and views for critical appreciation and judgmental reviews				

Unit I: New Criticism, Formalism and Structuralism
I. A. Richards: Four Kinds of Meaning
Roman Jakobson : Linguistics and Poetics
Ferdinand de Saussure : Course in General Linguistics, Chapter III&IV
Gerard Gennette - Structuralism and Literary Criticism

Unit II :Poststructuralism and Deconstruction
Roland Barthes: The Death of the Author
Derrida, Jacques. : Structure, Sign and Play in the Discourse of the Human Sciences
M.H. Abhrams: The Deconstruction Angel

Unit III: Psychology, Post-colonialism, Marxism
Sigmund Freud -The Theme of the Three Caskets
HomiBhabha - The Commitment to Theory
Edmund Wilson - Marxism and Literature
Unit IV: Reader Response and Eco-criticism
Michael Foucault - What is an Author
Wolfgang Iser - The Reading Process: A Phenomenological Approach
William Rueckert - Literature in Ecology: An Experiment in Eco Criticism

Unit V: New Historicism and Cultural Studies
Stephen Greenblatt - The Circulation of Social Energy
Stuart Hall – Encoding / Decoding
Judith Butler – Performity's Social Magic

Books for Reference:

- Lodge, David. 20th Century Literary Criticism: A Reader. London: Longman, 1986. Print.
- Sethuraman, V.S. Contemporary Criticism: An Anthology. S.G. Wasani for Macmillan India Limited, 1989. Print.
- Leitch, Vincent B. The Norton Anthology of Theory and Criticism. W.W.Norton& Company, 2001. print
- Hans Bertens: Literary Theory: The Basics Foundation Books, 2010.
- Wilber Scott: Five Approaches to Literature.
- S. Ramasamy& V.S. Sethuraman: English Critical Tradition, Vol I & II.
- Peter Barry: Beginning Theory: An Introduction to Literary and Cultural Theory, II Ed, 2002.
- Philip Rice and Patricia Waugh: Ed, Modern Literary Theory; A Reader: IV Ed, Oxford University Press.
- N. Krishnaswamy, John Varghese &Sunitha Mishra: Contemporary Literary Theory: A Students Companion, Macmillan, 2001.
- Barker, Chris. Cultural Studies: Theory and Practice. III Ed. Los Angeles: Sage, 2008.

Course Outcomes

Upon completion of this course, the student will be able to

K1,K2,K4	**CO1**	gain knowledge of the various aspects of literary theory
K3,K4,K5	**CO2**	understand and sharpen the critical acumen based on the theory
K2,K4,K3	**CO3**	apply the modern literary theories to literary texts
K1,K2,K3,K4	**CO4**	be competent to evolve a methodological framework
K4,K5, K6	**CO5**	acquire proficiency in theoretical terminology

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 Marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 Mark

Course Code	P21ENT35	RESEARCH METHODOLOGY	L	T	P	C
CORE- XV			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		This course is designed to • introduce students to the methods in research writing • familiarize students with various stages of writing research paper • train students in using appropriate language in writing research projects • enable the students to read and review the literary texts and language • be familiarized with the methods in research writing				

Unit – I: Foundations of Research

Meaning,
Objectives,
Motive
Utility,
Empiricism
Deductive and Inductive theory

Unit – II: Bibliography

Compiling a Working Bibliography
Evaluating Sources

Unit – III: Plagiarism

Plagiarism and Academic Integrity

Unit – IV: The Mechanics of Writing

Unity, Order, Coherence, Completeness
Importance of Mechanics of Writing
Spelling, punctuation, Capitalization,& Abbreviation

Unit – V: Formatting

The Format of the Research Writing
Abbreviations
Documentation

Books for Reference:

1. MLA Handbook for Writers of Research Papers: Joseph Gibaldi VIII Edition: Affiliated East – West Press, New Delhi, 2000.
2. Ralph Berry. The Research Project How to Write it, London: Routledge and Hegean Paul, 1995.
3. Bateson, F. W. The Scholar Critic. Abingdon: Routledge&Kegan Paul Books;1972.
4. Tracy Bowell and Gary Kemp Critical Thinking: A Concise Guide
5. Thorpe, J. Aims and Methods of Scholarship in Modern Languages and Literature. New York: MLA of America, 1963.
6. William Campbell. Form and Style in Thesis Writing. New York. Houghton Mifflin Company, 1978.
7. Williamson, Karp & Others. The Research Craft: An Introduction to Social Research Methods. Glenview, Ill.: Scott, Foresman, 1982.

Course Outcomes

Upon completion of this course, the student will be able to

K1,K2,K4	**CO1**	gain knowledge in applying critical tools and research methodology
K3,K4,K5	**CO2**	becomewell versed in the mechanics of thesis writing.
K2,K4,K3	**CO3**	comprehend the language of research
K1,K2,K3,K4	**CO4**	acquireanalytical and critical thinking
K4,K5, K6	**CO5**	becomean informed and competent researcher

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 Marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

Course Code	P21ENT36	INTENSIVE STUDY OF AN AUTHOR	L	T	P	C
CORE-XVI			4	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply** **K4: Evaluate** **K5: Analyze** **K6: Create**				
Learning Objectives		This course is designed to enable students • to acquire knowledge of the writer chosen for detailed research study. • to comprehend the common themes handled by him/her in his/her writings • to analyze the works of the writer in the socio, political and religious background • to evaluate the merits and messages conveyed by the writer and assessing him/her as a writer				

(All topics are on the writer chosen by the learner for project work)

Unit – I:Background Study

A Study of the Social, Economic, Political and Religious Background of the author
Life and Works of the author
The Essence of his/her writings

Unit – II: Primary Research

A Brief Survey of the works

Unit – III:Characterisation

A Study of the characters in the works

Unit – IV: Major Narrative

Various themes and issues in the works

Unit – V:Common techniques

Narrative Techniques
Style of Writing

Course Outcomes:

Upon completion of this course, the student will be able to

K1,K2,K4	**CO1**	acquire knowledge of the writer chosen for detailed research study
K3,K4,K5	**CO2**	comprehend the common themes handled by him/her in his/her writings
K2,K4,K3	**CO3**	analyzethe works of the writer in the socio, political and religious background
K1,K2,K3,K4	**CO4**	evaluate the merits and messages conveyed by the writer and assessing him/her as a writer
K4,K5, K6	**CO5**	carry out the detailed research work on the chosen works of the writer

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

SEMESTER – IV

Course Code	P21ENE411	ENGLISH FOR CAREERS	L	T	P	C
ELECTIVE I – Option - 1			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		The course aims to • give the students an understanding of the scope of English Language Teaching as a discipline. • Introduce key issues pertaining to Second Language Acquisition. • Provide a broad overview of English language learning, teaching and testing. • Make the students aware of the specific challenges of teaching English in India.				

Unit – I: Effective Writing

Features of Effective Writing
Business correspondence
E-Mail
Report writing
Technical Writing

Unit – II: Administrative Process

Agenda preparation
Preparing minutes

Unit – III: Communication

Presenting Data in Verbal modes
Presenting Data in Non-verbal modes

Unit – IV: Effective lecturing

Preparing Lectures on Topics
Preparing Persuasion Talks

Unit – V: Telephone Etiquette

Business Talks over Telephone

Discussion on Career Prospects and Advancements

Books for Reference:

V.Saraswathi&Maya.K.Mudbhatkal: English for Competitive Examinations, Emerald Publishers, Chennai 2000

Course Outcomes

Upon completion of this course, the student will be able to

K1,K2,K4	**CO1**	gain knowledge of the various modes of official correspondence and presentation
K3,K4,K5	**CO2**	comprehend the right use of English at official works
K2,K4,K3	**CO3**	apply the acquired styles of occupational skills and practising them
K1,K2,K3,K4	**CO4**	pick up the official behaviour and becoming better doers
K4,K5, K6	**CO5**	market the skill business correspondence and fixing themselves in better jobs

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 Marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 Mark

Course Code	P21ENE412	PRESENTATION SKILLS	L	T	P	C
ELECTIVE I-Option-2			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		The course aims to • consider ways of grabbing the listener's attention, holding their interest, and concluding strongly. • use body language and tone of voice to enhance their presentations. • market the skill of presentation to fix themselves in better jobs • use slides and visual aids effectively.				

Unit – I: Speech Format

Welcome Address
Vote of Thanks
Keynote Address
Convocation Address

Unit – II: Types of speech

Great Speeches (any 3)
Soliloquies/ Monologues (any 3)
Great Poems (any 3)

Unit – III: Effective writing

Motivational Writing
Argumentative Writing

Unit – IV: Kinds of Writing

Narrative Writing
Descriptive Writing

Unit – V: Literary Adaptation

Conversion of a Story into Drama
Conversion of a Drama into a Story

Book Recommended:

Brown Michael: Making Presentations Happen. Allen &Unwin, Australia, 2004.

Course Outcomes

Upon completion of this course, the student will be able to

K1,K2,K4	**CO1**	gain knowledge of the various modes of official correspondence and presentation
K3,K4,K5	**CO2**	comprehend the right use of English at official works
K2,K4,K3	**CO3**	apply the acquired styles of occupational skills and practising them
K1,K2,K3,K4	**CO4**	pick up the official behaviour and becoming better doers
K4,K5, K6	**CO5**	market the skill business correspondence and fixing themselves in better jobs

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

Course Code	P21ENE421	ENGLISH GRAMMAR AND USAGE	L	T	P	C
Elective II (Option –1)			4	-	-	4
Cognitive Level		K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		**The Course aims to** • make students attain writing skills by making them applying the usage of grammar. • develop fluency among the students. • assess the experience and fluency in English transforming their personality. • learn and brighten up their career. • strengthen the communication skills through exercise and Quiz.				

Unit – I: Grammar

Exercises with Usage

Parts of Speech
Voice
Tenses
Speech
Clause Analysis

Unit – II: Vocabulary

Exercises with Usage

Synonyms
Antonyms
Homonyms
Spotting Error Zones
Cloze Test
Single Word Substitutes
Rewriting Sentences in the right order

Unit – III: Official Writing

Different types of letters-Personal / Social / Commercial
Letters to Newspapers
Letters of Complaints and Suggestions

Unit – IV: Writing for Media

Writing dialogue in a given context
Writing advertisements: Matrimonial/Exhibition/Industry/Fairs/Seminars/Films
Writing reply to Advertisements
Appreciation of a film/play

Unit – V: Creative Writing

Reporting an incident / an experience
Note-making
Expansion of axioms and proverbs
General Essays

Course Outcome

At the end of the course, the students will be able to:

K1, K2	**CO1**	gain comprehensive knowledge about the nuances of the grammatical structures and vocabulary
K1, K2	**CO2**	practise basic grammatical structures in short conversations and discussions
K5, K4	**CO3**	gain the ability to practice the grammar skills involved in writing sentences and short paragraphs
K5, K1	**CO4**	master the skill to write various types of writing including journals, and personal /academic paragraphs
K6, K3	**CO5**	acquire confidence to communicate with the external world with the strong grammatical background

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

Course Code	P21ENE422	ENGLISH LANGUAGE TEACHING	L	T	P	C
ELECTIVE II (OPTION – II)			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Course aims to • gain knowledge of the various aspects of the language • comprehend the different roles played by the English language in all spheres of life • analyze the impact of English at different socio-political levels genres • evaluate the quality of teaching English in India and other countries as well • analyze and find out innovative methods of teaching English in India				

Unit – I: Concept of English

English as an International, Colonial and National Language
English in Post- Independence India

Unit – II: Aims of teaching English

Objectives of Teaching English
Practical Use of English

Unit – III: Methods of teaching

The Direct Method
The Reading Method
The Army Method

Unit – IV: Methodology

The Oral Approach
Situational Language Teaching
Structural Approach
Total Physical Response
The Silent way

Unit – V: Scope of Teaching

Language Pedagogy and the Teaching of English
Community Language Teaching
Use of ICT in ELT
Modern Applied Linguistics

Books for Reference:

1. N.Krishnaswamy&LalithaKrishnaswamy, Teaching English: Approaches, Methods and Techniques, Macmillan.2003.
2. KripaK.Gautam, English Language Teaching: A Critical Study of Methods and Approaches.
3. New Delhi: Harman Publishing House, 1988.
4. Harold B Allen.Teaching English as a Second Language. Bombay: Tata McGraw Hill
5. Publishing Company, 1965.

Course Outcome

At the end of the course, the students will be able to:

K1, K2	**CO1**	gain confidence and will be able to be assertive with the skilful acquisition of language and communication skills.
K1, K2	**CO2**	overcome the fear of learning a second language or a foreign language and equip themselves
K5, K4	**CO3**	demonstrate how technology can be used for learning the language.
K5, K1	**CO4**	identify and classify strategies to teach language
K6, K3	**CO5**	analyze and find out innovative methods of teaching English in India

Mapping of COs with POs& PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
sCO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

VALUE ADDED COURSES

(JUNE 2021 onwards/ (First & Forth Semester)

Duration : Minimum 30 Hours

Mode : Concurrent

No. of Papers : 1

Maximum Marks for each paper : 100

Evaluation	:	**Internal**	**External**
		25Marks	**75 Marks**

Total Marks : **100**

Passing Minimum : **50%**

Question Pattern:

External - Total Marks : **75**

Part A: 10 Multiple Choice Questions: 10x2 =20

Part B: 5 out of 7 questions : **5x5 =25**

Part C: 2 out of 4 questions : **2x15 =30**

Internal Total Marks : **25 Assignment-(15) and Quiz-(15)**

Course Code	P21ENV11	MEDIA WRITING	Total Hours	C
VALUE ADDED COURSE - I			30	2
Course Objectives:		Course aims to • develop the ability to write articles in journals and magazines. • apply the acquired knowledge in writing columns and editorials • distinguish the writing style for print and broadcast media • exhibit a command over language and general knowledge • develop their communication skills		

Unit I -Media
Mass Media
Characteristics and Techniques, Ethics for Media Writing

Unit II - Print Media
Writing Headlines, News Features, Advertisements
Writing Reviews- Book and Film

Unit III News broadcaster
Visual Media
News Anchoring

Unit IVe-media
Creating a blog
Writing Scripts

Unit V Internet based applications
Social Media
Face book Profile, Twitter

Text Books:
1. Kumar, KevalJ .Mass Communication in India. Delhi: Jaico Publishing House, 2013. Print.
2. Meera, RaghavendraRao N. Feature Writing. New Delhi: PHI Learning Private Limited, 2009. Print.

Books for Reference:
1. Nick, Ceramilla and Lee Elizabeth. Cambridge English for the Media. New Delhi: Cambridge University Press, 2008. Print.

2. Schiff, Richard. Foreword. Writing for TV and Radio: A Writers'& Artists' Companion by Sue Teddem and Nick Warburton.Eds. Carole Angier and Sally Cline. Bloomsbury. London: 2016. Print.

Course Code	P21ENV42	APPRECIATION OF FILMS (FILM VERSIONS OF LITERARY TEXTS)	Total Hours	C
VALUE ADDED COURSE - II			30	2
Course Objectives		Course aims to • recognize types of films and their impact on society. • understand the concepts behind storytelling, setting &surrounding of an event and cinematography. • compare and contrast the written form (books) and adapted form (movies). • evaluate the role of films on the lives of the people. • understand narrative techniques and stage directions used in films.		

Unit I- Film Adaptation
What is Film Adaptation? – Key Factors that matter in a Film
Adaptation – Advantages and disadvantages of adopting a written art into visual art.
Mise-en-scène: Setting, Props, Actors, Costumes, Performance, Sound, Lighting & Colour and Composition
Shakespeare (1564-1616): A Midsummer Night's Dream

Unit II
Jane Austen (1775-1817) : Emma

Unit III
Charles Dickens (1812-1870): Oliver Twist

Unit IV
George Bernard Shaw (1856-1950): Pygmalion (My Fair Lady)

Unit V
Yann Martel (b 1963) : Life of Pi

Note:
(Recent BBC versions of films are recommended)

Books for Reference:
1. Corrigan, Timothy. Ed. Film and Literature: An Introduction and Reader. India: Pearson, 1998. Print.
2. Dix, Andrew. Beginning Film Studies. New Delhi: Viva Books, 2010. Print.
3. Bordwell, David and Kristin Thompson. Film Art: An Introduction. New York: McGraw-Hill, 2010. Print.

SEMESTER II-SHORT TERM COURSE IN SPOKEN ENGLISH

Duration : Minimum 30 Hours
Hours : 2 hrs / week
Eligibility : Any Graduate
Evaluation : Internal - 100 %
I **Test (75) + Assignment (15) + Seminar/Quiz(10) = 100**

Total : 100
Duration of the Practical Examination : 3 Hrs
No. of Papers : 1

Passing minimum : 50%

Course Code	S21SET21	SHORT TERM COURSE IN SPOKEN ENGLISH	Total Hours	C
SHORT TERM COURSE			30	2

Course Objectives :

To enable the students to converse freely in English and deliver a public speech effectively.

To facilitate the students to be placed in suitable jobs.

Unit – I: Speaking Skill through Self Introduction

Self Introduction

Questioning and Answering

UNIT – II: Speaking Skill through Extempore

Speak for a Minute

Extempore

Turncoat

Debate

UNIT – III: Engage in Dialogues and Narration

Dialogues in Formal and Informal Situations

Narrating Experiences

UNIT – III: Engage in Conversation and Story Telling

Conversation in Formal and Informal Situations

Narrating Stories

UNIT – V: Involvement in Discussion

Discussion

Argument

Books Recommended:

1. Krishna Mohan and N.P.Singh: Speaking English Effectively, Macmillan India Limited, 2000.
2. Leo Jones: Activities for Intermediate Students of English, Students Book, Cambridge University Press, 1992.
3. G.RathakrishnanPillai and K.Rajeevan: Spoken English for you,Emerald Publishers, Chennai, 2002.
4. KothurAdhan.Spoken English II for Under Graduates.
5. V.Sasikumar, P.V.Dhamija: Spoken English: A Self LearningGuide to Conversation Practice. New Delhi: Tata McGraw-Hill Pub. Co., 2005.

Course Code	S21FRT31	SHORT TERM COURSE IN FRENCH	L	T	P	C
SHORT TERM COURSE			30	-	-	2

General objectives of the course:

- Develop the two basic language skills of the learner of a foreign language: comprehension and speaking.
- Initiate the learner into French civilization.
- Help the learner have a better insight into French culture and society.

Prescribed Text Book:

Karla Moreira BostosPalmieri :Écho –A1, uneméthodeVeritablementactionnelle.

UNIT I

Leçon 0 – Parcoursd'initiation

Leçon 01 – VousComprenez?

Leçon 02 – Au travail!

UNIT II

Leçon 03 – On Se détend?

Leçon 04 – Racontez - moi

Leçon 05 – Bon Voyage!

UNIT III

Leçon 06 – Bon appétit!

Leçon 07 – QuelleJournée!

UNIT IV

Leçon 08 – Qu'onestbienici!

Leçon 09 – Souvenez–Vous

UNIT V

Leçon 10 – On S'appelle?

Leçon 11 – Un bon conseil!

Leçon 12 – Parlezmoi de vous

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

B.A. ENGLISH

(CHOICE BASED CREDIT SYSTEM)

(from 2021-2022)

SYLLABUS, REGULATIONS AND SCHEME OF EVALUATION

DEPARTMENT OF ENGLISH

Mother Teresa Women's University, Kodaikanal
Department of English and Foreign Languages
Choice Based Credit System (CBCS)
(2021-2022 onwards)
B.A. English

1. About the Programme

English literature is a wide area of study that is considered a subject that is highly important. It creates a standing connection to various cultural enquiries. It helps to bring together several scopes of culture including film scripts, fiction and poetry. These are the various aspects that are anchored on English literature. BA English Literature is a modern undergraduate degree program that is known to equip students with global ability to deal with both historical and cultural situations. The degree has a well designed curriculum that includes English language and creative writing. The degree is a comprehensive inclusion of modules that form a strong foundation for all students taking the course. The course exposes students to the advanced skills and the analytical capacity to deal with the evaluation of various means of communication in the literal contexts.

There are many opportunities available for students to undertake work placements during BA English Literature coursework. This helps to prepare students for industrial application of their skills and knowledge throughout the world. The course prepares students for modern hospitality matters and other literary issues in the world today. There are many employment opportunities throughout the world now for B.A. English Literature graduates.

2. Programme Educational Objectives (PEOs)

PEO1	To prepare students to understand and use the English language effectively, build vocabulary and introduce them to current ideas and issues as represented in some of the best examples of English writing
PEO2	To educate the student in both the artistry and the utility of the English Language through the study of literature
PEO3	To make the students get a better idea of the subjects and to make them intellectually sharper and innovative.
PEO4	To offer unlimited opportunities to the students in future like research and facing all the competitive examinations.
PEO5	To provide students with the critical faculties necessary in an academic environment, and in the complex and interdependent world.

3. Eligibility

i) Candidates should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Examination, Govt. of Tamil Nadu or any other Examination accepted by the syndicate as equivalent.

ii) Candidate should have secured at least 50% in major subjects.

iii) A relaxation of 10% in the total percentage will be given to SC, ST candidates.

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	10	25	10	25
External	30	75	30	75

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	A	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	B	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	C	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade
(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance less than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

BA ENGLISH CURRICULAM

Course Code	Title of the Course	Credits	Hours		Maximum Marks		
			L	P	Int	Ext	Total
FIRST SEMESTER							
U21LTA11 U21LFR11	Tamil I / French I	3	6	0	25	75	100
U21LEN11	Communicative English I	3	6	0	25	75	100
U21ENT11	**Core I**- Age of Shakespeare and Milton	4	5	0	25	55	100
U21ENT12	**Core II**- Advanced English Grammar	4	6	0	25	55	100
U21ENA11	**Allied I**- Social History of England	4	5	0	25	75	100
U21EVS11	Environmental Studies	2	2	0	25	75	100
U21PEAS11	Professional English-I	4	6	0	25	75	100
	Total	**24**	**36**				**700**

SECOND SEMESTER

U21LTA22 / U21LFR22	Tamil II / French II	3	6	0	25	75	100
U21LEN22	Communicative English II	3	6	0	25	75	100
U21ENT21	**Core III**- Age of Dryden and Pope	4	5	0	25	75	100
U21ENT22	**Core IV**- Indian Writing in English	4	6	0	25	75	100
U21ENA22	**Allied II**- History of English Literature	4	5	0	25	75	100
U21VAE21	Value – Education	3	3	0	25	75	100
U21PEAS22	Professional English-II	4	6	0	25	75	100
Total		**25**	**36**				**700**

THIRD SEMESTER

U21LTA33/ U21LFR33	Tamil III / French III	3	6	0	25	75	100
U21LEN33	General English-I	3	6	0	25	75	100
U21ENT31	**Core V**- Age of Wordsworth	4	5	0	25	75	100
U21ENA33	**Allied III-** Literary Genres and Terms	4	5	0	25	75	100
U21ENE311/ U21ENE312	**Elective – I**- Journalism and Mass Communication / Travel Writing	3	4	0	25	75	100
U21CSS31	**SBE-1-**Computer Skills for Office Management	2	2	0	25	75	100

	Non Major Elective – I	2	2	0	25	75	100
U21PEAS33	Professional English III	4	6	0	25	75	100
	Total	**25**	**36**				**800**

FOURTH SEMESTER							
U21LTA44/ U21LFR44	Tamil IV / French IV	3	6	0	25	75	100
U21LEN44	General English-II	3	6	0	25	75	100
U21ENT41	**Core VI**- American Literature	4	4	0	25	75	100
U21ENT42	**Core VII**- Age of Tennyson	4	4	0	25	75	100
U21ENA44	**Allied IV**- Translation: Basic Concepts and Practice	4	4	0	25	75	100
U21ENE421/ U21ENE422	**Elective II**- Comparative Literature/ Children's Literature	3	3	0	25	75	100
U21MSS42	**SBE -II**- Managerial Skills	2	2	0	25	75	100
	Non Major Elective – II	2	2	0	25	75	100
U21PEAS44	Professional English IV	4	6	0	25	75	100
	Total	**29**	**37**				**900**

FIFTH SEMESTER

U21ENT51	**Core VIII**- Introduction to English Language and Phonetics	4	5	0	25	75	100
U21ENT52	**Core IX**- Twentieth Century British Literature	4	5	0	25	75	100
U21ENT53	**Core X**-Women's Writing in English	4	5	0	25	75	100
U21ENT54	**Core XI** Introduction to Literary Criticism	4	5	0	25	75	100
U21ENT55	**Core XII** Shakespeare	4	5	0	25	75	100
U21ENE531/ U21ENE532	**Elective III**- Marginal Writing/ Creative Writing	3	3	0	25	75	100
U21ENS53	**SBE III**- Writing for the Web	2	2	0	25	75	100
	Total	**25**	**30**				**700**

SIXTH SEMESTER

U21ENT61	**Core XIII**- Introduction to World Classics	4	5	0	25	75	100

U21ENT62	**Core XIV**- New Literatures in English	4	5	0	25	75	100
U21ENT63	**Core XV**-Life Writings	4	5	0	25	75	100
U21ENT64	**Core XVI**-English Teaching Methods and Materials	4	5	0	25	75	100
U21ENT65	**Core XVII**- Literatures from Asia	4	4	0	25	75	100
U21ENE641/ U21ENE642	**Elective IV**- Myth and Literature/ Film and Literature	3	4	0	25	75	100
U21ENS64	**SBE IV-** Soft Skills- Life Skills	2	2	0	25	75	100
U21EAS61	NCC/ NSS/ RRC/YRC/Physical Education	3	0	0	100		100
	Total	**28**	**30**				**800**
	Grand Total	**156**	**205**		**Grand Total**		**4600**

Non Major Elective

The candidates, who have joined the UG Programme, can also undergo Non Major Elective offered by other Departments.

Non Major Elective (NME) offered by the Department of English and Foreign Languages

U21ENN31	NME- I- Computer Assisted Language Learning
U21ENN42	NME-II- Women and Holistic Development

Additional Credit Courses (Two Credit courses)

U21ENO31	Online Course in- III Semester
U21ENI41	Internship – IV Semester
U21ENV51	Value Added Course-Presentation Skills- V Semester

PROGRAMME OUTCOMES (POs)

On successful completion of B. A. English programme, the students will be able to

PO1	develop intellectual flexibility, creativity, and cultural literacy so that they may engage in lifelong learning
PO2	demonstrate an attitude of service and commitment to social change
PO3	appreciate and admired the master minds of literature and analyze a variety of literary samples to determine the components, organizations, and structure of the academic text
PO4	understand the process of communicating and interpreting human experiences through literary representation using historical contexts and disciplinary methodologies
PO5	identify, analyze, interpret and describe the critical ideas, values, and themes that appear in literary and cultural texts.
PO6	promote their managerial skills to work independently and in groups so that they could transform themselves into job-ready candidates and achieve their career goals
PO7	understand the way the ideas, values, and themes inform and impact culture and society, both now and in the future

PROGRAMME SPECIFIC OUTCOMES (PSOs)

At the end of the programme, the students will be able to

PSO	know and appreciate the location of literature within humanities,establish connections across frontiers of disciplines, critically engage with culture, gender and marginality, become acquainted with narration and representation.
PSO2	distinguish the genres of literature (drama, poetry and prose, fictional and nonfictional) and various approaches to reading literature with acuity and insight (e. g. Realism, Romanticism, Naturalism, Impressionism, Expressionism, Modernism, Post-Modernism, Structuralism, Post-structuralism et al.)
PSO3	demonstrate command of written academic English, including the abilities to a) organize and present material in a cogent fashion, b) formulate and defend original arguments, c) employ effectively the language of their discipline.
PSO4	appreciate the interconnectedness and interdisciplinary of all knowledge and demonstrate curiosity, humility and courage reflecting a commitment to reading and critical inquiry
PSO5	acquire vital employability skills and employment opportunities in the fields like teaching, media, journalism, content writing, free lance writing, film, drama etc.,

SEMESTER-I

COURSE CODE	U21ENT11	AGE OF SHAKESPEARE AND MILTON	L	T	P	C
CORE1			5	-	-	4
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		The course aims at • providing a wide spectrum of literary exuberance of the great masters of both the ages of Shakespeare and Milton for the young minds to revel in the luxury of representative literary pieces in each genre and to be informed and inspired. • helping the students imbibe the abiding human and moral values through the study of great pieces of literature. • developing critical and creative faculties in students.				

UNIT 1 : Prose
Francis Bacon - Of Truth
Francis Bacon – Of Parents and Children
The Bible –Jonah

UNIT 2 : Poetry
John Milton – Paradise Lost Book IV
Edmund Spenser - Epithalamion

UNIT 3: Poetry
Shakespeare – Let Me Not to the Marriage of True Minds.
John Donne - A Valediction: Forbidding Mourning
George Herbert – Easter Wings , The Altar
Henry Vaughan – Retreate, The Shower

UNIT 4: Drama
Thomas Kyd – The Spanish Tragedy
John Webster – The White Devil

UNIT 5 : Fiction
John Bunyan – The Pilgrim's Progress, Part I

Reference:
1. Andrew Sanders., *A Short Oxford History of English Literature* , Clarendon Press, Oxford. **1994**.
2. M.H. Abramseal, ed, *The Norton Anthology of English Literature,* Vols. 1 and 2, Edited
3. F. Kermode and J. Hollander, ed, *The Oxford Anthology of English Literature,* 2 vol., 1973
4. Brijadish Prasad, Hari Priya Ramadoss., *A Background to the study of English Literature:* Revised Edition, January 2016
5. Edward Albert, *History of English Literature*, Fifth Edition. Oxford University Press, January 2018

E- Resources
https://libguides.southernct.edu/c.php?g=721855&p=5148244
http://writersinspire.org/
http://www.literature-study-online.com/resources/
https://www.wwnorton.com/college/english/nael/

Course Outcomes
Upon completion of this course the students will be able to

K1, K2	CO1	know the poetic tactics of the classical writers
K1, K2	CO 2	understand the difference between Old English and Middle English
K2, K4	CO 3	be aware of the salient features of aphoristic style
K2, K6,K3	CO 4	discover and to apply the creative power behind art and literature
K4, K6	C05	critically analyze the life and works of great writers and will be able to create literary pieces on their own

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENT12	ADVANCED ENGLISH GRAMMAR	L	T	P	C
CORE II			6	-	-	4
Cognitive Level		K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		**The course aims** • to make students attain writing skills by making them applying the usage of grammar. • to develop fluency among the students. • to assess the experience and fluency in English transforming their personality. • to learn and brighten up their career. • to strengthen the communication skills through exercise and Quiz.				

UNIT I - Explanation and Usage
Types of sentences
Interrogatives
Declarative
Exclamatory, and Imperative

UNIT II- Explanation and Usage
Parts of Speech and Agreement with Sentence
Tense, Number
Degrees of Comparison

UNIT III - Explanation and Usage
Modals
Auxiliaries
Question Tags
Active Voice and Passive Voice

UNIT IV - Explanation and Usage
Direct and Indirect Speech,
Transformation of Sentences
Simple Sentence
Compound
Complex- Independent and Dependent Clause
Semi- Negatives

UNIT V-Explanation and usage
Gerund, Infinitives, Participles
Common errors and Modern English Usage

Reference:

1. Thomson , A. J. and Martin *A Practical English Grammar .Madurai* et: Oxford University Press, 1986.
2. Augustine, A.E , and K.V.Joseph.*Macmillan Grammar- A Hand book.*Chennai: Macmillan India Limited, 2005.

E- Resources

1. http://www.chompchomp.com/menu.htm
2. https://www.fluentu.com/english
3. http://www.5minuteenglish.com/grammar.htm
4. https://learnenglish.britishcouncil.org/en/grammar

Course Outcome

At the end of the course, the students will be able to:

K1, K2	**CO1**	acquire knowledge of linguistic conventions for reading, writing and speaking.
K1, K2	**CO2**	use targeted grammatical structures appropriately in oral and written production.
K5, K4	**CO3**	analyse the grammatical structure of sentences within English texts.
K5, K1	**CO4**	communicate effectively in both spoken and written Standard English.
K6, K3	**CO5**	make inferences and predictions based on comprehension of a text.

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENA11	SOCIAL HISTORY OF ENGLAND	L	T	P	C
ALLIED-I			5	-	-	4
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4 Analyze K5 Evaluate K6 Create				
Learning Objectives		The course aims to • make the students Understand different movements that originated in England. • make them understand the religious, political, literary, and social problems as reflected in the literature of these periods • help students appreciate the seminal works of prominent writers of these periods • introduce the important incidents and movements in English history. • help the students obtain a comprehensive view of the periods in the history of England. • inculcate an interest in understanding literature with the background				

UNIT-1- Renaissance and Reformation
The Renaissance and its Impact on England,
The Reformation - Causes and Effects,

UNIT-2- Social Significance
The Commonwealth of Nations,
The Restoration,
Coffee-houses and their social relevance-

UNIT-3- Revolutions and Movements
Impact of the Industrial, Agrarian and the French Revolutions on the English society,
Humanitarian Movements in England,

UNIT-4- Reform Bills and Education
The Reform Bills and the Spread of Education-
Social impact of the two World Wars

UNIT-5- The Labour Movement
The Welfare State- The Cold War (1985-1991)
The Falkland War (1981)
The Gulf War (1991)

Reference:
Ashok, Padmaja. "The Social History of England", Chennai: Orient Black Swan Pvt. Ltd, 2011.
G. Xavier, The Social History of England, ", Chennai:Ananda Book House, 2017.

E- Resources
https://libguides.southernct.edu/c.php?g=721855&p=5148244
http://writersinspire.org/
http://www.literature-study-online.com/resources/
https://www.wwnorton.com/college/english/nael/

Course Outcomes
Upon completion of this course, the students will be able to

K1, K2	**CO1**	provide a basic knowledge of the political and social history of England.
K1, K2	**CO 2**	understand different movements that originated in England.
K2, K4	**CO 3**	acquaint with the literary movements, favoured genres and the evolution and development of literary forms.
K2, K6,K3	**CO 4**	familiarize with terms, practices and theoretical foundations of the disciplines.
K4, K6	**C05**	analyze texts from these cultures; To gain some understanding of their traditions, historical aspects and values

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
CO1	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	M	S	S	M	S	S
CO3	S	S	S	S	M	M	S	S	M	S	M	S
CO4	S	M	S	S	S	M	M	S	S	S	M	S
CO5	S	S	S	S	M	M	M	S	M	M	S	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

SEMESTER-II

COURSE CODE	U21ENT21	AGE OF DRYDEN AND POPE	L	T	P	C
CORE III			5	-	-	4
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		The course aims to • make them understand the religious, political, literary, and social problems as reflected in the literature of these periods • help students appreciate the seminal works of prominent writers of these periods • enable students to understand the characteristics of the Metaphysical poetry • enhance the students' understanding of the literary conventions followed during these periods • highlight the salient features of Comedy of Manners				

UNIT 1: Prose

The Spectator Papers (Addison and Steele) – Female Orators
Sir Roger at Home,
Of the Club

Jonathan Swift – The Battle of the Books
Oliver Goldsmith – A Man in Black

UNIT 2: Poetry

Pope – The Rape of the Lock – Canto 1
Dryden – Alexander's Feast
A Song for St. Cecilia's Day
Collins – Ode to Evening

UNIT 3: Drama

Goldsmith – She Stoops to Conquer
Congreve – The Way of the World

UNIT 4: Fiction

Samuel Richardson - Pamela

UNIT 5: Fiction
Daniel Defoe – Robinson Crusoe

Reference:
1. Andrew Sanders., *A Short Oxford History of English Literature*, Clarendon Press, Oxford. **1994**.
2. M.H. Abramseal, ed, *The Norton Anthology of English Literature,* Vols. 1 and 2, Edited
3. F. Kermode and J. Hollander, ed, *The Oxford Anthology of English Literature,* 2 vol., 1973
4. Brijadish Prasad, Hari Priya Ramadoss., *A Background to the study of English Literature:* Revised Edition, January 2016
5. Edward Albert, *History of English Literature*, Fifth Edition. Oxford University Press, January 2018

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http://writersinspire.org/
http://www.literature-study-online.com/resources/
https://www.wwnorton.com/college/english/nael/

Course Outcomes
Upon completion of this course, the students will be able to

K1, K2	**CO1**	understand the sense of rationalism and sensibility of the writers
K1,K2	**CO2**	recognize and understand the figurative language
K2,K3	**CO3**	apply the technical nuances of Neo-Classical dramas
K5, K2,K3	**CO4**	comprehend the artistic style of the writers and adopt the style in writing
K6, K3	**CO5**	appreciate the intense zeal of the writers and stimulate the creativity of the students

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	S	S	M	S	S	M	S	M
CO2	S	M	S	M	S	S	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	S	S	M
CO4	S	M	S	S	S	S	M	S	S	S	S	M
CO5	S	M	S	M	S	S	M	S	S	S	S	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENT22	INDIAN WRITING IN ENGLISH	L	T	P	C
CORE- IV			6	-	-	4
Cognitive Level		K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		The course aims to • enable the students to have an understanding of the historical and political movements in India • enable the students to gain knowledge about Indian cultural ethos and its uniqueness • encourage the students to analyze the cultural traits of Indian English Literature during the colonial and post-colonial periods • motivate the students to compare and contrast the Indian writers' literary acumen with that of the British writers • inspire the students to critically evaluate the merits and demerits of Indian Writing in English				

UNIT 1: Prose
M.K.Gandhi – Stealing and Atonement
Jawaharlal Nehru - A Glory Has Departed
J. Krishna Moorthy – The Rich and the Poor / K.M. Paniker – The Awakening of Women

UNIT 2: Poetry
Sarojini Naidu- Indian Weavers
A.K.Ramanujan – A Small Scale Reflection on a Great House
Kamala Das - My Grand Mother's House
Sujata Bhatt - Don't Call me an Indo Anglian
Nissim Ezekiel – Poet, Lover, Birdwatcher

UNIT 3: Short Story
Anita Desai- The Accompanist
Ruskin Bond- Train Stops at Shamli

UNIT 4: Drama
Rabindranath Tagore - Chandalika
Mahesh Dattani - Tara

UNIT 5: Fiction
Amitav Ghosh – The Shadow Lines
Arundhati Roy- The Ministry of Utmost Happiness

Reference:

1. "An Anthology of CommonWealth Poetry". Ed., C.D. Narasimhaiah. Chennai: Macmillan India Pvt. Ltd., 1990.
2. Iyengar. R.Srinivasa., "Indian Writing in English". New Delhi: Sterling Publishers Private Limited. 1983
3. Naik, M.K, ed. "Aspects of Indian Writing in English". New Delhi: Macmillan India Limited, 1982.
4. Appasamy, S.P, RaoGovinda C.D, ed.. "Representative Selections from Indian Prose". Chennai: Macmillan India. 2003

E- Resources

http://www.mdudde.net/pdf/study_material_DDE/ma/maEnglish/INDIAN%20WRITING%20IN%20ENGLISH

https://www.ukessays.com/essays/english-literature/the-introduction-to-indian-writing-in-english-

http://sahitya-akademi.gov.in/journals/indianliterature.jsp

Course Outcome

At the end of the course, the students will be able to:

K1, K2	**CO1**	understand the social, and political controversies in India during the colonial and post- colonial periods
K1, K2	**CO2**	acquire knowledge about Indian cultural ethos and its uniqueness
K5, K4	**CO3**	evaluate the unique characteristics of Indian writing in English
K5, K1	**CO4**	appreciate the spirit of the Indian writers to preserve the noble values of Indian society
K6, K3	**CO5**	acquire literary acumen for facing the SET/ NET/TET and other competitive examinations with confidence

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENA22	HISTORY OF ENGLISH LITERATURE	L	T	P	C
ALLIED-II			5	-	-	4
Cognitive Level		K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		**The course aims** • to make students attain writing skills by making them applying the usage of grammar. • to develop fluency among the students. • to assess the experience and fluency in English transforming their personality. • to learn and brighten up their career. • to strengthen the communication skills through exercise and quiz.				

UNIT-1- Age of Chaucer
The Renaissance Period (1350 – 1660): An Introduction to Bible Translation - Tyndale, Coverdale,

UNIT-2-Development Drama
The University Wits,
Elizabethan and Jacobean drama, Comedy of Humour

UNIT-3-(1660 - 1800)
The Late Seventeenth and the Eighteenth Centuries(1660 - 1800): Comedy of Manners, Neo-Classicism, Sentimental and Anti-sentimental comedies,

UNIT-4- Pre- Romantics& Romantic Age
Features of Romantic Age
Well made play (Drama of Ideas)
Existential Drama, Comedy of Menace

UNIT-5- Victorian Age
Feature of Victorian Age
Features of Pre- Raphaelites
Twentieth-Century Literature

Reference
1. Andrew Sanders., A Short Oxford History of English Literature, Clarendon Press, Oxford. ***1994***.
2. M.H. Abramseal, ed, The Norton Anthology of English Literature, Vols. 1 and 2, Edited
3. F. Kermode and J. Hollander, ed, The Oxford Anthology of English Literature, 2 vol., 1973

4. Brijadish Prasad, Hari Priya Ramadoss., A Background to the study of English Literature: Revised Edition, January 2016
5. Edward Albert, History of English Literature, Fifth Edition. Oxford University Press, January 2018

E- Resources

https://libguides.southernct.edu/c.php?g=721855&p=5148244
http://writersinspire.org/
http://www.literature-study-online.com/resources/
https://www.wwnorton.com/college/english/nael/

Course Outcome

At the end of the course, the students will be able to:

K1, K2	**CO1**	acquaint with factual contents.
K1, K2	**CO2**	strengthen the aesthetic sense.
K5, K4	**CO3**	develop a critical perspective in students.
K5, K1	**CO4**	express, to find out and analyze the period and the authors in the period they belong to.
K6, K3	**CO5**	realize the influence of writers in creating new trends.

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	M	S	S	S	S	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	M
CO3	S	M	S	M	S	S	S	S	S	S	S	S
sCO4	S	S	S	S	M	S	S	S	S	S	M	M
CO5	S	M	S	M	S	S	S	S	S	S	M	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

SEMESTER-III

COURSE CODE	U21ENT31	AGE OF WORDSWORTH	L	T	P	C
CORE V			5	-	-	4
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		The course aims to • make them understand the religious, political, literary, and social problems as reflected in the literature of these periods • help students appreciate the seminal works of prominent writers of these periods • enable students to understand the characteristics of the poetry of that age • enhance the students' understanding of the literary conventions followed during these periods • highlight the salient features of Drama and Fictions of the particular literature.				

UNIT 1: Prose
Hazlitt – On Going a Journey
Lamb – Dream Children A Reverie
A Dissertation upon Roast Pig

UNIT 2: Poetry
Wordsworth – Daffodils
Keats – Ode on a Grecian Urn
Shelley – Ode to the West Wind
Coleridge – Frost at Midnight

UNIT 3: Poetry
Coleridge – The Rime of an Ancient Mariner
Wordsworth – Tintern Abbey

UNIT 4: Fiction
Walter Scott : Kennilworth

UNIT 5 : Fiction
Jane Austen – Pride and Prejudice

Reference:

1. Andrew Sanders., *A Short Oxford History of English Literature*, Clarendon Press, Oxford. **1994**.
2. M.H. Abramseal, ed, *The Norton Anthology of English Literature,* Vols. 1 and 2, Edited
3. F. Kermode and J. Hollander, ed, *The Oxford Anthology of English Literature,* 2 vol., 1973
4. Brijadish Prasad, Hari Priya Ramadoss., *A Background to the study of English Literature:* Revised Edition, January 2016
5. Edward Albert, *History of English Literature*, Fifth Edition. Oxford University Press, January 2018

E -Resources

https://libguides.southernct.edu/c.php?g=721855&p=5148244
http://writersinspire.org/
http://www.literature-study-online.com/resources/
https://www.wwnorton.com/college/english/nael/

Course Outcomes

Upon completion of this course, the students will be able to

K1,K2	CO1	understand the sense of rationalism and sensibility of the writers
K1,K2	CO2	recognize and understand the figurative language
K2,K3	CO3	apply the technical nuances of dramas
K5,K2,K3	CO4	comprehend the artistic style of the writers and adopt the style in writing
K6, K3	CO5	appreciate the intense zeal of the writers and stimulate the creativity of the students

Mapping of COs with POs & PSOs:

CO/ PO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	S	S	M	S	S	M	S	M
CO2	S	M	S	M	S	S	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	S	S	M
CO4	S	M	S	S	S	S	M	S	S	S	S	M
CO5	S	M	S	M	S	S	M	S	S	S	S	M

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENA33	LITERARY GENRES AND TERMS	L	T	P	C
ALLIED-III			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		By introducing the course, it is intended to: • sensitize students to the language forms of Literature. • enable the students in enjoying the flair of literature through the various forms of classical works • elucidate the students with the knowledge of English Literature • give the students a thorough knowledge of the important literary genres and the sub divisions of the genres • help the students to analyze and evaluate various terms and concepts.				

Unit – 1: PROSE
Essay
Biography
Auto-biography

Unit – 2: POETRY
Ballad
Epic
Sonnet
Lyric
Ode
Elegy

Unit – 3: DRAMA
Revenge play
Comedy
Tragedy
Comedy of Humor
Comedy of Manners
Tragic Comedy
One-Act play
Kitchen-sink drama,
Problem Play,
Didactic
Drama(Propaganda play),
One-act play

Unit – 4: FICTION
Dystopian/ Apocalyptic writing
Short Stories
Novels

Unit – 5: FIGURES OF SPEECH
Simile, Metaphor, Alliteration, Hyperbole, Litotes, Onomatopoeia, Personification, Euphemism, Irony, Oxymoron, Epigram, Symbolism, Antithesis and Pun.
Literary Terms
Anti-Climax, Archetype, Prototype,
Rhetoric, Canon, Caricature, Character,
Characterization, Paradox, Conflict, Crisis,
Freytag's Pyramid, Closure, Dénouement.

Books Recommended:
1. Birjadish Prasad, *A Background to English Literature,* Macmillan. (Rev. Ed.) Macmillan, 2000
2. M.H. Abrams: *A Glossary of Literary Terms* 7th ed. Thomson Pub, 2004
3. J. A. Cuddon, M. A. R. Habib, *The Penguin Dictionary of Literary Terms and Literary Theory:* Fifth Edition, 2015

E- Resources
1. https://uomustansiriyah.edu.iq/media/lectures/8/8_2018_12_19!10_28_26_PM.pdf
2. https://libguides.cca.edu/literature

Course Outcome
Upon completion of this course, the students will be able to

K6, K2, K4	CO1	instigate to have an eminent craves on Literature
K2, K5	CO2	develop an understanding of the forms of literature
K6, K5	CO3	familiarize with the terms of Literature
K3, K2, K5	CO4	get a comprehensive knowledge of the literary works produced all over the world in different languages and different genres
K5, K6	CO5	develop their skills and understands the greatness of Literature.

Mapping of COs with POs & PSOs

CO/ PO	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	M	S	M
CO3	S	S	S	M	S	S	M	S	S	S	M	S
CO4	S	S	S	S	S	M	S	S	M	S	S	M
CO5	S	S	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) -2 Marks
Weakly Correlating (W) -1 Mark
No Correlation (N) -0 Mark

COURSE CODE	U21ENE311	CHOICE - I	L	T	P	C
ELECTIVE- I		JOURNALISM AND MASS COMMUNICATION	4	-	-	3

Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply** **K4: Evaluate** **K5: Analyze** **K6: Create**
Learning Objectives	By introducing the course, it is intended to: • impart the knowledge of media • expose the significance of Print Media and its features. • prepare the students for Competitive Exams and to become a media person • enable the students speak and write in English fluently on various topics • develop the professional ability to communicate information clearly and effectively in all kinds of environment and contexts

Unit-1: Introduction

Introduction to Journalism
A Short History of Journalism in India
Ethics of Journalism
Basic concepts and types of Communication,
Nature of media, Mass communication in India

Unit-2: The Press

Freedom of Press and Threats to Press Freedom
The Government and the Press
Press Laws: Defamation, Libel, Contempt of Court,
Slander, Copyright Laws, Press Regulation Act, Press
Registration Act, Law of Privileges

Unit-3: Reporting News

Role of the Reporter and the Editor State Integrated Board of Studies – English UG
Types of News Reports – Straight, Interpretive,
Investigative, Scoop, Sting
Headlines - Editorial, Feature Writing, Personal Column,
Reviews, Interviews and Press Conferences
Reporting – News Values, Human Interest, Story Angle,
Obituaries

Unit-4: Layouts, Advertising and News Agencies
The make-up of a newspaper - Editing, Proof-Reading
Photographic Journalism, Cartoons, News Agencies, Press Council of India
Advertisements – Types and Social Responsibility

Unit 5: Electronic and New Media
Electronic Media- Radio, Television
The emergence of New Age Media-Definition & Conceptualization of New Media, Future of New Media

Reference Books:

1. M.V. Kamath –*Professioanal Journalism, 2018*
2. Kumar J Keval – *Mass Communication in India*, 2019

Course Outcomes
On successful completion of the course, the student will be able to

K1,K2,K4	CO1	demonstrate practical skills of various types of media writing, reviews, reports,
K3,K4,K5	CO2	make programme and discussions.
K2,K4,K3	CO3	demonstrate their familiarity with the new media, its techniques, practices of social media and hypermedia
K1,K2,K3,K4	CO4	critically analyze how the media reflects, represents and influences the contemporary world.
K4,K5, K6	CO5	demonstrate some awareness of the literary influence and literary history.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENE312	CHOICE - II	L	T	P	C
ELECTIVE I		TRAVEL WRITING	4	-	-	3
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply** **K4: Evaluate** **K5: Analyze** **K6: Create**				
Learning Objectives		Course aims to • appreciate the distinctive contribution that the study of literature can make. • recognize the historical changeableness of foundational words and ideas such as 'nature,' 'country,' 'environment,' 'animal,' and 'landscape'. • identify some of the main controversies, problems, and priorities in the field of Travel literary studies. • show a detailed knowledge of the set literary texts, and make connections between those texts and the conceptual issues involved in interpreting them. • articulate their understanding of the set texts in an essay and an exam, displaying appropriate competence.				

UNIT I: **The Genre**
The genre of travel literature
History
Surveys
Sites

UNIT II : Techniques and Characteristics
Narrative technique, structure, thematics,
generic variants and characteristics

UNIT III : Gender
The qualities of a good travel writer
Use of vivid language, voice, tone
Readings from published travel writers –the dos and don’ts from professionals
Gender on Travel Writing.

UNIT IV: Model of Travel Writing
ShivyaNath - The Shooting Star
Paulo Coelho The Pilgrimage
Freya Stark- Ionia: a Quest

UNIT V: Practice

Writing practice on Travel
Your journal - presentation Week
Your travel writing - readings and wrap up discussion

Recommended Books:

Hulme, Peter, and Tim Youngs, eds. *The Cambridge Companion to Travel Writing*. Cambridge, UK: Cambridge University Press, 2002.

E - Resources

1. https://www.researchgate.net/publication/274640565_TRAVELOGUES_AN_INNOVATIVE_AND_CREATIVE_GENRE_OF_LITERATURE
2. https://travelwriting2.com/resources/
3. https://www.cambridge.org/core_title/gb

Course Outcomes

Students will be able

K1,K2,K4	CO1	to investigate environmental (in) justice, and ecological crisis through an exciting variety of Travelliterary texts.
K3,K4,K5	CO2	to enjoy reading, and who wants to think about the cultural, artistic, and philosophical issues involved in human beings' relationships with the living things around them.
K2,K4,K3	CO3	to compare travel literary texts with attention to their contexts.
K1,K2,K3,K4	CO4	to consider issues of environmentalism and sustainability from cultural, historical, and ethical perspectives.
K4,K5, K6	CO5	to recognize how the present-day landscapes and cultures have been shaped by reading and practising Travel Writing.

Outcome Mapping

CO/ PO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

SEMESTER – IV

COURSE CODE	U21ENT41	AMERICAN LITERATURE	L	T	P	C
CORE - VI			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		By introducing the course, it is intended to: • critically analyze American literary texts in the light of several movements in literature. • understand the changing faces of texts with developments in culture. • understand the progression of ideas across genres and times. • get a clear idea of the literary space of America • be sensitized towards cross cutting issues				

Unit 1 – Prose
R.W. Emerson - Illusions
H.D. Thoreau - Where I Lived, and What I Lived For
Martin Luther King Jr. - I Have a Dream

Unit – 2 - Poetry
Robert Frost - Mending Wall, Home Burial
Walt Whitman - Song of Myself
Maya Angelou - Still I Rise
Edgar Allan Poe - The Raven
Robinson E A – Reuben Bright
Allen Ginsberg - Howl

UNIT 3- Drama
Tennessee Williams - The Glass Menagerie
Arthur Miller - The Death of a Salesman
Amiri Baraka - The Slave

UNIT 4 -Fiction
Nathaniel Hawthorne -The Scarlet Letter
UNIT 5–Fiction
Earnest Hemingway - The Old Man and the Sea

Reference Books:

- Norton's Anthology of American Literature, 2016.
- American Literature: Studies on Emerson, Thoreau, Hawthrone, Melville and Whitman, SujataGurudev, Atlantic, 2011, 1st Edition.
- Studies in American Literature, Edited by Mohit K. Ray, Atlantic, 2011, 1st Edition.
- Hoffman Daniel, Harvard Guide to Contemporary American Writing: Oxford University Press, 1979.

E- Resources:

https://libguides.southernct.edu/c.php?g=721855&p=5148245
https://fordham.libguides.com/EnglishAmericanLiterature/Internet
https://www.english.cam.ac.uk/research/american/?page_id=2

Course Outcome

Upon completion of this course the students will be able to

K6,K2, K4	**CO1**	learn the literary works & culture of the Americans
K2, K5	**CO2**	understand the literary activities of the writers of American descent
K6,K5	**CO3**	gain a perception of literary trends set by the American writers
K3,K2,K5	**CO4**	understand the character, flavor and ethos of the American literature
K5,K6	**CO5**	appreciate the positive approaches of the American writers towards equality and emancipation and enable them to practice and to be an instructor.

Mapping of COs with POs & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	M	S	M
CO3	S	S	S	M	S	S	M	S	S	S	M	S
CO4	S	S	S	S	S	M	S	S	M	S	S	M
CO5	S	S	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENT42	AGE OF TENNYSON	L	T	P	C
CORE -VII			4	-	-	4
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4 Analyze K5 Evaluate K6 Create				
Learning Objectives		The course aims at ➢ providing a wide spectrum of literary exuberance of the great masters of the age of Tennyson for the young minds to revel in the luxury of representative literary pieces in each genre and to be informed and inspired. ➢ helping the students imbibe the abiding human and moral values through the study of great pieces of literature. ➢ developing critical and creative faculties in students.				

Unit 1: Prose
Ruskin – Of Queen's Gardens
Carlyle – Hero as a Poet

Unit 2: Poetry
Tennyson - Tithonus
Arnold –To Marguerite Continued
Browning – FraLippo Lippi
D.G. Rosetti – The Blessed Damozel

Unit 3: Drama
Oscar Wilde – Lady Windermere's Fan

Unit 4: Fiction
Dickens – The Tale of Two Cities
George Eliot – Silas Marner

Unit 5: Fiction
Stevenson - Kidnapped

References:

1. Jeremy, Hawthorn(ed) The Nineteenth-Century British Novel. London: Edward Arnold, 1986
2. Lubboch, Percy. The Craft of Fiction. New Delhi B.I. Publications, 1973
3. Boulton, Marjorie. The anatomy of the Novel. London: Routledge and Kegan Paul, Print.1984.
4. Andrew Sanders., A Short Oxford History of English Literature, Clarendon Press, Oxford. ***1994***.
5. M.H. Abramseal, ed, The Norton Anthology of English Literature, Vols. 1 and 2, Edited F. Kermode and J. Hollander, ed, The Oxford Anthology of English Literature, 2 vol., 1973

6. Brijadish Prasad, Hari Priya Ramadoss., A Background to the study of English Literature: Revised Edition, January 2016
7. Edward Albert, History of English Literature, Fifth Edition. Oxford University Press, January 2018

E -Resources

1. https://libguides.southernct.edu/c.php?g=721855&p=5148244
2. http://writersinspire.org/
3. http://www.literature-study-online.com/resources/
4. https://www.wwnorton.com/college/english/nael/

Course Outcomes

Upon completion of this course the students will be able to

K1,K2	**CO1**	understand the sense of rationalism and sensibility of the writers
K1,K2	**CO2**	recognize and understand the figurative language
K2,K3	**CO3**	apply the technical nuances of dramas
K5,K2,K3	**CO4**	comprehend the artistic style of the writers and adopt the style in writing
K6, K3	**CO5**	appreciate the intense zeal of the writers and stimulate the creativity of the students

Mapping of COs with POs & PSOs:

CO/ PO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	S	S	M	S	S	M	S	M
CO2	S	M	S	M	S	S	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	S	S	M
CO4	S	M	S	S	S	S	M	S	S	S	S	M
CO5	S	M	S	M	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENA44	TRANSLATION: BASIC CONCEPTS AND PRACTICE	L	T	P	C
ALLIED-IV			4	-	-	4
Cognitive Level		K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		By introducing the course, it is intended to: • introduce the students to the different theories of translation • enable the students to understand the significance of translationstudies in general • encourage the students to acknowledge the importance of translationin a multilingual country like India • familiarize them with the theories of translation and the current practices • inspire the students to critically evaluate and appreciate the translated genres.				

UNIT I: The Notion of Translation
Meaning and definition;
Nature, Characteristics and Functions of Translation.

UNIT II: Notion of Equivalence
Translating prose and Poetry
Fiction and Non-Fiction
Critical and Scientific
Literary and Non-Literary Material

UNIT 1II: Poetry
A.K. Ramanujan - What She Said (Kuruntokai 3, 290)
Thiruvalluvar – Tirukural (Chapter 11,30)
Rabindranath Tagore – Gitanjali (35, 48)

UNIT IV: Prose &- Fiction
Puthumaipithan - "GulabjaanKaadhal" (Love for Gulabjamun)
Bhama - Sangati (Tamil)

UNIT V:Translation Practice
Translation of Statements
Proverbs, Headlines
Translation of Paragraphs
Translation of Official Letter, Articles ,& Editorials

Reference Books

- Natarajan, Nalini and Emmanuel Sampath Nelson Handbook of Twentieth-Century Literatures of India Greenwood Publishing Group 1996
- Swami, Indu Exploring North-East Indian Writings in English -2 Vols. SaujanyaBooks, Delhi 2011-2012
- Kumar, T.Vijay, MeenakshiMukherjee, HarishTrivedi and Vijayasree. C Focus India: Postcolonial Narratives of the Nation. SaujanyaBooks, Delhi 2007.
- Bama, Sangati, OUP: 2008.
- Chandra, N.D.R Multicultural Literature in India.Vol.1 Saujanya Books, Delhi 2009.
- Bassnett, Susan, Translation Studies, London and New York, 1980 (revised edition 1991)
- Routledge Bell, Roger T. Translation and Translating, Theory and Practice, Longman, 1991.
- Callow, Kathleen, Man and Message: A Guide to Meaning-Based Text Analysis, 1998.
- Cumulative Index of United Nations Legal Materials Produced and Applied in Kosovo 1999-2004.
- Central European and Euroasian Law Institute, USAID Duff, Alan, Translation, OUP, 1997 Gërmizaj, Shykrane, Translation Theory in the Classroom, Prishtina, 2005.

E-Resources

- https://www.teachthought.com/technology/100-free-online-resources-for-students/
- https://nptel.ac.in/Translation/
- http://osou.ac.in/eresources/CIT-01-Unit-01-Meaning,%20Nature%20and%20Scope%20of%20Translation.pdf

Course Outcome

Upon completion of this course, the students will be able to

K6, K2, K4	**CO1**	analyze and evaluate the works for content, style, the structure of Indian writers.
K2, K5	**CO2**	have a broad knowledge of the regional Indian writers, understand the variety of regional writings and understand the cultural diversity reflected in them.
K6,K5	**CO3**	evaluate the unique characteristics of Indian writing in English
K3,K2,K5	**CO4**	appreciate the spirit of the Indian writers to preserve the noble values of Indian society
K5,K6	**CO5**	identify and describe the unique literary tendencies evident in the different translated texts from the different regions of India.

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21ENE421	CHOICE - I	L	T	P	C
ELECTIVE II		COMPARATIVE LITERATURE	3	-	-	3

Cognitive Level	K1:Knowledge K2: Understand K3: Apply K4 Analyze K5 Evaluate K6 Create
Learning Objectives	The course aims to • introduce compare and contrast in different kinds of literature. • expose different schools of Literature and terms. • introduce students to a comparative methodology of reading • introduce an overview of the literary genre from a comparative perspective, including texts • deepen knowledge in English literature for higher studies

Unit 1
Definition and Scope
National Literature
Comparative Literature
General Literature

Unit 2
World Literature
The French and American Schools of Comparative Literature

Unit 3
Influence and Imitation
Periodization – Epoch
School, and Movement

Unit 4
Genre Studies
Thematology

Unit 5
Literature and other Discipline
Literature and other Arts

Reference:
1.SusanBassnet - An Introduction to Comparative Literature
2. Padma Srinivasa, Dr G.R. Balakrishnan, Dr Subramanian – Introduction to Comparative Literature – Theory and Practice
3. Rene Wellek and Austen Warren – Theory of Literature

Reference:
https://guides.libraries.uc.edu/englit
https://docs.lib.purdue.edu/clcweb/
https://www.bachelorstudies.com/BA/Comparative-Literature/

Course Outcomes
Upon completion of this course the students will be able to

K1,K2	CO1	equip the students with literary concepts with special reference to Comparative Literature
K1,K2	CO2	help them prepare for various competitive exams
K2,K3	CO3	keep and updates them with the increasing demand for English
K5,K2,K3	CO4	develop their overall confidence and personality
K6, K3	CO5	expand the knowledge of the students about the development of Comparative Literature

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	S	M	S	S	M	S	S	M	S	M
CO2	S	M	S	M	S	S	M	S	S	M	S	M
CO3	S	S	S	S	S	S	M	S	S	S	S	M
CO4	S	M	S	S	S	S	M	S	S	S	S	M
CO5	S	M	S	M	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENE422	CHOICE - II	L	T	P	C
ELECTIVE II		CHILDREN'S LITERATURE	3	-	-	3
Cognitive Level		K1:Knowledge K2: Understand K3: Apply K4 : Analyze K5 : Evaluate K6 : Create				
Learning Objectives		The course aims to • analyze writing for children in terms of literary and artistic elements and standards. • apply knowledge of genres of writing for children. • evaluate works written for children. • plan, share, and evaluate the presentation of literature to/ with children • demonstrate knowledge of diverse cultures and value systems				

Unit-1- Tales
Fairy Tales and their Permutations
Cinderella
Beauty and the Beast
Animal Fable
Rudyard Kipling: Just So Stories

Unit 2: Poetry
Tennyson - "The Brook"
Felicia Hermann -"Casablanca"
Toi Derricote - "A Place in the Country"

Unit 3 : Legends and Fantasy
J. R. R. Tolkien --The Hobbit
William Golding- Lord of the Flies

Unit 5: Fiction
Lewis Carroll - Alice in Wonderland
Ruskin Bond - The Blue Umbrella

Resources:
https://iasl-online.org/resource/childrenslit.html/
https://www.childlitassn.org/resources
https://www.springer.com/journal/10583

https://libguides.reading.ac.uk/english-literature/e-resources

Course Outcome

Upon completion of this course the students will be able to

K1,K2,K4	CO1	display working knowledge of classic and contemporary children's literature
K3,K4,K5	CO2	identify and describe distinct literary characteristics of literature, including techniques of illustration and format of children's books
K2,K4,K3	CO3	analyze literary works from various genres for their structure and meaning, using correct terminology
K1,K2,K3,K4	CO4	write analytically about children's literature using MLA guidelines
K4,K5, K6	CO5	effectively communicate ideas related to the literary works during class and group activities

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

SEMESTER –V

COURSE CODE	U21ENT51	INTRODUCTION TO ENGLISH LANGUAGE AND PHONETICS	L	T	P	C
CORE VIII			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluat K6: Create				
Learning Objectives		By introducing the course, it is intended to: • enable the student recognize the need for learning correct (RP) pronunciation • make the student familiar with the different stages of speech production • help the student know the criteria for the description of English vowels and consonants • familiarize the student with the use supra-segmental features • analyze the Growth and development of English and Its structural, grammatical and functional aspects				

Unit 1:
History of English Language
Human Language and Animal Language
Theories of Language Origin
Speech and Writing
Origin of the writing Systems

Unit 2:
Language and Regional Variation
Language, and Social Variation
Language and Culture

Unit 3:
The Sounds of English Language
The Sound Patterns of English Language

Unit 4:
Syllable- Word Accent& Rhythm in Connected Speech -Stress and Intonation

Unit 5:
Phonetics Transcription

Books for Reference

1. F.T.Wood, An Outline History of English Language: Paperback Publishers 1994.
2. J.D.O'Connor Better English Pronunciation (Second Edition): Cambridge University Press, 2013.
3. John Lyons, Introduction to Theoretical Linguistics: Cambridge University Press, 1971.
4. T.Balasubramaniam, A Textbook of English Phonetics for Indian Students (2nd Edition):
5. Macmillan Publishers, 2013.
6. N.Krishnaswamy, Modern Applied Linguistics: Macmillan Publishers,1992.

E-Resources:

https://busyteacher.org/15081-esl-pronunciation-practice-9-best-online-resources.html
https://www.fluentu.com/blog/educator/computer-assisted-language-learning/

Course Outcome

Upon completion of this course the students will be able to

K6,K2, K4	**CO1**	comment on linguistic choices in writing for specific audiences, purposes, contexts and cultures
K2, K5	**CO2**	develop an understanding of language issues and debates, and respond critically to these issues
K6,K5	**CO3**	analyze the theories and remember the concepts in speech sounds
K3,K2,K5	**CO4**	comprehend and evaluate various theories, concepts of language and linguistics
K5,K6	**CO5**	develop their skills as interpreters and producers of meaning

Mapping of COs with POs & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	M	S	M
CO3	S	S	S	M	S	S	M	S	S	S	M	S
CO4	S	S	S	S	S	M	S	S	M	S	S	M
CO5	S	S	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 Marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 Mark

COURSE CODE	U21ENT52	TWENTIETH CENTURY BRITISH LITERATURE	L	T	P	C
CORE IX			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		By introducing the course, students: • acquire knowledge about modern and post-modern trends • increase the analytical ability of students in evaluating and assessing the literary works • develop critical thinking capabilities • becomesefficient in English for global competency • improve the communication strategies • will be placed in good jobs				

Unit 1: Prose

Bernard Shaw - How I became a public Speaker
Virginia Woolf - A Room of One's Own (Chapter I)

Unit 2: Poetry

W.B. Yeats - The Lake Isle of Innisfree
T.S. Eliot – A Love Song for Alfred J. Prufrock
G.M. Hopkins – God's Grandeur
Ted Hughes - Hawk Roosting
Philip Larkin - Aubade

Unit 3: Drama

John Galsworthy - Justice
T.S. Eliot - The Family Reunion

Unit 4: Fiction

Joseph Conrad - Lord Jim

Unit 5: Fiction

Kazuo Ishiguru - The Remains of the Day

Reference Books:

1. Ashley Dawson, The Routledge Concise History of Twentieth-Century British Literature, Routledge, 2012.
2. G.R. Taneja, 20th Century British Literature, Prestige Books (1 January 2013)

E- Resources

1. https://uomustansiriyah.edu.iq/media/lectures/8/8_2018_12_19!10_28_26_PM.pdf
2. https://libguides.cca.edu/literature
3. http://www.mdudde.net/pdf/study_material_DDE/ma/maEnglish/INDIAN%20WRITING%20IN%20E ENGLISH
4. https://www.ukessays.com/essays/english-literature/the-introduction-to-indian-writing-in-english-
5. http://sahitya-akademi.gov.in/journals/indianliterature.jsp

Course Outcome

Upon completion of this course, the students can

K6,K2, K4	CO1	strengthen the knowledge of Twentieth-Century Writers
K2, K5	CO2	familiarize with the contemporary writers
K6,K5	CO3	develop critical perspective
K3,K2,K5	CO4	analyse the periods of the authors
K5,K6	CO5	acquaint with the important aspects and movements of the respective period

Mapping of COs with POs & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	M	S	M
CO3	S	S	S	M	S	S	M	S	S	S	M	S
CO4	S	S	S	S	S	M	S	S	M	S	S	M
CO5	S	S	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENT53	WOMEN'S WRITING IN ENGLISH	L	T	P	C
CORE X			5	-	-	4
Cognitive Level		**K1: Knowledge** **K2: Understand** **K3: Apply** **K4: Analyze** **K5: Evaluate** **K6: Create**				
Learning Objectives		**The Course aims to** • understand Gender and Women's Studies as an academic field of study • be familiar with its major concepts, history, assumptions, and theories/theorists, and recognize its epistemological and methodological diversity and character. • analyze the ways in which societal institutions and power structures impact the material realities of women's lives. • evaluate information derived from various women's writing. • interpret information from a variety of sources including print and electronic media, film, video, and other information technologies and Cater to the needs of women in Society proactively.				

Unit 1: (Prose)
Elaine Showalter- Towards a Feminist Poetics
Maya Angelo - I Know Why the Caged Birds Sings

Unit 2: (Poetry)
Sylvia Plath- Lady Lazarus
Margaret Atwood- Morning in the Burned House
Kamala Das- a) An Introduction b) The Looking Glass

Unit 3: (Drama)
Lorainne Hansberry- A Raisin in the Sun

Unit 4:(Fiction)
K.R.Meera- Hangwoman

Unit 5: (Fiction)
Bharathi Mukherjee- Wife

Reference Books:

1. Riley Catherine, Feminism and Women's Writing, Edinburgh University Press, 2015
2. Patricia Demers, Women's Writing In English, University of Toronto Press, Scholarly Publishing Division; 2nd ed. edition (March 21, 2005)

E- Resources:

https://www.tandfonline.com/toc/rwow20/current
https://guides.library.harvard.edu/schlesinger_womens_history_databases

Course Outcome

On successful completion of the course, the students will be able to

K1,K2	**CO1**	learn how and on what grounds women's writings can be considered as a separate genre.
K1,K2	**CO2**	read and understand canonical texts written by Women writers across different ages.
K3,K4	**CO3**	differentiate between sex and gender and how the latter is a social construction.
K4,K5	**CO4**	be aware of the issues and concerns of the women writers of the developed, developing and under-developed countries
K3,K6	**CO5**	demonstrate awareness of cultural and intercultural concerns relating to women's writing

<u>Mapping of COs with POs & PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**
CO2	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**
CO3	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**
CO4	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**
CO5	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**S**

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENT54	INTRODUCTION TO LITERARY CRITICISM	L	T	P	C
CORE XI			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		The Course aims to ➢ have an overview of major critical tools available to understand a text contextually ➢ attain the skill of attempting a close reading of the text and to analyze and interpret facts ➢ show an appreciation of the relevance and value of theoretical models in literary study ➢ demonstrate an understanding of important theoretical methodologies by summarizing key concepts or arguments. ➢ apply these concepts or arguments successfully in a close reading of a literary text.				

Unit 1:
Introduction to Classical Humanism: From Plato's Theory of imitation to Aristotle's Theory of Mimesis and Catharsis

Unit 2:
Introduction to Biographical and Historical Criticism

Unit 3:
Introduction to early 20th literary Criticism- Modernism, Formalism, New Criticism, Structuralism

Unit 4:
Introduction to late 20th century Literary criticism –
Postmodernism, Post structuralism, Post colonialism, Eco criticism, Gender Studies

Unit 5:
Literary Interpretation- Close Reading Techniques

Reference Books:

1. Manfred John (Editor), Marie- Laure, The Routledge Encylopedia of Narrative Theory,2005.
2. Johns Hophiks, Michael Groden,ed. Guide to Literary Theories and Criticism,), 2004.

E- Resources

1. **https://haywood.libguides.com/c.php?g=146425&p=961064**
2. **https://www.thrall.org/litcrit/**
3. **https://www.gale.com/literature-criticism**

Course Outcome

Upon completion of this course the students will be able to

K6,K1,K2	**CO1**	provide a critical understanding of the developments in literary criticism from the beginning to the end of the 19th century
K2,K1,K3	**CO2**	familiarize selected texts/critics which are prescribed for the detailed study whose contribution to this area constitutes a significant benchmark in each era.
K6,K1,K2,K4	**CO3**	provide a conceptual framework for developing an understanding of the function and practice of traditional modes of literary criticism
K3,K4,K5,K6	**CO4**	learn the history of literary criticism and various literary theories. Apply critical and technical theory and vocabulary to describe and analyze, and formulate an argument about literary and other texts.
K5,K4,K5,K6	**CO5**	think about the non-fixity of the meaning of literacy texts. develop skill in applying various literary theories in interpreting a specific text.

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	M	M	S	S	S	S	M	M	S
CO2	S	S	S	S	S	S	S	S	S	M	S	S
CO3	S	S	S	M	M	S	S	S	S	M	M	S
CO4	S	S	S	M	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	M	M	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENT55	SHAKESPEARE	L	T	P	C
CORE XII			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		By introducing the course, it is intended to • enable the students to appreciate the genius of Shakespeare that has made him a classic of eternal value • enable them to know the historical and present day value of Shakespeare, the poet- dramatist • make the students understand the aesthetics of Shakespeare • understand the social, historical, and cultural content of Shakespearean works • enable the students analyze the strengths and weaknesses of • the characters • enable the students appreciate Shakespeare's skill of characterization, plot construction, use of humour and wit,and song and music				

Unit 1:Introduction
Theatre and Audience
Fools in Shakespeare Plays
Villains in Shakespeare Plays
Women in Shakespeare Plays
Songs and Music in Shakespeare Plays

Unit 2: (Shakespearean Comedy)
As You Like It

Unit 3: (Shakespearean Tragedy)
King Lear

Unit 4: (Shakespearean Historical Play)
Henry IV Part I

Unit 5: Shakespearean Criticism
Shakespearean Criticism and Shakespearean Adaptation

Reference Books:

1. Charles Boyce, Shakespeare A to Z: The Essential Reference to His Plays, His Poems, His Life and Times, 1991
2. Micheal Dobson, Stanley Wells, *The Oxford Companion to* Shakespeare, Oxford University Press. 2001.

Resources:

1. https://morningside.libguides.com/shakespeare/online
2. https://it.pearson.com/aree-disciplinari/english/literature/best-shakespeare-resources.html

Course Outcomes

On successful completion of the course, the students will be able to

K1,K2,K4	**CO1**	understand the magnitude of the Shakespearean world
K3,K4,K5	**CO2**	introspect the complexities of Shakespeare's plays
K2,K4,K3	**CO3**	attain a comprehensive knowledge of the plays of Shakespeare
K1,K2,K3,K4	**CO4**	analyze the stylistic features of Shakespeare
K4,K5, K6	**CO5**	relish the sublimity of Shakespearean language and expression through creative writing

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENE531	MARGINAL WRITING	L	T	P	C
ELECTIVE III			3	-	-	3
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Upon completion of this course the students will be able to • have a wider knowledge of the trials and tribulations endured by downtrodden people • enhance their ability to read text analytically to understand the social discrimination • cultivate ability to analyze the elements and strategies of various genres • comprehend literary writing as a platform for recording the voice of the voiceless • evaluate the power of creative writing as a means to recover and to redeem one to get better job.				

Unit 1: Important Personalities
Bama, Oprah Winfrey, Maria Campbell, Louise Gluck -their contributions to Literature
Aboriginals and other suppressed class, Racism, Sexism, Dalits

UNIT 2: Prose
Sharankumar Limbale: Towards Aesthetics of Dalit Literature

Unit 3:**Poetry**
Govindaiah: "In the Soil of Tears"
Maya Angelou: "Phenomenal Woman", "Men"

Unit 4: Drama
Gurucharan Das: Larins Sahib (Drama)

Unit 5; Fiction
U. Pillai: Chammeen (Fiction)
T. Sivagami – The Grip of Change

Reference Books:
1. Sarangi, C. Ghosal, *Marginal Writings in English*, 2013.
2. Jaydeep Sarangi, *Marginal Writings In English,* Author's Press, 2013

Resources:

1. **https://libguides.reading.ac.uk/english-literature/e-resources**
2. **http://www.ideunom.ac.in/syllabus/ma_english.pdf**

Course Outcomes

On successful completion of the course, the students will be able to

K1,K2,K4	**CO1**	understand the concept of Marginal Writings with a positive perspective
K3,K4,K5	**CO2**	gain insight into the key ideas of Marginal Writings
K2,K4,K3	**CO3**	recognize Marginal Writings as a social and cultural construct
K1,K2,K3,K4	**CO4**	analyze societal representations of Marginal Writings at moral, social, and political levels
K4,K5, K6	**CO5**	recognize contributions of Marginal Writings in the literary world

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENE532	CREATIVE WRITING	L	T	P	C
ELECTIVE III			3	-	-	3
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		• students will acquire experience writing creatively. • they also hone their skills writing about the great works of literature they encounter as English majors. • it will develop the ability of the students to write with wit and grace. • it will train them to tell compelling stories. • students who study English and Creative Writing will develop strong research, reading and writing skills. • skills that easily translate into careers in fiction writing, journalism, academia, marketing, advertising, and technical writing, as well as government, law and business.				

Unit 1:Types
Descriptive Writing
Narrative Writing

Unit 2: Writing Components
Analysis of the Creative Writing Components (Poem, Novel, Short Story, Drama, Diary) Craft of poetry: subject matter, theme.

Unit 3: writing for Media
Writing for various media
Editing & Proofreading

Unit 4: Fundamental Norms of Writing
Feature Writing
Composing poetry/ Short Story
Writing for Radio, Theatre, Television and Films
Writing scripts for Publishers and Copy Writing.

Unit 5:Assignment in Creative Writing:
Poetry
Short Story

Fiction / Drama

Reference Books:

1. Julia Bell Paul Magrs, *The Creative Writing Coursebook*. 2001
2. Dev Anjana Neira, *Creative Writing,* Pearson Education India, 2008

Resources:

1. https://www.aspenwords.org/6198-2/
2. https://guides.library.ucla.edu/c.php?g=180834&p=1189338
3. https://research.pugetsound.edu/c.php?g=304227&p=2029021

Course Outcomes

On successful completion of the course, the students will be able to

K1,K2,K4	**CO1**	closely read both canonical and modern/postmodern prose narratives and poems.
K3,K4,K5	**CO2**	demonstrate an understanding of various forms and structures of fiction and poetry.
K2,K4,K3	**CO3**	demonstrate familiarity with a variety of professional writers' styles and voices in fiction and poetry to develop his or her style.
K1,K2,K3,K4	**CO4**	demonstrate some awareness of the literary influence and literary history.
K4,K5, K6	**CO5**	exhibit knowledge of editing and revision techniques, the world of publishing, and other career-related aspects of writing.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENS53	WRITING FOR THE WEB	L	T	P	C
SKILL BASED III			2	-	-	2
Cognitive Level		K1: Knowledge K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		The course aims to • create and edit well-designed and technically sound e-news pages using industry standard software. • create and maintain all aspects of a daily, Internet-based, multimedia publication. • participate as an effective member of a team. • manage and lead a team of journalism professionals • instill acumen in the field of journalism and media • develop portfolio that demonstrates creative and professional skills and abilities in journalism.				

Unit 1: Web
Knowing the Web and its domain: Messages,
Audience, Blogs, personal sites, portfolio sites, technical and
corporate web writing

Unit 2: Practices
Best Practices for writing for the web

Unit 3 :Content Writing
Style, Linear/Non-linear
Interactive stories, Good Grammar, Revising,

Unit 4: Images and Sounds
Working with Images
Sounds
collaborating

Unit 5 :Introduction to Information Security
Overview of Information Security, Internet Governance – Challenges and Constraints, Threats. Need for Security, Business Needs, Attacks, Legal, Ethical and Professional Issues -An Overview of Computer Security –Integrity policies and Hybrid policies.

Recommended Text:

1. Lynda Felder, Writing for the Web: Creating Compelling Web Content Using Words, Pictures and Sound. New Riders Publisher, 2011.
2. Crawford Kilian, Writing for the Web, Self-Counsel Press; Fifth Edition, Fifth edition August 15, 2015

E-Resources

1. https://www.emergingedtech.com/2018/08/tips-online-resources-help-students-improve-their-writing/
2. http://www.bu.edu/erc/writingassistance/online-writing-resources/
3. https://advice.writing.utoronto.ca/researching/research-using-internet/
4. https://www.ef.com/wwen/blog/teacherzone/self-study-resources-for-students/
5. Introduction to Cyber Security available at http://uou.ac.in/foundation-course.
6. Fundamentals of Information Security http://uou.ac.in/progdetail?pid=CEGCS-17

Course Outcome

On successful completion of the course, the students will be able to

K2,K3,K4	**CO1**	demonstrate their ability to observe events, gather information, write news reports and news releases and report on events
K3,K2,K5	**CO2**	gain first-hand experience in designing the News Letters.
K4,K2,K3	**CO3**	understand the difference between communication and media theories and would have gained the expertise to handle this area in their profession
K5,K4,K6	**CO4**	grasp the complex relationship between communication/media theories and a diverse set of individual, social, and professional practices
K6,K2,K3	**CO5**	know the processes and practice of writing for the media and to have placement in Media

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

SEMESTER-VI

COURSE CODE	U21ENT61	INTRODUCTION TO WORLD CLASSICS	L	T	P	C
CORE XIII			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Course aims to • display working knowledge of the historical and cultural contexts of world classic literature • identify and describe distinct literary characteristics of world literature from the beginning. • analyze literary works for their structure and meaning • write analytically about literature using MLA guidelines • effectively communicate ideas related to the literary works during class and group activities				

Unit 1: Prose
The Bible – Book of Esther
Guy de Maupassant- Two Friends (Short Story)
Fyodor Dostoyevsky- A little Hero
Vivekananda- Birth of Religion.

Unit 2: Poetry:
Homer--- The Odyssey, Book-1, Lines 1-20
Dante – Inferno, Canto- 1
Constantine Petrou Cavafy--Ithaca
Bertolt Brecht- Alabama
Rabindranath Tagore. - Let me not Forget.

Unit 3: Drama
Sophocles- Oedepus Rex

Unit 4: Fiction
Tolstoy- Anna Karenina
Unit 5: Fiction
Alexander Dumas- The Count of Monte Cristo

Reference Books:

Arthur Morrison, Peter Miles**,** *Oxford World's Classics*, Oxford University Press, 2014

E- Resources:
https://classics.williams.edu/resources/online-resources-2/
https://global.oup.com/academic/content/series/o/oxford-worlds-classics-owc/

Course Outcomes
The main aim of the course is to

K1,K2,K4	**CO1**	introduce the Background of World literature
K3,K4,K5	**CO2**	inculcate interests to focus on Contemporary literature
K2,K4,K3	**CO3**	deepen the knowledge of contemporary world culture through literature
K1,K2,K3,K4	**CO4**	enhance the aesthetic sense through admiring the beauty of life and literature
K4,K5, K6	**CO5**	ignite the minds to compare the glory of Indian Writings

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENT62	NEW LITERATURES IN ENGLISH	L	T	P	C
CORE XIV			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		The course • Introduces the elements of Post-colonial literature. • Introduces the creative writing in English from countries formerly colonised by Britain. • Makes the students understand the texts in relation to postcolonial theory. • Offers the ideas of nuances which handled by the authors of different region. • Provides the picture of different landscapes.				

Unit 1: Prose
Zadie Smith- Speaking in Tongues
BinyavangaWainaina How to Write about Africa

Unit 2: Poetry
FunomMakama- Wake up Oh Africa
Alice Walker- a) The Tree of Life Has Fallen b) Desire

Unit 3: Short Story
Margaret Atwood - Happy Endings
Alice Munro- Boys and Girls

Unit 4: Drama
Betty Roland- The Touch of Silk
Riwia Brown- Roimata

Unit 5: Fiction
Wilson Harris- The Palace of the Peacock

Reference Books:

1. Janatha Kumari, Chitra Thrivikraman Nair, *Perspectives on New Literatures: Postcolonial Responses*, 2015
2. K Sarkowsky, *The* New Literatures *in English*, Lexington Books, 2007.

E- Resources

1. https://guides.library.unt.edu/c.php?g=531524&p=3999016
2. https://postcolonial.net/postcolonial-resources/academic-journal

Course Outcomes

Upon completion of this course the student will be ablt to

K2, K1	**CO1**	possess the knowledge of Post-colonial Literature.
K3,K4	**CO2**	understand the ideas of colonized writers.
K4,K2	**CO3**	figure out the importance of knowing Postcolonial theory.
K5,K4	**CO4**	demonstrate the nuances of the authors of the different region and apply in their analysis.
K6,K5	**CO5**	gather the ideas of different landscapes and the culture.

Mapping of COs with POs & PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENT63	LIFE WRITINGS	L	T	P	C
CORE XV			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		• Be acquainted with major trends and key works in biographical thinking and writing. • Be familiar with some of the main constructs related to biography and life writing. • Be supposed to have developed abilities to assimilate, asses and synthesise information • in a coherent way. • Be familiar with some key primary sources for understanding biography writing from a global perspective.				

Unit 1: Definition and Concept
Life Writing Definition and Concept
Boundaries of fiction and non-fiction

Unit 2:Autobiography
Anne Frank- The diary of a Young Girl
Biography: Andrew Wilson –Mad Girl's Love Song

Unit 3: **Autobiography**
Ruskin Bond- Scenes from the Writer's Life
Memoir: MalalaYousafzai: I am Malala

Unit 4: **Literary Journalism**
George Orwell- Animal Form

Unit 5:Creative Nonfiction
Jon Krakauer- Into the Wild

Narrative Nonfiction
A. Revathy- The Truth about Me: A Hijra Life Story

Resources:

1. **https://libguides.reading.ac.uk/english-literature/e-resources**
2. **https://www.lifehack.org/articles/lifestyle/20-online-resources-for-free-books.html**

Course Outcomes

On successful completion of the course, the students will be able to

K1,K2,K4	**CO1**	expose to a range of contexts where the language is used to meet a variety of real-life communication
K3,K4,K5	**CO2**	equip with the practical, emotional and creative aspects of language through biography and autobiography.
K2,K4,K3	**CO3**	enhance practice in objective and subjective writing.
K1,K2,K3,K4	**CO4**	offer a platform to express creativity and talent.
K4,K5, K6	**CO5**	learn the elements of fiction and non-fiction.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENT64	ENGLISH TEACHING METHODS AND MATERIALS	L	T	P	C
CORE XVI			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Course aims to • expose to a range of contexts where the language is used to meet a variety of real-life communication • equip with the practical, emotional and creative aspects of language through biography and autobiography. • enhance practice in objective and subjective writing. • offer a platform to express creativity and talent. • learn the elements of teaching and learning.				

Unit 1: Language:
Describing Language;
Language Acquisition and Development

Unit 2: Methodologies
English Language teaching methodologies
The Direct Method
Grammar-translation
Audio-lingual
The structural approach
Communicative language teaching (CLT)
TPR
The Silent Way
Immersion
Task-Based, Natural, Lexical.

Unit 3: Techniques
Teaching Techniques- Blended learning, flipped
Learning, Participatory learning, Experiential learning

Unit 4: Methods
Collaborative Learning, Spaced Learning,
Self- Learning, Gamification and VAK Learning

Unit 5: Instructional Materials
Types of Instructional Materials, Evaluation
Learning materials- Print-Audio- Visual Materials, Computers and Internet

Reference Books:

1. Dhanavel S P English Language Teaching in India: The Shifting Paradigms - The Shifting Paradigms McGraw Hill Education India, 2018
2. Francis, English Language Teaching Guide, EFL Ltd; 9th Revised edition (1 August 2004).

Resources :
https://www.ihteachenglish.com/resource/11-useful-online-resources-elt-teachers
https://www.fluentu.com/blog/educator-english/esl-teaching-resources/
https://www.britishcouncil.org.br/en/programmes/english/resources-teachers

Course Outcomes
On successful completion of the course, the students will be able to

K1,K2,K4	**CO1**	have confidence in facing English speaking environment would have progressed.
K3,K4,K5	**CO2**	gain confidence and be assertive with the skilful acquisition of language and communication skills.
K2,K4,K3	**CO3**	overcome the fear of learning a second language or a foreign language and equip themselves
K1,K2,K3,K4	**CO4**	demonstrate how technology can be used for learning the language.
K4,K5, K6	**CO5**	identify and classify strategies to teach language.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENT65	LITERATURES FROM ASIA	L	T	P	C
CORE XVII			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Course aims • to introduce students to a selection of literatures from Asia. • to equip students to study the similarities between the literatures and culture of this region. • to equip students to identify issues related to the intersection of gender, caste, class, language, religion and politics. • to enable students to develop a fervor for world culture and values • to encourage students to extend their knowledge of this region to understand larger global concerns.				

Unit 1: Prose

Aung San Suu Kyi	Nobel Lecture (Myanmar)
Zong Pu	Melody in Dreams (China)
Jean Arasanayagam	All is Burning (Sri Lanka)
Rokeya Sakhawat Hossain	Sultana's Dream (Bangladesh)

Unit 2: Poetry

Mirza Ghalib	The Ghazals (Indian)
Edwin Thamboo	Ulysses by the Merlion; (Malaysia)
Fadwa Tuqan	Longing: Inspired by the Law of Gravity (Palestine)

Unit 3: Drama

Seami *Astumori*	(NOH play) (Japan)
Ernest MacIntyre	*He Still Comes from Jaffna* (Sri Lanka/ Australia)

Unit 4: Fiction

Yasunari Kawabata	*Beauty and Sadness* (Japan)
Meira Chand	*A Different Sky* (Singapore)

Unit 5: Cultural Readings
Features and Scope

Recommended Reading:

1. Holden , Philip and Rajeev Shridhar Patke .The Routledge Concise History of South East Asian Writing in English. Routledge, 2010.
2. Smith, David . Ed. The Cannon in South East Asian Literatures. Psychology Press, 2000.
3. Kratz, E. Ulrich. South East Asian Languages and Literatures. I.B. Tauris, 1996.
4. ThamSeong Chee, Ed., Essays in literature and society in South-East Asia. NUS Press, 1981.
5. Obeyesekere, Ranjini. The Sri Lankan Theatre in the Past Two Decades. Marga Institute, 2001.

Journals:
SARE: Southeast Asian Review of English
International Journal of Asian Studies (IJAS)
Asian Theatre Journal

E-Learning Resources:
Ghalib -

1. http://www.columbia.edu/itc/mealac/pritchett/00urduhindilinks/abdulqadir/02ghalibprose.pdf
2. https://www.youtube.com/watch?v=XqduRPl5PBw
3. Ulysses by the Merlion; Evening by Batok Town -
4. https://pdfs.semanticscholar.org/f441/af9e241641b7e26ac25fa17cfb9810bfb3a1.pdf
5. The Case of Literature - https://www.youtube.com/watch?v=-jffgZDVBSc
6. NOH play- https://www.youtube.com/watch?v=-6msFSM1d9A
7. https://www.youtube.com/watch?v=wr-USxFyuYU
8. YasunariKawabata- https://youtu.be/5RBxq3esrKs

Course Outcome:
On successful completion of the course, the students will be able to

CO 1 critically read representative literary texts from these regions as cultural texts.
CO 2 dentify the similarities and differences among Asian literatures to appreciate difference
CO 3 demonstrate an understanding of the universal factors of social realities of this Region
CO 4 relate to cultural and social values of a variety of cultures
CO 5 extend their knowledge of this region to discuss larger global concerns with culture.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENE641	MYTH AND LITERATURE	L	T	P	C
ELECTIVE IV			4	-	-	3
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Course aims • to identify and describe the difference between cinematic and literary images • to examine different theories of adaptation and link them to contexts of expression and reception • to help them to understand the major themes and literary trends. • to discuss the problem of language in film and Literature. • to create an interest in students to appreciate literary pieces.				

Unit-1: Greek Mythology
The Three Sisters of Fate
Pandora's Box

Unit-2: Roman Mythology
Hercules (Atlas and Hercules)
The Story of Romulus and Remus
The Story of Dido, Queen of Carthage
The Story of Cupid & Psyche
The Story of Echo & Narcissus

Unit-3: Celtic Mythology
Oisin in the Land of Eternal Youth

Unit-4: Legends
Arthurian Cycle (The Holy Grail)
Robin Hood Cycle

Unit-5: Indian Mythology
• Stories from Ramayana
The Burning of Lanka
• Stories from Mahabharatha
Kurukshetra - The Battle &The Deception of Bheema
The Story of Nala and Damayanthi

Recommended Text

1. Linda H. Peterson, John C. Brereton, ed. The Norton Reader, August 2008
2. Antonia Barber, · D'Aulaire's ,. **Mythology** Collections · Apollo and Daphne: Masterpieces of **Mythology**, 2019.·
3. D'Aulaire's **Book** of Greek **Myths**, 2019
4. Roshani Chokshi, Indian mythological-fiction books, **The Pandava series, 2019.**

E- Resources

1. **https://guides.nyu.edu/fairytales/digital**
2. **https://guides.lib.uw.edu/c.php?g=403912&p=2749152**
3. **https://guides.stlcc.edu/c.php?g=154584&p=1014999**

Course Outcomes

On successful completion of the course, the students will be able to

K1,K2,K4	**CO1**	evaluate the power of Myth as a means to recover and to redeem one
K3,K4,K5	**CO2**	master the current trends in Myth and Literature
K2,K4,K3	**CO3**	comprehend the context of Myth and Literature
K1,K2,K3,K4	**CO4**	assess a wide range of Mythology.
K4,K5, K6	**CO5**	acquaint themselves with the knowledge of Myth and Literature

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	S	M	S	S	S	S	M	S	M
CO3	S	S	S	S	M	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	M	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S)	-	3 Marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 Mark
No Correlation (N)	-	0 mark

COURSE CODE	U21ENE642	FILM AND LITERATURE	L	T	P	C
ELECTIVE IV			4	-	-	3
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Evaluate K5: Analyze K6: Create				
Learning Objectives		Course aims • to identify and describe the difference between cinematic and literary images • to examine different theories of adaptation and link them to contexts of expression and reception • to help them to understand the major themes and literary trends. • to discuss the problem of language in film and Literature. • to create an interest in students to appreciate literary pieces.				

Unit-1: Adaptation
The Concept of Film Form: genre / sub-genre
narrative film , avant-garde film, film noir, documentary.
Themes -tropes - cue - suspense - themes - functions -
motif - parallelism - development - unity / disunity .

Unit-2: Adaptation of Contemporary Indian English Fiction
Danny Boyle - Slum Dog Millionaire (2008)

Unit-3: Adaptation of Fantasy / Science Fiction
Steven Spielberg - War of the Worlds (2005)

Unit-4: Adaptation of British Literature in Films
Ang Lee- Sense and Sensibility (1995)
Rajiv Menon–KandukondainKandukondain (2000) (Tamil)

Unit-5: Components of a Film Review
Plot, Genre, Role of actors, Background
information, condensed synopsis, argument/analysis.

Recommended Text:
Linda, *A Theory of Adaptation*, 2006.
Hutcheon, - "*Beginning to Theorize Adaptation*"2014

E- Resource:
https://libguides.reading.ac.uk/english-literature/e-resources

COURSE OUTCOMES
On successful completion of the course, the students will be able to

K1,K2,K4	**CO1**	assess a wide range of Film and Literary texts
K3,K4,K5	**CO2**	demonstrate a systematic and historically-grounded knowledge of literature and cinema
K2,K4,K3	**CO3**	present a coherent view of the relationship between written and cinematic texts
K1,K2,K3,K4	**CO4**	identify and illustrate the distinction between literary and cinematic arts of storytelling
K4,K5, K6	**CO5**	organize different sets of activities to identify and make use of skills that distinguish the medium of cinema from that of literature

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**
CO2	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**M**
CO3	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**S**	**M**	**M**
CO4	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**M**	**S**
CO5	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**S**

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENS64	SOFT SKILLS AND LIFE SKILLS	L	T	P	C
SBE- IV			2	-	-	2

Course Objectives:
Course aims to

- describe the process and types of communication
- explain the types, modes and barriers in listening
- inculcate a deep sense of respect for oneself and others for a holistic living.
- build self-confidence with a focus on personal development and self- awareness.

Unit 1:Soft Skills
Definition, and Types of Soft Skills
Communication, Team Work and Interpersonal Skills
Keys to Improve Soft Skills

Unit 2: Interpersonal Skills
Adaptability, Problem Solving and Creativity

Unit 3: Ethics
Work Ethics and Time Management

Unit 4: **Self-management skills**
Self-awareness, Self-confidence, Self- Reflection, Stress management, Perseverance, Resilience, Mind mapping

Unit 5:. **Body language**
Gestures, postures, Tone of Voice, Eye contact
The Importance of Body Language
The Possitive and the Negative Body Language Signs

Reference Books:.

1. Sasikumar, V, et al. A Course in Listening & Speaking I. Foundation Books,2005.
2. Eastwood, John. Oxford Practice Grammar. Oxford University Press, 1999.
3. Prasad, Hari Mohan. A Handbook of Spotting Errors. Mcgraw Hill Education, 2010.
4. Johnson, Spencer , Who Moved My Cheese?: An Amazing Way to Deal with Change in Your Work and in Your Life. RHUK, 1999.
5. Sharma, Robin, The Monk Who Sold His Ferrari. Harper Collins, 2013.

Earning Resources:

1. www.youtube.com/watch?v=cR75B7CVuZA (What is Attitude?)
2. youtu.be/dhuabY4DmEo (Some tips to improve self- esteem)
3. www.youtube.com/watch?v=-ki9-oaPwHs (How to believe in yourself)
4. Zhu, Jessie. “What is Self Awareness and Why is it Important?,
5. https://positivepsychology.com/self-awareness-matters-how-you-can-be-more-self-aware/

COURSE CODE	U21ENN31	COMPUTER ASSISTED LANGUAGE LEARNING	L	T	P	C
NME - I			2	-	-	2
CognitiveLevel		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		By introducing the course, • students will utilize language learning environments equipped with technology to develop learner autonomy. • students will be aware of the indicators of autonomy by using language learning strategies • students will be motivated to a high level to learn the English language; • They will take responsibility for one's own learning; • students will continue English language study outside the classroom.				

Unit 1:**English Language Teaching (ELT**)

English as Foreign Language (EFL)
English as Second Language (ESL)
English for Specific Purpose (ESP)

Unit 2:Computer-Assisted Language Learning (CALL)

Introduction to the History of CALL
Behaviouristic CALL
Communicative CALL
Integrated CALL

Unit 3:**Creating and Using Blogs in Teaching**

Online Groups-Google Groups, Yahoo Groups
Online Classroom/conference,

Unit 4: 3D Virtual worlds

Interactive webpage- Funbrain, Scholastic Teachable and Read Write Think
Digital storytelling—Story creator, Story Dice, Tell about this

Unit 5: Classroom Management

Student Diversity and Classroom Management
Teacher as Facilitator or Mentor

Reference Books:

1. Mike Levy, Françoise Blin, Claire Bradin Siskin, Osamu Takeuchi, ed. International Perspectives on Computer Assisted Language Learning, 2014
2. Glen Stockwell, ed, Computer Assisted Language Learning, Cambridge University Press, 2012

E- Resources

1. https://elt.fandom.com/wiki/Computer_assisted_language_learning
2. https://www.fluentu.com/blog/educator/computer-assisted-language-learning/

Course Outcome

On successful completion of the course, the students will be able to

K6,K2, K4	**CO1**	equip students with a thorough general awareness of computer hardware and software
K2, K5	**CO2**	incorporate extensively researched web source
K6,K5	**CO3**	enhance good practical skill in performing common basic tasks with the computer.
K3,K2,K5	**CO4**	enhance teaching and learning processes.
K5,K6	**CO5**	create PowerPoint presentations on any topic in literature

Mapping of COs with POs & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**S**	**S**
CO2	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**M**	**S**	**M**
CO3	**S**	**S**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**	**M**	**S**
CO4	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**M**
CO5	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**S**	**S**

Strongly Correlating (S) - 3 Marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 Mark
No Correlation (N) - 0 mark

COURSE CODE	U21ENN42	WOMEN AND HOLISTIC DEVELOPMENT	L	T	P	C
NME - II			2	-	-	2
CognitiveLevel		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate K6: Create				
Learning Objectives		Course aims to • know the role of women in society • develop insight into the process of protection of women health and environment . • know the National Policy and constitutional Protection for Women Empowerment. • identify opportunities for women empowerment and women leadership • sensatize women towards gender equality.				

Unit 1: Women and Technology
Modernization – Industrialization – Liberalization, Privatization, Globalization (LPG) – Impact on Women & Family-case History of Women Achievers in Scientific and Professional field

Unit 2: Changing Roles of Women in the Society
Role of education and attitudinal changes of women-Family- Workplace- Society Environment-Complicated and Complex Roles in the Professional, Leadership and Managerial Positions- -Changing values and women- Moral Vision-Professional Decision-Bridging the Gap of Gender equality-Equity – Cultural impact -Awareness of women's position- Gender Discrimination-Changes in the attainment of Goals.

Unit – 3: Women's Health at Different Stages
Definition of Health Disparity- Gender Disparities in Health- Forms of Gender Disparities – Holistic Approach to Women's Health- Health issues at Different Stages of Women(Adolescents, During Menstruation, Trimesters Pregnancy, Child Birth, Breast Feeding, Marriage, Menopause and Old age)-Common Diseases of Women (Heart attacks cancer- Stroke- Chronic Obstructive Pulmonary Disease (COPD)- Alzheimer's – Disease - Diabetes- Influenza and Pneumonia- Morbidity-Mortality-Anaemia–Life Expectancy- MMRNMR- Kidney Failure -Tumours-Diseases of Bones Joints and Mind, Obesity-Healthy Diets for Women

Unit – 4: Women and Entrepreneurship
Concept of women entrepreneurship-Women and Entrepreneurship –Entrepreneurial decision process-Growth of Women entrepreneurship in India; Entrepreneurial motivation; Factors affecting entrepreneurial growth; strategies for entrepreneurial development.

Unit-5: Women and Laws

Violence Against Women (CEDAW)- Laws relating to Eve Testing, Wife battering Rape, Abduction, Adultery, Murder and Kidnapping. Constitutional Provisions with special reference to Women - Women & Family Laws : (1) Marriage (2) Child Marriage (3) Widow Remarriage (4) Divorce (5) Maintenance (6) Inheritance and Succession (7) Dowry Prohibition - National Commission for Women Act, 1990 - Protection of Women from Domestic Violence Act 2005

References:

Kapur, Ratna and Crossman, Brenda, Subversive Sites: Feminist Engagements with Law in India, Sage Publications, New Delhi, 1996.
Anil Kumar (2007), Women Entrepreneurship in India, Regal Publications, New Delhi.
ChetanaKal (ed) Women and Development Discovery Publishing Home, New Delhi, 1991.
JyotsnaAgnihotri Gupta (2000) New Reproductive Technologies, Women's Health and Autonomy: Freedom or Dependency?, Sage Publications, New Delhi
. Mohan Rao (ed) (2004) The Unheard Scream: Reproductive Health and Women's Lives in India, Zubaan, An Associate of Kali for Women, New Delhi.
Neill Mckee, Jane T. Bertrand and Antje Becker-Benton (2004) Strategic Communication in the HIV/AIDS Epidemic, Sage Publications, New Delhi.

U21ENV51-VALUE ADDED COURSES -2021 June onwards

Duration	Minimum 30 Hours	
Mode	Concurrent	
Eligibility	+2 onwards	
No. of Papers	1	
Maximum Marks for each paper	100	
Evaluation	Internal	External
	25Marks	75 Marks
Total Marks	100	
Passing Minimum	50%	
Question Pattern: **External**	Part A: 10 Multiple Choice Questions	10x2 =20
	Part B: 5 out of 7 questions	5x5 =25
	Part C: 2 out of 4 questions	2x15 =30
Internal	25 Assignment-(10) and Quiz-(15)	

COURSE CODE	U21ENV51	PRESENTATION SKILLS	Total Hours	C
VAP-1			30	2

Objectives:
Course aims

- to strengthen the speaking and writing skills.
- to develop Self-confidence.
- to prepare the students for Competitive Exams.
- to enable the students to speak and write in English fluently on various topics

Unit 1: Organizing Speech
Planning and Preparation
Developing Main Points, Supporting Ideas
Beginning and Ending Speech

Unit 2: Modes of Delivery
Reading the Manuscript
Speaking Extemporaneously
Impromptu
Speaking from memory
Speaker's Voice- Non- Verbal Communication

UNIT 3: Speech Etiquette
Avoiding Bad Habits
Developing Good Ones

Unit 3: Speech for Special Occasions
Welcome Speech
Introduction Speech- Felicitation Speech
Vote of Thanks

Unit 4: Speeches that Changed the World
Sample- Speeches of Jawaharlal Nehru and Mother Teresa

Course Text:
1. Krishna Mohan & N.P Singh – Speaking English Effectively New Delhi Macmillan, 1995

Reference books:
1. Stephen E. Lucas- The Art of Public speaking Chennai: McGraw Hill.
2. Richard Denny- Speak for yourself, New Delhi: UBS, 1995 27

Department of History

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

DEPARTMENT OF HISTORICAL STUDIES AND TOURISM MANAGEMENT

B.A HISTORY

SYLLABUS TO BE IMPLEMENTED FROM THE ACADEMIC YEAR

2021-2022

(CHOICE BASED CREDIT SYSTEM)

Mother Teresa Women's University, Kodaikanal
Department of Historical Studies and Tourism Management
Choice Based Credit System (CBCS)
(2021-2022 onwards)
B.A. History

1. About the Programme

Considering the need for revising and updating the Syllabi from time to time, and as per the UGC/TANSCHE guidelines, the B.A. HistoryProgrammeoffers broad-based curriculum. The Programme is offered through semester pattern and credit system.The outcome based curriculum facilitates the students' understanding of the recent trends in historical studies and tourism. Facilities are provided to earn extra credits through Add on Online course in the third semester, internship in the fourth semester, Value Added Course in the fifth semester, each carrying two additional credits. Extension activities in the sixth semester are compulsory with 3 credits. Professional English is a compulsory paper with 4 credits. Third and fourth semester have NME with 3 credits each. It will help the students acquire needed skills for business communication that is the need of the hour.

2. Programme Educational Objectives (PEOs)

PEO 1	To prepare students to understand historical concepts, terms and definitions
PEO 2	To educate the students in the evolution of culture and heritage and create involvement and interest in the preservation of our culture and heritages
PEO 3	To enable the students to get interest in the subject and motivate them to become intellectually sharper and innovative.
PEO 4	To offer unlimited opportunities to the students for their better future like progressing to higher studies, research, facing all the competitive examinations and getting placements.
PEO 5	To make them responsible citizens with social responsibility and national consciousness.

3. Eligibility

Candidate should have passed the higher secondary examination or CBSE or other equivalent examination from any schools.

4. General Guidelines for UG Programme

i. Duration: The Programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. Medium of Instruction: English

iii. Evaluation: Evaluation of the candidates shall be through Internal Assessment and External Examinations.

	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**10**	**25**	**10**	**25**
External	**30**	**75**	**30**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz (5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External Examination for Core and Elective Papers**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions - 2 questions from each Unit	**10**
2	**B**	**5*4=20** (Internal Choice with 2 questions from each Unit (Either/or)	**20**
3	**C**	**3*15=45** Open Choice - Any three Questions out of 5 - one question from each Unit	**45**
Total Marks			**75**

***Minimum credits required to pass - 156**

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course / Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination, Students with 71% to 74% of attendance must apply for condonation in the prescribed form with the prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Students with less than 65% are not eligible to appear for the examination and they shall re-do the semester(s) after completion of the course, with the prior permission of the Controller of the Examination, and The Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and The Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

9. Programme Outcomes (POs)

On successful completion of B.A. History programme, the students will be able to

PO1	understand and interpret concepts, terms, and definitions and develop intellectual flexibility and knowledge; understand the mechanism driving change and its significance in the present time.
PO2	apply the lessons learnt from history that will guide and motivate them to grow as responsible citizens with leadership skills and team work.
PO3	acquire knowledge about arts and architecture, literature, the teachings of various religions and leaders and develop positive attitude, constructive thinking and tolerance.
PO4	gain new ideas and experiences from classroom and outside learning, discussions and interactions and opens gate for them to perceive various cultures around them.
PO5	appreciate and admire the contributions and sacrifices of kings ,leaders, freedom fighters and social reformers for the development of the nation and thereby develop patriotic feeling and social commitment.
PO6	analyze, interpret and understand various cultures, legislations, constitutional and human rights and responsibilities and thereby become responsible citizens with independent thinking and decision-making ability.
PO7	develop communicative and soft skills and secure sufficient knowledge and skills to face various competitive examinations.

10. Programme Specific Outcomes (PSOs)

At the end of the program, the student will be able to

PSO1	know and appreciate the location of history within Social Sciences establish connections across frontiers of disciplines, examine Arts and Culture, Gender and Marginality
PSO2	gain profound knowledge of historical events and critically examine them,. come to know about how nations developed, about heroes of the past, and much more.
PSO3	differentiate the features of good governance and civic responsibilities and wrong policies and become responsible citizens and develop patriotism and social commitments.
PSO4	enrich knowledge about society, right governance successful leadership traits, women's history ,Human Rights , environmental issues and also acquire soft skills , understand how the society we live in came into existence.
PSO5	progress for higher learning, attain employability skills to compete in various competitive examinations and employment opportunities in teaching profession , private and public sectors.

B.A HISTORY CURRICULUM

Course Code	Title of the Course	Credits	Hours		Maximum Marks		
			T	P	CIA	ESE	Total
FIRST SEMESTER							
U21LTA11	**Part-I** – Tamil I	3	6	0	25	75	100
U21LEN11	**Part -II** – English II	3	6	0	25	75	100
U21HIT11	**Core I** - History of India up to1206 AD	4	5	0	25	75	100
U21HIT12	**Core II** - History of Tamil Nadu up to 1336 AD	4	5	0	25	75	100
U21HIA11	**Allied I** - Modern Governments I	4	5	0	25	75	100
U21EVS11	Environmental Studies	2	3	0	25	75	100
U21PEAS11	Professional English I	4	6	0	25	75	100
	Total	**24**	**36**				**700**
SECOND SEMESTER							
U21LTA22	**Part-I** – Tamil II	3	6	0	25	75	100
U21LEN22	**Part-II** – English – II	3	6	0	25	75	100
U21HIT21	**Core III** - History of India, 1206-1707	4	5	0	25	75	100
U21HIT22	**Core IV** - History of Tamil Nadu, 1336-1800	4	5	0	25	75	100
U21HIA22	**Allied II** - Modern Governments –II	4	5	0	25	75	100
U21VAE21	Value Education	3	3	0	25	75	100
U21PEAS22	Professional English II	4	6	0	25	75	100
	Total	**25**	**36**				**700**
THIRD SEMESTER							
U21LTA33	Part I - Tamil III	3	6	0	25	75	100
U21LEN33	Part II - English III	3	6	0	25	75	100
U21HIT31	**Core V** - History of India, 1707-1947	4	5	0	25	75	100
U21HIE31	**Elective – I** - Epigraphy	3	4	0	25	75	100
U21HIA33	**Allied III** - History of Indian Women till 1985	4	5	0	25	75	100
U21CSS31	**SBE I** – Computer Skills for Office Management	2	**2**	0	25	75	100
	Non-Major Elective – I	2	2	0	25	75	100
U21PEAS33	Professional English III	4	6	0	25	75	100
	Total	**25**	**36**				**800**

FOURTH SEMESTER							
U21LTA44	Tamil –IV	3	6	0	25	75	100
U21LEN44	English- IV	3	6	0	25	75	100
U21HIT41	**Core VI** –History of Tamil nadu 1800-1947	4	4	0	25	75	100
U21HIT42	**Core VII** - History of World Civilization Upto 476 AD	4	4	0	25	75	100
U21HIA44	**Allied IV** - Principles And Methods of Archaeology	4	4	0	25	75	100
U21HIE42	**Elective –II**- Principals of Public Administration	3	3	0	25	75	100
U21MSS42	**SBE-II** - Managerial Skills	2	2	0	25	75	100
	Non -Major Elective – II	2	2	0	25	75	100
U21PEAS44	Professional English IV	4	6	0	25	75	100
	Total	**29**	**37**				**900**
FIFTH SEMESTER							
U21HIT51	**Core-VIII** – History of Europe, 1453 – 1789	4	5	0	25	75	100
U21HIT52	**Core-IX** - Constitutional History Of India, 1858 – 1950	4	5	0	25	75	100
U21HIT53	**Core X** - History of Tamil nadu 1947 – 1989	4	5	0	25	75	100
U21HIT54	**Core XI** – History of America, 1776 – 1945	4	5	0	25	75	100
U21HIT55	**Core-XII** – History of World Civilization-II	4	5	0	25	75	100
U21HIE53	**Elective–III** - Fundamentals of Tourism In India	3	3	0	25	75	100
U21HIS53	**SBE- III** – Computer Applications in History	2	2	0	25	75	100
	Total	**25**	**30**				**700**
SIXTH SEMESTER							
U21HIT61	**Core -XIII** – International Relations Since 1945 AD	4	5	0	25	75	100
U21HIT62	**Core XIV** – History of Science and Technology, 1800-2000	4	5	0	25	75	100
U21HIT63	**Core XV** – History of Europe, 1789 – 1945	4	5	0	25	75	100

U21HIT64	**Core-XVI** History of India, 1947 – 1985	4	5	0	25	75	100
U21HIT65	**Core-XVII**– History of Far East Since 1900	4	5	0	25	75	100
U21HIE64	**Elective –IV** Elements of Historiography	3	3	0	25	75	100
U21HIS64	**SBE-IV**-Archives Keeping	2	2	0	25	75	100
U21EAS61	Extension Activities	3	0	0	100	-	100
	Total	**28**	**30**		**-**	**-**	**800**
	Grand Total	**156**	**205**		**Grand Total**		**4600**

NON MAJOR ELECTIVE

U21HIN31- NME- I - Event Management

U21HIN42 - NME- II - History for Competitive Exams

ADDITIONAL CREDIT COURSES (Each carries 2 Credits)

U21HIO31 - Online Course – III Semester

U21HII41 - Internship – IV Semester

U21HIV51 - Value Added Course – V Semester – History of science and Technology 1800 -2000

Bloom's Taxonomy in fixing the Course Objectives:

The curriculum of B.A., (Eng. Lit) has been designed and the Course Objectives and outcomes of the programmes are set, following the Bloom's Taxonomy Cognitive Domain. Accordingly, it is segmented into six levels of Course Objectives, to be attained by each course. They are -

K1 / Knowledge = Remember

K2 / Comprehension = Understand

K3 / Application = Apply

K4 / Analysis = Analyze

K5 / Evaluation = Evaluate

K6 / Synthesis = Create

Bloom's Taxonomy Action Verbs:

K1 / Knowledge	Arrange, Define, Describe, Duplicate, Identify, Label, List, Match, Memorize, Name, Order, Outline, Recognize, Relate, Recall, Repeat, Reproduce, Select, State
K2 / Comprehension	Classify, Convert, Defend, Describe, Discuss, Distinguish, Estimate, Explain, Express, Extend, Generalize, Give example(s), Identify, Indicate, Infer, Locate, Paraphrase, Predict, Recognize, Rewrite, Review, Select, Summarize, Translate

K3 / Application	Apply, Change, Choose, Compute, Demonstrate, Discover, Dramatize, Employ, Illustrate, Interpret, Manipulate, Modify, Operate, Practice, Predict, Prepare, Produce, Relate, Schedule, Show, Sketch, Solve, Use, Write
K4 / Analysis	Analyze, Appraise, Breakdown, Calculate, Categorize, Compare, Contrast, Criticize, Diagram, Differentiate, Discriminate, Distinguish, Examine, Experiment, Identify, Illustrate, Infer, Model, Outline, Point out, Question, Relate, Select, Separate, Subdivide, Test
K5 / Evaluation	Appraise, Argue, Assess, Attach, Choose, Compare, Conclude, Contrast, Defend, Describe, Discriminate, Estimate, Evaluate, Explain, Judge, Justify, Interpret, Relate, Predict, Rate, Select, Summarize, Support, Value
K6 / Synthesis	Arrange, Assemble, Categorize, Collect, Combine, Comply, Compose, Construct, Create, Design, Develop, Devise, Explain, Formulate, Generate, Plan, Prepare, Rearrange, Reconstruct, Relate, Reorganize, Revise, Rewrite, Set up, Summarize, Synthesize,Tell, Write

Mapping COs with POs:

For the B.A., Degree Programme, the Educational objectives and the Programme Specific Objectives are specified. The Programme Outcomes are designed according to the curriculum, teaching, learning and evaluation process. For each course, the definite Outcomes are set, giving priority to the cognitive domain. The Course Outcomes are mapped with the Programme Outcomes and programme specific outcomes. The performance of the learners is assessed and the attainment rate is fixed, by using the measurements **Strongly Correlating (S), Moderately Correlating (M), Weakly Correlating (W), No Correlation (N)**. The restructuring of the curriculum is done based on the rate of attainment.

SEMESTER – I

COURSE CODE	U21HIT11	HISTORY OF INDIA UPTO 1206 AD	L	T	P	C
CORE -I			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the culture and civilization ➢ understand the administration and ruling methodology of rulers ➢ analyze and interpret the history ➢ know worldwide trade contacts of ancient people ➢ apply administration and irrigation methodology					

UNIT - I: Ancient Indian History

Physical features of India – Sources of Ancient Indian History –The Vedas- Ramayana & Mahabharatha- The Dharmasastras- The Puranas- The Buddhist Literature- Jain Literature- Mudrarakshasa- Arthasastra- Harshachariitha- Works of Kalidasa- Rajatharangini- Chronicles- Archaeological Sources - Epigraphy - Numismatics - Monuments - Sangam Literature - Foreign Accounts - Greek - Chinese - Arab Writers- Pre Historic Period –Stone age culture –Races- Indus Valley Civilization – Indus Sites –Extent – features – cause for the decline -Unity in Diversity –Indus Valley Civilization

UNIT- II: Vedic Society

The Aryans -Vedic Age – Society and culture in the Rig Vedic Age – Changes in the later Vedic period – Vedic literature-The Epic Age- The Age of the Dharma Sastras-Rise of Jainism and Buddhism – Teachings of Buddhism and Jainism - Impact of Persian and Greek contact - Spread of Religion – Decline - Alexander's Invasion and its Effects

UNIT -III : Mauryas andGuptas

The Age of Mauryas – Sources- Kautilya's Arthasastra – Indica of Megasthnese- Chandragupta Maurya- Bindusara- Ashoka – Kalinga War- Administration – Art-Culture -The Sungas and Kanvas – Pushyamitra- Importance of Sunga Period- The Kanvas- society -The Satavahanas- Political and social condition - Satavahana Art- The Sakas and Pahlavas- Rise and fall of the Kushana empire- Gandhara Art- Mathura School of Art.-- Guptas Age –Administration– Social and Economic condition – Women-Art- Architecture -Literature – the Golden age – Decline- The Vakatakas- Harsha Vardhana- Administartion Northern India after Harsha- Social and cultural Condition of Northern India.

UNIT -IV: Sathavahanas – Chalukya- Rajputs

The Rajput - Administration- Social Life - Culture - Literature- Art

The Rastrakutas - Genesis of the Rashtrakutas- Dantidurga- Krishna I- Tripartite Struggle between Palas, Prathiharas and Rashtrakutas-Administration- Religious and Cultural Condition - Art.The Chalukyas - The rise of the Western Chalukyas of Badami- Kirthivarman I- Pulikesin II- Later Western Chalukyas of Kalyani- The Eastern Chalukyas- Vishnuvardhana- The Deccan under the Chalukyas.

UNIT –V: Conquest of India

Indian Society on the eve of Arab conquest -– Arab invasion of Sindh – Muhammad-bin-Kasim - Consequences of the Arab Conquest.- Muhamad Ghazini - Encounter with Maharaja Jayapala- Somnath temple- Muhamad Ghori - Rajput chief Prithvi Raj Chauhan -First Battle of Terrain - Impact –Qutb-al-Din Aibak.- The Genesis of the Delhi Sultanate.

Maps

1. Sites of the Indus Valley Civilizations.
2. Asoka's empire
3. The Gupta Empire
4. Harsha's Empire.
5. Invasion route

Text Book

1. R.C. Majumdar and Srivastva, History of India (From 320 to 1206 A.D.), Surjeet Book Depot, New Delhi, 1996
2. A.L. Basham, The wonder that was India, Grow Press, New York, 1954.

Reference Books

1. D.D. Koasambi, The Culture and Civilization of Ancient India: In Historical Outline Vikas, New Delhi, 1971.
2. R.S. Sharma, Material Culture and Social Formation in Ancient India, MacMillan, New Delhi, 1983.
3. R.C. Majumdar (ed.), History and Culture of Indian People, Bharatiya Vidya Bhavan Bombay, 1960.
4 Kalpana, Rajaram and R. Vidhya, Facet of Indian Culture, spectrum Books, New Delhi, 2013.
5. Jawaharlal Nehru, The Discovery of India, Oxford University Press, 21st Impression, New Delhi, 2001.

Course Outcomes

On successful completion of the course, the students will be able to

K1, K2	CO1	better focus on the history of India
K1,K2,K5	CO2	understand the Indian culture and literature.
K1,K4, K5	CO3	examine the international contacts of Indians
K1,K2, K4	CO4	explore the evolution of Indian history
K6	CO5	students would demonstrate skills to learn more about Indian history

Mapping of COs with POs& PSOs

CO/ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	M	S	S	S	M	M	S
CO2	S	S	M	S	M	M	S	M	S	M	M	S
CO3	S	M	M	S	M	M	S	S	M	M	M	M
CO4	S	M	S	S	M	M	S	S	M	M	M	M
CO5	S	S	M	S	M	M	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT12	HISTORY OF TAMILNADU UPTO 1336 AD	L	T	P	C
CORE -II			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the political, social and economic conditions of ancient Tamil Nadu ➢ understand the antiquity of Tamil Nadu ➢ interpret the history of ancient Tamil Nadu ➢ analyse the cultural heritage of Tamils. ➢ appreciate the socio-political- cultural life of ancient Tamil people.					

UNIT- I: Archaeological Excavations

Sources :Archaeological – Numismatics – Literature – Pre-history of Tamil Nadu: Paleolithic age, Mesolithic age, Neolithic age, Iron age and Megaliths of Tamilagam -

Sangam Age: Sources—Sangam Cheras: Genealogy of Padirruppattu, I Mayavaramban Neduncheralathan, Palyanaiselkelu Kuttuvan, Kalankaikanni Narmudicheral, Kadalpirakkottiya Senguttuvan, Irumporai --Sangam Cholas: Karikala: Accession, Venni & Vagaipparantalai, Uttirapatha expedition—Successors of Karikala—Sangam Pandyas: Peruvaludi , Nedunchelian I, Nedunchelian II.

Rule of Kalabhras.

UNIT- II: Political History

Age of the Pallavas :Pallavas origin, Early Pallavas: Kanchipuram &Tondaimandalam-Later Pallavas:Mahendravarman I ,Narasimhavarman I, Paramesvaravarman I, Narasimhavarman II, Nandivarman II & III—Administration & Society- Taxation & measurements, Justice, Army & Navy, Society – Religious conditions:–Cultural developments: Literature, Art & Architecture and Education.

UNIT- III : Post Sangam age

Age of Cholas: Cholas of Vijayalaya Line: ParakesariVijayalaya, Aditya I-Pandyan Empire I:Early Pandyas, Kadungon, ArikesariMaravarman,KoccadayanRanadhira, Maravarman Rajasimha I, ParantakaNedunjadayan, SrimaraSrivallabha, Varaguna II, ParantakaViranarayana--Social Institutions-Customs and practices,Religion, Philosophy, Literature, Art and Architecture.

UNIT –IV: Imperial Cholas

The Imperial Cholas –Vijayalaya- Rajaraja I - Rajendra I - Chalukya Cholas - Kulottunga I and successors - Administration – Over seas conquests- boundary- Economic Condition - Trade and Commerce - Chola Art and architecture- Religion - Temple Economy - Temple Society - Merchant Guilds in the Indian Ocean- Education and learning.

UNIT- V : Later Pandya Age

Second Pandyan Empire -Consolidation of Power- Economic Condition - Social Condition -Art and Architecture - Language and Education - Account of Marco-polo - The Muslim Conquest - Invasion of Malikkafur - Madurai Sultanate - Impact of Muslim Rule- Establishment of Vijayanagar empire

Text Book:

1. M. Rajamanickam, CholarVaralaru (Tamil), Poovam Publisher, Chennai, 1999.
2. A. Krishnaswami, Topics in South Indian History: From Early Times upto 1565 A.D., The University of Michigan, 1975.

Reference Books

1. K.ANilakantaSastri, Champakalakshmi, P.M. RajanGurukkal, The Illustrated History of South India, Oxford University Press, USA, 2009.
2. K.K. Pillai - TamilagaVaralarumPanpadum (Tamil), International Institute of Tamil Studies, Chennai, 2002.
3. Manoranjithanmoni, History of Tamil Nadu (Kindle Edition), Dave-Beryl Publications, 2015.
4. ChithraMadhavan, History and Culture of Tamil Nadu, Vol. 1, D.K. Print World (P) Ltd., New Delhi, 2005.
5. Noboru Karashima, A Concise History of South India: Issues and Interpretations, Oxford University Press, Chennai, 2014

Course Outcomes

On successful completion of the course, the students will be able to

K1, K2	CO1	better focus on the Tamil Nadu history
K1,K2	CO2	understand the Tamil culture and literature.
K5	CO3	appreciate art and architecture
K4, K5	CO4	examine the social structure
K6	CO5	demonstrate skills to learn more about Tamil Nadu history that helps to understand how the society we live in came existence.

Mapping of COs with POs& PSOs

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	S	S	S	M	M	S
CO2	S	M	M	S	M	M	S	M	S	M	M	S
CO3	S	M	M	S	M	M	S	S	M	W	M	M
CO4	S	M	S	S	S	S	S	S	M	M	S	M
CO5	S	S	M	S	S	M	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIA11	MODERN GOVERNMENTS – I	L	T	P	C
ALLIED – I			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the salient features of the constitutions of various countries. ➢ understand the role of Judiciary. ➢ analyze and interpret the political thoughts and their rights. ➢ know the state level political party system. ➢ apply techniques and strategies in the field of election					

UNIT- I: Basic concepts

State and its elements – Constitution, Classification of Constitutions - Forms of government: Unitary, Federal, Quasi Federal – Theory of separation of powers.

UNIT -II: Organs of Government

Legislature - Bicameral and Unicameral - Executive–Judicial Review - Rule of Law- Administrative Law - Party Systems - Single Party - Bi Party – Multi Party Systems– Pressure Groups. Executives; Presidential, Parliamentary – Quasi Presidential – Legislature;

UNIT- III: Constitution of United Kingdom

Salient Features–Distinction betweenWritten and Unwritten Constitutions – Conventions – Importance of the English Constitution – salient features – the Queen, the Prime Minister, Cabinet -Parliament; House of Common and House of Lords- law making – Committee system – Rule of law- Party system – Judiciary – Structure – Powers.

UNIT- IV: Constitution of America

Salient Features–Separation of Powers–Distinction betweenUnitary and Federal States – American Federation and Distribution of Powers – Rigid and Flexible Constitution – Mode of Constitutional Amendments – Fundamental Rights and Safeguards.

UNIT –V: Three Organs of the Constitution of U.S.A

Executive - Nature of PresidentialExecutive – President – Election, Tenure and Removal – Powers and Position – His Cabinet –Vice President- Legislature ; Composition – Powers and Functions – Speaker – Relation between the Two Houses – Process of Law-making - the Committee System – Judiciary; Structure and Powers of the Supreme Court – Role of the

Supreme Court – Organization of the Judiciary – Party System – Civil Service – Pressure Groups.

Text Book

1. Pon. Thangamani, History of Indian Constitution (A.D. 1773 - 1950), PonnaiahPathipagam, Chennai, 2001.
2. N. Jayapalan, Modern Governments, Atlantic Publishers and Distributors, New Delhi, 1999.

Reference Books

1. Alan R. Ball, Modern Politics and Government, Macmillan, New Delhi, 1983.
2. K.C, Wheare, Modern Constitutions, Oxford University Press, II Edition, Madras, 1966.
3. C.F. Strong, A History of Modern Political Constitutions, G.P. Puthilam's Sons, New York, 1963.
4. J.C. Johari, New Comparative Governments, Lotus Press, New Delhi, 2000.
5. N. Jayapalan, Modern Governments and Constitutions, Vol. I & II, Atlantic Publishers and Distributors, New Delhi, 2002.

Course Outcomes

On successful completion of the course, the students will be able to

K1, K2	CO1	understand the basic concepts of constitutions, politics and party system
K1, K2, K3	CO2	apply the concepts in understanding politics and making of governments
K4,K5	CO3	analyze the merits and demerits of the constitutions of various countries and its applications
K5	CO4	evaluate a time series for activities in forming governments
K6	CO5	assess the salient features of different constitutions and make recommendations

<u>Mapping of COs with POs& PSOs</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	S	M	S	M	M	M
CO2	S	S	S	S	S	M	S	M	M	M	S	S
CO3	S	S	S	S	M	S	S	M	S	M	S	M
CO4	S	M	S	S	S	M	M	S	M	M	M	S
CO5	S	S	S	S	M	S	S	M	M	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

SEMESTER - II

COURSE CODE	U21HIT21	HISTORY OF INDIA 1206 - 1707	L	T	P	C
CORE III			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the history of Rajputs and their culture ➢ understand the diplomatic history of Delhi Sultanate, Mughals and the Vijayanagar Empire ➢ help the students to analyze and interpret the administration of Decc kings ➢ know the impact of Mughal invasion of India ➢ assess the Art and Architecture					

UNIT -I : Origin of the Delhi Sultanate
Foundation of the Delhi Sultanate – The Slave dynasty – Qutbuddin Aibak-- Iltutmish - Razia – Balban- Causes of downfall of slave dynasty -Khilji dynasty Jalaluddin Firoz Shah Khilji – Alauddin Khilji -Southern Conquest - Mongol Invasion and its effects - an assessment.

UNIT II: Tughlaq Dynasty
Tughlaq Dynasty: Ghiasuddin Tughlaq - Muhammad bin Tughluq – Firoz Shah Tughluq – Causes of the downfall of Tughlaq dynasty –Sayyid Dynasty - Khizr Khan- Mubarak Shah - Alam Shah- Lodi Dynasty -Bahlol Lodi- Sikander Lodi - Ibrahim Lodi - Causes for the downfall

UNIT- III: Rajputs Origin
Rajputs -Origin and their Achievements – Yadavas of Devagiri – Kakatiyas of Warangal – Hosysalas of Dwarsamudra – Rise of Jagirdari system –Art and Architecture- Bhakthi movement

UNIT-IV: Art and Architecture of Bahmini Kingdom
The Bahmini Kingdom: Mohammad Gawan – The Empire of Vijayanagar – Expansion- Administraion- Krishnadeva Raya – Art, Architecture and Literature
Establishment of the Portuguese Empire in India and its consequences.

UNIT –V: Establishment of Mughal Empire
Establishment of Mughal empire in India – Condition of India on the eve of Babar's invasion – Mughal empire from Babur to Aurangazeb – Conquests and annexations- Downfall of the

Mughals- Social and economic condition under Mughals – Akbar's religious policy – MughalArt - Architecture – Literature– Status of Women - Impact of Mughal rule on Hindu society.

Maps

1. India under Muhammad Bin Thuglag
2. Babur's Empire
3. Akbar's Empire
4. India under Aurungzeb
5. Vijayanagar Empire.

Text Book

1. History of India From 1206 To 1707 Third Semester Guide Bhabani Publishing Concern (Paperback, PROF. SARAKR & MITRA, BIDYUT GHOSH), BHABANI PUBLISHING CONCERN, 12 th edition, 2021.
2. Political History of Medieval India (1206 - 1707), Revised Edition (2020) Paperback – 1 January 2018, SBPD Publishing House (1 January 2018); SBPD Publishing House, Agra

References Books

1. History of Medievel India (1206-1707), Dr. S. R. Verma, SBPD Publishing House, 1st edition, 2021
2. R.C. Majumdar, H.C. Roychaudri & K. Datta : An Advanced History of India, Mac Millan India Ltd., 2004, New Delhi.
3. S.R. Sharma : The Crescent in India Lakshmi Narain Agarwal, 1983, New Delhi.
4. L.P. Sharma : History of Medieval India, Konark Publishers Pvt. Ltd, 1997, New Delhi.
5. J.L. Mehta : Advanced Study in the History of Medieval India Sterling Publishers Pvt. Ltd., 1983, New Delhi

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	better focus on the history of India
K2	CO2	understand the Indian culture and literature.
K4, K5	CO3	assess the art and architecture of different dynasties
K4, K5	CO4	examine the administrative system
K56	CO5	prepare report on the impact of foreign conquests of India

Mapping of COs with POs& PSOs

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	S	M	S	M	S	S	M	S	M	S	S
CO3	S	S	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT22	HISTORY OF TAMILNADU 1336 – 1800	L	T	P	C
CORE IV			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the administration and achievements of the Tamil rulers ➢ understand the significance of Tamil country under Nayak rulers ➢ help the students to analyze and interpret the South Indian rebellion ➢ know the Palayakkarars system ➢ gain knowledge in different styles of Art and Architecture					

UNIT- I: Tamilnadu Under Nayakkars

Vijayanagar Rule in Tamilnadu - Founding of Vijayanagar Empire - The Expedition of Kumara Kampana - The Administration -Education and Literature- Literacy Development - Growth of Art. Establishment of Maratha Rule–Marathas of Tanjore –Rulers- Venkoji - Shahji - Serfoji I - Tukoji - Pratap Singh - Tuljaji – Serfoji II – Sivaji III –Wars and Administration – Society- Saraswathimahal library- Art and Literature

UNIT- II: Nayakkars rule in Tamilnadu

Raise and Fall of Nayakkars rule in Tamilnadu –Nayaks of Madurai– Viswanatha Nayak - Thirumalai Nayak- Chokkanatha Nayak - Rani Mangammal - Reign of Meenakshi
Nayaks of Tanjore - Sevappa Nayak – Ragunatha Nayak – Vijayaraghava Nayak - Administration Nayaks of Senji- Vaiyappa - Tubaki Krishnappa, Krishnappa I, Krishnappa Nayak II Administration – Socio-Economic conditions under the Nayaks – Language and Literature – Art and Architecture.

UNIT- III: Sethupathis and Nawabs

Sethupathis of Ramnad and Sivaganga – Setupathis of Ramnad – RagunathaSetupati I – KilavanSetupati - Zamindars- Court of Wards - Administration –VeluNachiyar- Socio-economic condition .The ArcotNawabs – The Carnatic Wars and Effects – Mysore Wars–- Administration and Society

UNIT- IV: Advent of Europeans and Early Resistance

Advent of the Europeans–Tamilnadu on the eve of the advent of Europeans- The Portuguese – The Dutch –The French – The English – East India Company- The Anglo-French conflict – Trade and Commerce- Economy and industry.

UNIT- V: South Indian Rebellion

Early Resistances –Velu Nachiyar- South Indian Rebellion- First and second Palayakkararswars-The rebellion of Palayakkarars - Khan Saheb- Puli Thevar- Veerapandia Kattabomman Marudu brothers- Umathurai and Shevathiah-Dheeran Chinnamalai

Maps

1. Nayak Kingdom
2. Maratha Empire
3. Sethupathis
4. Tamilagam in 1800

Text Book

1. Gowri, K., Maduraiunder East India Company 1801-1857, Raj Publishers Madurai, 1987.
2. Venkatesan, G, History of Modern Tamil Nadu From 1600 – 2011 A.D., Narmatha Publications, Rajapalayam , 2017.

Reference Books

1. MangalaMurugesan, K., Self Respect Movement, ThendralPathipakam, Chennai, 1982.
2. Rajayyan, K., Tamil Nadu – A Real History, Ratna Publications, Trivandrum, 2005.
3. SathyanathaAiyar, R., History of Nayaks of Madurai, Oxford University, 1924.
4. Subramanian, N., History of Tamil Nadu 1565 – 1982, Ennes Publication, Madurai, 1987.
5. Varghese Jeyaraj, S., Socio-Economic History of Tamil Nadu, 1565-1967, Anns Publications, Uthamapalayam, 2017.

Course Outcomes

On successful completion of the course, the students will be able to

K1,K2	CO1	get better focus on the history of tamilnadu
K1, K2	CO2	understand the tamil culture and literature.
K3	CO3	learn lessons from history and apply it
K4, K5	CO4	analyze the causes for the advent of europeans
K6	CO5	interpret south indian rebellion

Mapping of COs with POs& PSOs

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	M	S	M
CO5	S	S	M	S	S	M	M	S	S	M	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIA22	MODERN GOVERNMENTS – II	L	T	P	C
ALLIED - II			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the unique features of the constitution of various countries ➢ understand the basic concepts of democratic rights and powers ➢ help the students to analyze and interpret the cabinet system and function ➢ understand the functions of judiciary ➢ apply party system					

UNIT- I: Constitution of Switzerland
Constitution: Salient Features- mode of Amendment – Federal Council – Federal Assembly – Instruments and working of Direct Democracy – Judiciary- Powers – POLITICAL PARTY SYSTEM - Direct Democracy – An Evaluation - Mode of Amendment.

UNIT- II: Constitution of France
Constitutional Development upto 1985– French revolution- Declaration of the rights of man and citizens 1789 - Fifth Republic- Main features of the Constitution of Fifth Republic- – Executive – President – Powers and Position – Cabinet – Powers and Position – Legislature – Composition and Powers – Judiciary – Administrative Law – Structure of the Judiciary – Party System – Multi-party System – Local Government – Mode of Amendment.

UNIT- III: Constitution of India
Constitution: Salient features–Federation and Distribution of Powers - Fundamental Rights – Nature and Safeguards - Fundamental Duties - Directive Principles of State Policy– Fundamental Rights- Fundamental Duties- Equality -Directive Principles of State policy – Emergency provisions- Constitutional Amendments.

UNIT –IV: The Parliament of India
Legislature : Composition and Powers of Rajya Sabha and Lok Sabha – Presiding officers – relation between the two houses – process of law making – committee system - President – Election and Impeachment – Powers and Position – President- Vice President - Council of Ministers – Formation – Powers and Position – Prime Minister - Powers and Position - Executive – Election, Functions, Cabinet- Government – Dictatorship, Coalition government and political stability.

UNIT –V: Judiciary

Structure and Powers of the Supreme Court – Organization of the Judiciary – Government of the State – Union-State Relations – Administrative, Legislative and Financial – Emergency Provisions – Mode of Amendment – Civil Service – Party System

Text Book

1. N. Jayapalan, Modern Governments and Constitutions, Vol. I & II, Atlantic Publishers and Distributors, New Delhi, 2002.
2. Pon. Thangamani, History of Indian Constitution (A.D. 1773 - 1950), PonnaiahPathipagam, Chennai, 2001

Reference Books

1. Alan R. Ball, Modern Politics and Government, Macmillan, New Delhi, 1983.
2. Maurer School of Law: Indiana University, 1926. 7. K.C, Wheare, Modern Constitutions, Oxford University Press, II Edition, Madras, 1966.
3. J.C. Johari, New Comparative Governments, Lotus Press, New Delhi, 2000.
4. Hoveyda Abbas, Ranjay Kumar and Mohammed AftabAlam, Indian Government and Politics, Pearson, Chennai, 2011.

Course Outcomes

On successful completion of the course, the students will be able to

K1,K2	CO1	learn the constitutions of various countries
K2	CO2	understand the structure of various governments
K2	CO3	recognize new concepts in politics
K3	CO4	develop interest to learn more about administration
K4, K5,K6	CO5	assess the parliament system of India and create a model parliament

<u>Mapping of COs with POs& PSOs</u>

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	S	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	S	S	M	M	S	M	M
CO4	S	M	S	S	M	S	S	M	M	S	S	M
CO5	S	M	M	S	M	S	M	M	S	S	M	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

SEMESTER-III

COURSE CODE	U21HIT31	HISTORY OF INDIA 1707 – 1947	L	T	P	C
CORE -V			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the historical background of the conquest of India by the Europe powers ➢ understand the socio-religious reform movements ➢ apply the nationalist feeling for the growth of theNation ➢ analyse the nature of nationalism ➢ evaluate the result of freedom movement					

UNIT -I: East India Company

East India Company- Decline of the Mughals – Invasion of Nadirshah: Causes and effects; Anglo- French rivalry; the Establishment of East India Company- Battle of Plassey –Nawab of Bengal – Third Battle of Panipat- Battle of Buxar - result - British ascendancy .
Portuguese- Dutch –French – English.The Anglo– French rivalry in the Carnatic– Ascendency of the British – Administrative System under the British Company –The establishment of the English power in the Bengal – Robert Clive administration.

UNIT- II: Maratha Culture and religion

Rise of Marathas-Life of Shivaji –His administration and army –Achievements -Maratha Culture and religion – Maratha war with neighboring Kingdoms –Third Battle of Panipat- Administration -Art and Architecture

UNIT -III : Lord Cornwallis Reforms

Warren Hastings – Reforms- Lord Cornwallis – Reforms- Permanent Land Revenue Settlement- Lord Wellesley – The Subsidiary system – William Bentinck reforms, Lord Dalhousie- Reforms – Policy of Annexations- Revolt of 1857 – Cause- course and result-. Mangal Pande, Nana Sahib, Tantia Tope, Jhansi Rani Laxmi Bai –Result of the war- Queen's Proclamation- Administration under British Queen

UNIT-IV: Genesis and Growth of the Indian National Congress

Partition of Bengal- Moderates – Extremists Surat Split – Swadesi and Boycott Movement –- Ghokale – Tilak – Lajpat Rai- V.O. Chidambaram Home Rule Movement -Jallianwalabagh Tragedy - Non Co-operation Movement – Civil Disobedience Movement - Second World War

and the Congress –Cripps Mission - Quit India Movement –INA- Role of Women- Cabinet Mission Plan - Partition and Independence – Some Personalities – Motilal Nehru – Mohamad Ali Jinnah, Mahatma Gandhi, Jawaharlal Nehru, Rajaji – The British Legacy.

UNIT- V: Social Reforms

Socio - Religious Reform Movements - Brahmo Samaj - Prarthana Samaj - Arya Samaj - The Ramakrishna Movement- The Theosophical Movement - Narayana Guru - Jyothirao Phule and Satya Shodhak Samaj - G.Subramania Iyer - Abolition of Devadasi System – Abolition of Sati – Abolition of Female Infanticide – Widow Remarriage Act – Economic Condition – Religious and Social Development – Growth of Local Self Government – Development of Education.

Text Book

1. Sharma, L.P, History of Modern India, Konark Publishers Pvt Ltd, Delhi, 2000
2. Majumdar, R. C, An Advanced History of India, Macmillan, New Delhi, 2002.

Reference Books

1. Grover, B.L and Grove.S, A New Look on Modern Indian History, S. Chand &Co, New Delhi, 2006.
2. Krishna Reddy, Indian History, Tata McGraw-Hill, New Delhi, 2003.
3. Nanda,S.P, Landmarks in Indian History (part–II From the Advent of Islam to Indian Independence), Dominant Publishers and Distributors, New Delhi, 2004
4. Sharma, L.P, History of Modern India, Konark Publishers Pvt Ltd, Delhi, 2000.
5. SumitSarkar, Modern India 1885 - 1947, Macmillan, New Delhi, 2004.

Course Outcomes

On successful completion of the course, the students will be able to

K1,K2	CO1	gain knowledge on the history of India
K1,K2	CO2	understand the causes for the British ascendancy
K4, K5	CO3	examine the impact of social reform movement in Indian society
K4, K5	CO4	analyze the trends in freedom movement
K6	CO5	create document on the role of women in freedom movement

<u>Mapping of COs with POs& PSOs</u>

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIE31	EPIGRAPHY	L	T	P	C
ELLECTIVE – I			4	-	-	3
Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyse** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the survey of inscriptions and epigraphy ➢ understand the importance of antiquities ➢ help the students to analyze and interpret the various types of scripts ➢ get exposure in archaeological excavations ➢ evaluate the scripts and writing materials					

UNIT- I: Scope and Purpose of Epigraphy

Epigraphy – meaning and scope – purpose – Paleography-Definition and importance of Palaeography-Origin and antiquity of writing in India.-Forms of writing- Indian Scripts – Brahmi, Karoshthi, Nagari, Grantha – Tamil Brahmi – Vatteluttu -Ancient Numerals-Logography

UNIT- II: Inscription of Asoka

Writing materials – Metals and Stones - Palm leaf–Engraving-Forged records-Seals-Coinage Dating and Eras- Saka Era- Vikrama Era- Inscriptions of Asoka -Besnagar Garuda Pillar Inscription-Hatigumpha Inscription of Kharavela-Samudragupta's Allahabad Pillar Inscription.-Mathura Pillar Inscription of Chandragupta-II-Saranath Buddhist Inscription of the time of Kanishka-I

UNIT- III: Copper Plates

Editing and Preservation – Inscriptions – Palm Leaves – Estampages – Fascimile – Eye Copy – Photocopy – Comparison – Editing and Publications – Methods of Conservation and Preservation – Using Paper Mess – Chemical Treatment

UNIT- IV : Evaluation of Coinage

Epigraphists – Hultzech – James Princep – George Buhler – V.Venkayya – T.V.Mahalingam – K.V.SubrahmanyaIyer – D.C.Sircar – R.Nagaswamy – Y.Subbarayalu .H. Krishnasastri–Iravatham Mahadevan

UNIT –V: Origin and growth of Vatteluttu

Importance of the Tamil Brahmi inscriptions - Origin and growth of Vatteluttu.

Sample study of select inscriptions

1. Kuram Copper plates
2. Velvikkudi coper Plates
3. Uttiramerur Inscription
4. Kannanur Inscription
5. The Manur inscription

Maps

1. Mark the archaeological sites in Tamilnadu
2. Mark the archaeological sites of Indus Civilization

Text Book

1. Sudha Prasad, Ancient Indian Epigraphy, MotilalBanarasidas Publications, New Delhi , 2013
2. Dinesh Chandra Sircar, Indian Epigraphy, 2nd edition, Motilal Banarasidas Publications New Delhi , 2017.

Reference Books

1. Brown, C.J., The Coins of India, The Heritage of India Series, Calcutta, 1922.
2. Chattopadhyaya, B.D., Coins and Currency System in South India (A.D. 1225-1300), Delhi, 1977.
3. Dani, A.h., Indian Paleography, Oxford University Press, 1963.
4. Kosambi, D.D., Indian Numismatics, New Delhi, 1981.
5. Mahadevan, Iravatham, Corpus of the Tamil Brahmi Inscriptions, Tamilnadu State Department of Archaeology, Madras, 1968.

Course Outcomes

On successful completion of the course, the students will be able to

K1, K2	CO1	focus on epigraphy
K2	CO2	understand the writings in copper plates
K4, k5	CO3	assess the history through inscriptions.
K5	CO4	analyse the writings in coinage
K6	CO5	prepare a report on the methods of conservation

Mapping of COs with POs& PSOs

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	M	S	S	M	M	M	M
CO2	S	M	M	S	M	M	S	M	M	M	S	M
CO3	M	M	M	S	S	M	S	M	M	M	M	M
CO4	S	M	S	M	M	S	S	M	M	M	M	M
CO5	S	S	M	S	M	S	S	M	S	M	M	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIA33	HISTORY OF INDIAN WOMEN UPTO 1985	L	T	P	C
ALLIED -III			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the Universality of issues and factors pertaining to women. ➢ understand the diversity and regional perspective of women. ➢ help the students to analyze and interpret self-esteem and initi discussion on current issues. ➢ equip the students to understand the status of women in society ➢ apply rights and responsibilities					

UNIT- I: Gender and Women

Definition of Women Studies – Terminologies- Gender, Sex, Patriarchy Matriarchy-Scope and importance of Women Studies-Subject matter of women's Studies- Importance of Women studies – purpose of Women Studies.

UNIT –II: Women in India

Women in Vedic, Epic, Sangam and Medieval period, Women in Freedom Movement – Velu Nachiyar –Jansi Rani Lakshmi Bai –Sister Subbulakshmi- Annie Besant - Sarojini Naidu - Anuna Asaf Ali -Kasthurba Gandhi - Captain Lakshmi - Susila Nayar –Usha Mehtha - Sucheta Kripalani -Muthulakshmi Reddy-Rukmini Lakshmipathi -Indira Gandhi.

UNIT- III: Contemporary Issues and Challenges for women

Issues and Challenges for Women - Gender Discrimination – Child Labour – Child Marriage – Dowry – Divorce – Female Infanticide – Female Foeticide – Immoral Traffic – Eve teasing- – Sexual Exploitation – Works Spot Harassment – Domestic Harassment – Honour Killing - Denial of property

UNIT –IV:Women's Movements and Organizations

Social Reform Movements –Campaign Against social evils- Women Organizations and women's movement– NGO's for Women-Women's Health Movement –Eco Feminism- Chipko Movement Anti price rise movement

UNIT- V: Protective Measures for Women

Factors of Change - Education – Health – Economic and Employment Opportunities – Women Franchise – Personal Laws - Social Legislations –Reservation of seats for women in Local Self government-Social Welfare Schemes and Programmes for Women at Centre, State and District level –Self help groups-Education and Empowerment- Women and politics.

Text Book

1. Chandrababu, S, Thilagavathi, L, Women: Her History and Her Struggle Emancipation, Bharathi Puthakalayam, Chennai, 2009.
2. Krishnammal, S, Women Studies, Sujiranoje Publications, Chennai, 2012.

Reference Books

1. Bakshi Kriran Bala, S.R, Welfare and Development of Women, Criterion, New Delhi, 2000.
2. Neera Desai and Vibhuti Patel, Indian Women: Change and Challenge in the International Decade 1975-85, Popular Prakasham,Bombay, 1990.
3. Premalatha,P.N. Nationalism and Women's Movement in South India, 1917-1947 , Delhi,2003
4. SushilaNayer and Kamala Mantekar (ed.), Women Pioneers in India's Renaissance, National Book Trust Publication, New Delhi, 2009.
5. Mishra, S, Women and Social Change in India, Pearl Books Publications, New Delhi, 2013.

Course Outcomes

On successful completion of the course, the students will be able to

K1,K2	CO1	get knowledge on the theory of feminism
K2	CO2	understand the contributions of women in various fields.
K4, K5	CO3	evaluate the protective measures for women.
K4, K5	CO4	analyze the role of women in different movements
K6	CO5	identify the contemporary issues and challenges and create report.

<u>Mapping of COs with POs& PSOs</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	S	S	S	M	S	S
CO2	S	M	M	S	S	S	S	M	S	M	S	S
CO3	M	M	M	S	M	S	S	S	M	M	M	M
CO4	S	M	S	S	S	S	S	S	M	S	S	M
CO5	M	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

SEMESTER –IV

COURSE CODE	U21HIT11	HISTORY OF TAMILNADU 1800- 1947	L	T	P	C
CORE -VI			4	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ learn the medieval History of Tamil Nadu ➢ understand the Tamil peoples' resistance against Europeans ➢ help the students to analyze and interpret the contributions of Nayak rulers to the Art and Architecture ➢ train the students to know the British Revenue system in Tamil Nadu ➢ apply techniques and strategies in the field of politics					

UNIT - I: Advent of the Europeans and Early resistance

The advent of the Europeans –Wars and resistances-– Palayakkars-Kattabomman – Palayakkars revolts-South Indian Rebellion – Causes, course and results –Maruthu Brothers-Theeran Chinnamalai-Fall of Palayakkars- Vellore Mutiny of 1806 A.D- Causes- Course – Consequences-Judiciary

UNIT – II: British rule and Social Reform movement in Tamilnadu

Economic condition – British Revenue Policy – Permanent and Ryotwari System - Indigenous Education-Introduction of Western Education – Christian Missionary Activities - Conversion to Christianity – Socio –Religious Reform Movement- Vallalar – Samarasa Sanmarga Sangam – Vaikundaswamy-G.Subramania Iyer-Movement for the Eradication of untouchability- Temple Entry Movement

UNIT- III: Freedom Movement- First phase

The Early Phase- Swadesi and Boycott movement- V.O Chidambaram Pillai- A. Subramanya Bharathi – Vanchinathan –Neelakanta Brahmachari- Subramanya Siva – Home Rule Movement-Annie Besant –Non Cooperation Movement and after –Justice party government-Padmasani Ammal- Thiru-Vi-Ka- Satyamurthy- Srinivasa Iyengar

UNIT –IV: Freedom Movement- Later phase

Rise of Swaraj Party- Neill Statue Satyagraha- Simon Commission boycott- Civil Disobedience movement-Rukmini Lakshmipathhi- Rajaji- Tamil Nadu under Congress Rule, 1937-39 – Achievements – Temple entry- Prohibition- Individual Satyagraha – Quit India movement – Kamaraj- Indian National Army- Captain Lakshmi- India's independence

UNIT – V: Non –Brahmin Movement and other developments

Rise of Justice Party – E.V.R. and Self-Respect Movement- Women's Movement-Women's India Association-Dr.Muthulakshmi Reddy-Sister Subbulakshmi- Widows education- Progress of Girls education- Medical education- Dr.Ida Sophia Scudder and CMC Vellore- The Economic Development of Tamil Nadu till 1947

Text book

1. Devanesan, History of Tamil Nadu, Benu Publications, Madurai, 1990.
2. Rajayyan. K , History of Tamil Nadu, Ratna Publications, Trivandrum, 1989.

Reference Books:

1. Chellam, V.T. History of Tamil Nadu, Kudal Publications, Madras, 1995.
2. Champakalakshmi,R. rade,IdeoloogyandUrbanization:SouthIndia,BC300– AD 1300
3. Karashima,Noboru, South Indian History and Society: Studies fromInscription AD 850 – 1800
4. Varghese Jeyaraj.S., Socio-Economic History of Tamil Nadu (1565 – 1967 A.D.), Anns Publication, Uthamapalayam, 2017.
5. NilakantaSastri, History of South India, Oxford University Press, Madras,1971.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	study on the history of Tamil Nadu
K2	CO2	understand the economic and social structure of Tamil Nadu
K6	CO3	analyze the causes for the advent of Europeans and create a feeling of unity.
K4	CO4	develop the feeling of unity in diversity
K5, K6	CO5	examine the role of women in freedom movement and write a report based authentic sources

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	S	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT42	HISTORY OF WORLD CIVILIZATION UPTO 476 A.D	L	T	P	C
CORE -VII			4	-	-	4

Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**
Course Objectives	**The Course aims to** ➢ learn the civilizations of various countries ➢ understand the value of civilizations ➢ help the students to analyze and interpret the evolution features a legacy of World civilizations ➢ train the students in the civilized life of people of various countries. ➢ apply culture, religion , economy, customs and tradition where possible.

UNIT- I: Egyptian Civilization

Civilization - Meaning and Definition–Causes for the growth of Civilization – Difference between Civilization and Culture. Egyptian Civilization – Features-The Government – Socio-Economic condition – Art – Religion and Literature

UNIT- II: Sumerian Civilization

Sumerian Civilization Features–Legacy–Mesopotamian–Babylonian Civilization – Hanging Garden- People – Government – The Code Hammurabi – Socio-Economic condition – Art – Religion - Literature.

UNIT -III: Greek Civilization

City States–Athenian Democracy–Legacy in the field of Art – Architecture – Philosophy – Education and Science. Roman Civilization - Political Legacy – Roman Law – Legacy in the field of Art – Architecture – Religion – Philosophy – Education and Science.

UNIT- IV: Byzantine Civilization

The Government - Emperor Justinian–Government–Socioand Economic Conditions – Contribution to Art – Religion and Philosophy.Feudalism – Features – Merits and Demerits – Manorial System.

UNIT –V: World Religions

Christianity - Life and Teachings of Jesus Christ - Life andTeachings of Prophet Mohammad – Hinduism – Saivism – Vaishnavism – Zorastrianism– Judaism -Confucianism.

Text Book

1. Manoj Sharma, History of World Civilizations, Anmol Publications Pvt. Limited, New Delhi, 2005
2. Davies, H.A, An Outline History of the World, Oxford University Press, New Delhi, 1968

Reference Books

1. Philip Lee Ralph & Others, World Civilizations, W.W. Norton, New York, 1997.
2. Dharmaraj, J, History of World Civilizations, (Tamil), Tensy Publications Sivakasi, 2015.
3. Arnold Pacey, Technology in World Civilization: A Thousand-Year History, The MIT Press Cambridge, Massachusetts, 1991.
4. Philip J. Adler, Randall L. Pouwels, World Civilizations, Wadsworth, Boston, 2008.
5. Arnold Toynbee, A Study of History, Oxford University Press, New York, 1974.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	gain knowledge about world civilizations
K4,	CO2	explain the growth and impact of civilization
K2	CO3	understand the civilization&its special features
K4, K5	CO4	examine how the civilizations are different in each country? it opens the gate to perceive various cultures around us.
K6	CO6	knowledge of different civilizations is helpful in preparing for competitive examinationscivilizations

<u>Mapping of COs with POs& PSOs</u>

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	S	M	M	S	M	M	S	S	M	S
CO3	S	M	S	S	M	M	S	S	S	S	M	M
CO4	S	S	M	S	S	S	S	M	M	S	M	S
CO5	S	S	M	S	S	M	S	S	M	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIA44	PRINCIPLES AND METHODS OF ARCHEAOLOGY	L	T	P	C
ALLIED- IV			4	-	-	4

Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze** **K5 Evaluate** **K6 Create**
Course Objectives	**The Course aims to** ➢ learn the importance of archaeology in the study of history. ➢ understand the different methods of archaeological excavation. ➢ help the students to analyze and interpret the various archaeologi sites in India. ➢ train the students in Archaeology ➢ apply ttechniques' and strategies in the field of the Archaeologi Excavations

UNIT -I: Archaeology Introduction

Nature-Scope Purpose and Value of Archaeology and History–Definition, of Archaeology, its aims and scope; Difference between History and Archaeology, Kinds of Archaeology -Ethno Archaeology & Linguistic Archaeology – Marine Archaeology-Value of Archaeology

UNIT- II: Development of Archaeology in India

Archaeology in India – Indus Valley Excavations and Explorations -Role of Archaeologists - Contributions by – James Princep.-Alexander Cunningham–Bruce Foote–Sir John Marshall - William Zones -Sir Mortimer Wheeler- H.D. Sankalia –V.N. Misra- Shikaripura Ranganatha Rao (S.R. Rao)– T.V. Mahalingam – K.V. Raman

UNIT- III: Science of Archaeology

Dating Methods–Radio Carbon dating –Pollen Tests–Dendro chronology-Thermo luminescence – Exploration – Ground Survey – Aerial Photography– Magnetic Prospecting (Magnetometer) - Surface Exploration

UNIT- IV: Principles of Exploration

Survey of pre-historic – proto - historic and historical sites --Resistivity Survey- Electro Magnetic Survey–Excavation – Trenching – Gridding – Open Stripping – Digging Procedures –

Recording - Photography – Digging Equipments – Personnel -Excavation of Burial Moulds – Graves – Pits – Trenches.

UNIT- V: Archaeological Sites of India

Indian Archaeological Sites–Harappa–Mohen-jo-daro – Nalanda – Dwaraka – Arikkamedu – Kaveripoompattinam – Adhichanallur – Keeladi – Azhakankulam – Preservation and Documentation- Organic and Inorganic Study – Analysis – Recording – Argon dating – pollen analysis and Conservation.

Text Book

1. Ramachandran,K.S,Archaeology of South India, Tamil Nadu, SundeepPrakasham, Delhi, 1980
2. Venkatraman, Ramaswamy, Indian Archaeology A Survey ,Ennes Publications, Madurai, 1985.

Reference Books

1. Basham, A.L, The Wonder That was India, Macmillan Publications, London, 1957.
2. Daniel, Glyn Edmund, A Hundred Years Archaeology ,Ann Arbori, Publications , 1973.
3. Egambaranathan, Arangam Ponnusamy, Thollial Agalaivu,
4. Gomathinayagam, P, An Introduction to Archaeology, Sri VinayagaPathipagam, Rajapalayam, 1997.
5. Raman, K.V, Principles and Methods of Archaeology, Parthajan Publications, Chennai, 1991.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	define archaeology and trace the evolution of archaeology
K2	CO2	understand the archaeology&its function
K3	CO3	apply the impact of archaeology in the field of history
K4, K5	CO4	examine the techniques of archaeology, appraisal and compensation
K6	CO5	write a report on any one archaeological center after field visit

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	S	M	M	S	M	M	S	S	M	S
CO3	S	M	S	S	M	M	S	S	S	S	M	M
CO4	S	S	M	S	S	S	S	M	M	S	M	S
CO5	S	S	M	S	S	M	S	S	M	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIE42	PRINCIPLES OF PUBLIC ADMINISTRATION	L	T	P	C
ELLECTIVE - II			3	-	-	3

Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**
Course Objectives	**The Course aims to** ➢ learn the concepts of public administration ➢ understand the various theories of organizations ➢ help the students to analyze and interpret the importance of field administration ➢ train the students to know the skill of administrative knowledge. ➢ equip the students to be good administrators

UNIT- I: Concepts of Public Administration

Public Administration – Meaning – Nature – Scope – Public and Private Administration – Human factor – Art of Science. Introduction - State and Government constitution- types of constitution – government and its types- Federal –Unitary- Parliamentary and Presidential.

UNIT- II: Organization Theories

Meaning – Various theories – a) Bureaucrat b) Classic c) Human relation d) Scientific Management: Principles – Hierarchy – Span of Control – Unity of Command. Theories of separation of powers- executive, legislature and judiciary- meaning- nature - scope and importance of public administration- politics administration dichotomy – public and private administration.

UNIT- III: Structure of Public administration

Chief Executive – Functions – Line and Staff agencies – Indian Prime Minister's Office – Secretariat – White house office (U.S.A) Department as Unit of administration – Bases of Organization - Departments of Home Foreign Affairs, and Defence. Evolution of public administration- politics – public administration -basic concept of public administration- principles of public administration- new public administration -new public management administration

UNIT- IV: Public Undertaking and Commissions

Finance Commission – UPSC – Backward Class, Official Language - Significance of Public undertakings – Various kinds and reasons for Government participation in India – Public Corporations – Their problems – Ministerial control and corporations accountability to Parliament Structure of public administration- staff and auxiliary agencies- human resources and field agencies

UNIT- V:Field Administration

Importance of Field Organization – Area Head quarters and Field Agencies relationship – Territorial and functional Dichotomy – Examples : Foreign Affairs ministry, police Dept. and Railway Board. Importance of Panchayat Raj in India as Field Administration Recent trends in corporate governance – Good governance- impact of LPG on public administration.

Text Book

1. Ramesh K Arora, RajniGoyal, Indian Public administration: Institutions and Issues, 2nd Edition, New age International Publishers Ltd, New Delhi, 1996.
2. RukmiBasu, Public Administration: Concepts and Theories, Sterling Publishers, New Delhi, 1995.

Reference Books

1. Herbert A Simon, Donald W.Smithburg and Victor A.Thomson, Public Administration, Alfred A. KnofInc, New York, 1950.
2. A. Avasthi and S. Maheswari, Public Administration, LaximiNarainAgarwal, Agra, 2013.
3. A. Avasti and K. Aroraramesh (eds.), Bureaucracy and Development: Indian Perspectives, Associated Publishing House, New Delhi, 1978.
4. VishnooBhagwan and VidyaBhushan, Public Administration 22nd Edition, s.cnand Publishing, New Delhi, 2009.
5. NoorjahanBava, People's Participation in Development Administration in India, Uppal Publishing House, New Delhi, 1984.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	know the concepts of public administration
K2	CO2	understand the organizational structure of public administration
K4	CO3	examine the administration &its function
K4, K5	CO4	analyze the performance of UPSC
K6	CO5	create dialogue with local Panchayatraj through field visit for further development

Mapping of COs with POs& PSOs

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	S	M	M	S	M	M	S	S	M	S
CO3	S	M	S	S	M	M	S	S	S	S	M	M
CO4	S	S	M	S	S	S	S	M	M	S	M	S
CO5	S	S	M	S	S	M	S	S	M	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

SEMESTER – V

COURSE CODE	U21HIT51	HISTORY OF EUROPE, 1453- 1789	L	T	P	C
CORE -VIII			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K6 Create**					
Course Objectives	**The Course aims to** ➢ introduce students to the importance of Geographical Discoveries ➢ elaborate the fall of Papacy in Europe ➢ present new perspectives in enlightened despotism ➢ enable students to learn the Renaissance and Reformation movement Europe ➢ discuss the Industrial Revolution.					

UNIT- I: Beginning of Modern Age

Fall of Constantinople - Geographical Discoveries–Causes – Results - End of Feudalism - Rise of Nation States-Europe at the end of Middle Ages –Causes and Results- Maritime Discoveries of the 15th and 16th centuries- Exploration – Colonization.

UNIT- II: Renaissance

Meaning–Causes–Renaissance in Italy and other Countries -Philosophy – Literature – Architecture - Art and Science – Results.

UNIT -III: Reformation

Meaning–Causes–Protestantism in Germany - Martin Luther -Protestantism in England – Calvinism - Zwingli - Counter Reformation – Society of Jesus - Results.

UNIT- IV: Rise of France

End of 100 years war – Peace and prosperity- Henry IV–Cardinal Richelieu–Cardinal Mazarin–Thirty YearsWar – Causes - Course and Results - Louis XIV – Achievements -Jean-Baptiste Colbertt –Louis V1- Europe on the eve of French Revolution.

UNIT- V: Benevolent Despotism

Peter the Great–Catherine II–Frederick the Great of Prussia – Maria Theresa of Austria – Joseph II of Austria.

Text Book

1. Dharmaraj, J, History of Europe1453 - 1789A.D, (Tamil), Tensy Publications, Sivakasi, 2015.
2. James Edward Gillespie, A History of Geographical Discovery, 1400 - 1800, H. Holt and Company Publishers, New York, 1933.

Reference Books

1. Cicely Veronica Wedgwood, The Thirty Years War, Review Books, New York, 1938.
2. Charles River Editors ,French Legends, The Life and Legacy of King Louis XIV Space Independent Publishing Platform, North Charleston South Carolina, 2013.
3. Andrew Graham Dixon, Renaissance, University of California Press, California, 1999.
4. ArunBattacharjee, History of Europe (1453 - 1789), Sterling Publishers Private Limited, New Delhi, 2001.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	focus on the history of Europe
K2	CO2	understand the European culture and literature.
K6	CO3	examine the causes for the renaissance
K4	CO4	develop interest in students to learn more about Europe
K6	CO5	create report on the impact of reformation and understand the positive a negative aspects of developments

<u>Mapping of COs with POs& PSOs</u>

CO/ F	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT52	CONSTITUTIONAL HISTORY OF INDIA 1858 to 1950	L	T	P	C
CORE -IX			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze** **K5 Evaluate**					
Course Objectives	**The Course aims to** ➢ introduce students to the evolution of Indian Constitution ➢ elaborate on the unique features of the constitution of India. ➢ present the democratic principles of State policies ➢ enable students to understand the power of judiciary. ➢ learn the fundamental rights and duties and become responsible citize					

UNIT- I: Development of the Constitution from 1773 - 1853
The Regulating Act, 1773–Provisions – Defects of the Act – Bengal Judicature Act, 1781 – Pitt's India Act, 1784 – Provisions and Significance– The Charter Acts of 1793 – 1813- 1833 and 1853 – Provisions – Significances.

UNIT -II: Constitutional Development from 1858 - 1919
Queen's Proclamation, 1858-Significance – Indian Councils Act 1861 and 1892 – Provisions – Importance – Minto - Morley Reforms, 1909– Provisions – Significance- Government of India Act, 1919 – Provisions – Nature and Working of Diarchy in the Provinces – Importance.- Simon Commission

UNIT -III: Development of Constitution from 1935 - 1947
The Government of India Act,1935 - Provisions – All India Federation – Provincial Autonomy - The Constitutional Development between 1935 and 1947 – The August Offer – Cripps Proposal – Wavell Plan – The Cabinet Mission Plan – Mountbatten Plan – The Indian Independence Act, 1947.

UNIT –IV: Features of Indian Constitution
Framing of Indian Constitution- Constituent Assembly- Salient Features – Sources- Fundamental Rights- Fundamental Duties- Directive Principles of State Policy – President – Vice – President- Prime Minister and Cabinet.-Powers and functions

UNIT- V: Parliament of India
Composition and Powers of Rajya Sabha –Electoral system- - Lok Sabha- powers and functions - Process of Law Making-Committee System –-- Judiciary-Powers and functions Judicial Review.

Text Book

1. Agarwal, R.C,Constitutional Development of India and National Movement, S.Chand & Company Ltd, New Delhi, 1999.
2. Mahajan,V.D, Constitutional History of India, Including the Nationalists Movement, S. Chand & Company Ltd, New Delhi,1969.

Reference Books

1. Gupta, D.C, Indian National Movement and Constitutional Development, Vikas Publishing House, New Delhi 1976.
2. Joshi, B.V, Constitutional History of India, S. Chand & Company Ltd , New Delhi 1985.
3. Kapur,A.C, Constitutional History of India 1765 to 1975, S. Chand & Company Ltd , New Delhi ,1985.
4. PremaArora, Constitutional Development and National Movement in India, Bookhive, New Delhi, 1985.
5. Vishnoo Bhagawan, Indian Constitutional Development: 1600 to 1947, Sterling Publishers Private Limited, New Delhi, 2001.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	know about the evolution of Indian constitution and importa concepts
K2	CO2	understand the fundamentals of Indian constitution
K3	CO3	apply the constitutional provisions in appropriate context
K5	CO4	examine the center- state powers
K4	CO5	create a model parliament for better exposure and practical knowledg

<u>Mapping of COs with POs& PSOs</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S	S	S	M	M	S	S	M
CO2	S	S	S	S	M	S	S	S	M	M	M	S
CO3	S	S	M	S	S	S	S	S	M	S	S	S
CO4	S	M	S	S	S	S	M	M	S	S	S	M
CO5	S	S	S	S	M	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT53	HISTORY OF TAMILNADU 1947-1989	L	T	P	C
CORE -X			5	-	-	4

Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**
Course Objectives	**The Course aims to** ➢ introduce students to the various sources for the History of Tamil Nadu ➢ elaborate on the impact of independence and the challenges to the new government ➢ present new perspectives on the growth of various Political Parties ➢ enable students to learn the Economic policies of the state government. ➢ enable students to face competitive examinations.

UNIT- I: Congress Rule in Tamil Nadu

Formation of new Government- O.P. RamasamyReddy–Administration - P.S.Kumaraswami Raja –Administration- Separation of Executive and Judiciary – Zamindari Abolition Act – Prohibition of Liquor – Rajaji – Administration – Linguistic Re-organization and Formation of Tamil Nadu-Anti-Hindi Agitations

UNIT- II: Kamaraj Administration

Kamaraj - Administration - Development ofEducation – Industry – Agriculture – Irrigation systems-Achievements – Kamaraj Plan – Baktavatsalam - Administration and achievements-The Fall of Congress. Rajaji – Swatantra party

UNIT- III: The Rise of Dravidian Parties in Tamil Nadu

Rise and Growth of DMK– Formation of DMK government- C.N.Annadurai –achievements-DMK's Manifesto – Administration of Karunanithi – Policies and Programs – Education- The Rise and Growth of ADMK - M.G. Ramachandran - his administration and Achievements.

UNIT -IV: Social Development

Social Welfare Measures from 1947 - Society – E.V.R. - Campaign against Caste and superstitious beliefs- Education and Empowerment –Empowerment of women –Right to property -Self Help Groups – Social Legislations – Legal Protection – Public Health-Reservation Policy

UNIT- V: Economic Development

Industries – Agriculture- Science and Technology – Media - Film and Politics - Cauvery RiverWater Disputes –MullaiPeriyar Dispute– Sri Lankan Tamil Refugees –- Problems of Fishermen.

Text Book

1. RamaswamySastry, K.S, The Tamils and their Culture, Annamalai Nagar, Chidambaram,1967.
2. Subramanian,N, Social and Cultural History of Tamil Nadu A.D 1336 – 1984, Ennes Publication,Udumalapet,2007.

Reference Books

1. Venkatraman,V, DesabimaniP.S.Kumarasamy Raja 1898-1957, (Tamil), Swadanthira Publications, Rajapalayam,1998.
2. Venkatraman,V, Role of Rajapalayam in Freedom Struggle (Tamil), Swadanthira Publications, Rajapalayam, 1997.
3. NilakantaSastri, History of South India, Oxford University Press, Madras,1971.
4. Rajayyan, K., History of Tamilnadu 1565-1982, Ratna Publications, Madurai,1982.
5. Varghese Jeyaraj.S., Socio-Economic History of Tamil Nadu 1565 – 1967 A.D, Enns Publication, Uthamapalayam, 2017.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	knowthe history of Tamil Nadu
K2	CO2	understand the reasons for the failure of the congress and the rise of dmk power
K4, K5	CO3	assess the policies which are beneficial to the people
K4	CO4	develop confident and leadership qualities
K6	CO5	students will get sufficient exposure to face various competitive examinations

<u>Mapping of COs with POs& PSOs</u>

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21HIT54	HISTORY OF AMERICA 1776 - 1945	L	T	P	C
CORE -XI			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ introduce students to the events contributing to the development of the United States. ➢ elaborate the interpretations of major historical events in American history from Reconstruction to the Second World War ➢ present new perspectives in foreign policies of America ➢ enable students to learn the diplomatic relations of India and America. ➢ discuss the knowledge of Information Technology of America to other countries of the world.					

UNIT -I: Advent of the Europeans to British supremacy

Advent of the Europeans to British supremacy (1492-1606)- USA as a British Colony (1606-1783).-George Washington - Early life- Continental Army - War of independence- USA as an Independent Country - George Washington Presidency-Confederation period -1783-1789-Articles of Confederation-Constitutional Convention- USA Constitution - Salient Features

UNIT-II: National Expansion and Reform, 1815 - 1880

Evolution of Pan Americanism- The war of 1812- Causes and effects- Treaty of Ghent- James Monroe - Foreign policy - Monroe Doctrine- National Expansion and Reform,- The question of Slavery – Abraham Lincoln- Civil war-and Reconstruction - Reconstruction Plans– Lincolns' Ten Percent Plan – Johnson's Plan - Congressional Reconstruction - Black Reconstruction- Radicals – Ku Klux Klan - Rise of Big Business -Industrialization and its emergence as one of the world powers

UNIT-III: Spanish American War 1898

Causes-Spanish American War 1898 -Open Door Policy -– Internal Policy -– Foreign Policy -– William Taft –Dollar Diplomacy - Westward expansion—US and Great Britain -

Theodore Roosevelt - Big Stick Diplomacy -Square Deal- Fifteenth amendment to American Constitution.-Woodrow Wilson–New Diplomacy- USA in the First World War – Fourteen Points of Wilson- Treaty of Versailles

UNIT- IV: Economic Depression and Recovery

Herbert Hoover - Great Depression–Causes and its Impact –Foreign policy- Franklin D. Roosevelt – New Deal – Achievements-Domestic and Foreign policy – Economic recovery- Lend Lease Act

UNIT- V: America in the Second World War

Factors leading USA to join the Second World War– Atlantic Charter - Pearl Harbour Attack – US Attack on Hiroshima and Nagasaki - War time Conferences –- Establishment of UNO.

Maps

1, Main centers of 1World War

2, Main centers of 11 World War

Text Book

1. Subramanian, N, A History of USA, Ennes Publications, Udumalpet, 2006.
2. Majumdar R.K and Srivastva, A.N, The History of The United States of America (From Colonisation to 1865 A.D)S B D Publishers' Distributors, New Delhi, 1994.

Reference Books

1. Hill, C.P, A History of United States, Arnold Henimann Publishers, New Delhi, 1976.
2. Marshall Smelser, American History at a Glance, Barners and Nonle, New York,1966.
3. Rajayyan, K, A History of United States, Madurai Publishing House, Madurai, 1981.
4. Sharma Mahmood, The History of America from Pre-Colonial times to World War II, Pearson Publication, New Delhi,2012.
5. Henry BamfordParkes, The United States of America, A History, Scientific Book Agency, Calcutta, 1976.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	know about thefreedom struggles.
K2	CO2	understand the development tactics of America.
K3	CO3	applynew strategies in the field of freedom struggles.
K4	CO4	interpret the history of America
K5, K6	CO5	assess the development plans during depression and prepare documents of it.

Mapping of COs with POS & PSOs

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT55	HISTORY OF WORLD CIVILIZATIONS -II	L	T	P	C
CORE -XII			5	-	-	4

Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate**
Course Objectives	**The Course aims to** ➢ introduce students to the origin of ancient world civilizations ➢ elaborate on the Socio, Political and cultural contributions of Ancient Greece ➢ present new perspectives in the Chinese Civilization. ➢ enable students to learn about Egyptian civilization and their Architecture and Pyramids. ➢ discuss the role of World religions in Indian civilization.

UNIT -I: Rise and growth of Civilizations

Civilization – Definition – Factors influencing the growth of Civilization- difference between Civilization and Culture.- Rise and growth of Civilizations - Comparison between Culture and Civilizations. Mesopotamian Civilization– Sumerian Civilization- Religion

UNIT- II: Egyptian Civilization

Egyptian Civilization - Pharaohs – Pyramids – Script – Intellectual Achievements. Egyptian Civilization: Geography – The people – Government –Growth in Social and Economic Conditions- The Arts- Religion – Literature and Learning- Estimate of the Egyptian Civilization.

UNIT -III: Greek Civilization

Ancient Greece - Legacy of the Greek –City States – Hellenistic Civilization, Ancient Rome – Roman life style - Socio, Political and cultural contributions- Civilization – Political legacy – Legacy in the fields of Art, Architecture, Religion, Philosophy, Literature, Education and Science.

UNIT- IV: Rome and Chinese Civilization

Legacy of Roman Civilization, Political legacy, Roman law- Legacy in the fields of Art, Architecture, Religion, Philosophy, Literature, Education and Science. Chinese Civilization- Confucianism-Script – Intellectual Achievements –Literature – An estimate

UNIT- V: Indian Civilizations

Indian Civilizations – Indus valley civilization- Vedic Civilization- Hinduism- Buddhism- Jainism- Zoroastrianism –Sangam Tamil civilization - Literature – Science – Art - Architecture – Women – Society

Map

1, Mark Egypt, Rome Greece and China

2, Mark the lands associated with Sangam Chera, Chola Pandyas

3, Mark the places associated with Indus Civilization

Text Book

1. Robert E. Lerner and Standish Meacham, Western Civilizations, WW Norton and Company. New York, 1986
2. Allan, O. Knownslar and Terry L. Smart, People and Our World: A Study of World History, Holt, Rinehart and Winston Publishers New York, 1981

Reference Books

1. Bruce G. Trigger, Understanding Early Civilizations: A Comparative Study, Cambridge University Press New York, 2003.
2. Douglas J. Brewer, Egypt and the Egyptians, Cambridge University Press New York, 2007
3. Felipe Fernandez- Armesto, Civilizations, Macmillan Publisher London,2000.
4. Joseph R. Strayer and Hans W. Gatzke,.The Mainstream of Civilization, Harcourt Brace Jo Vanovich, Inc. New York, 1979

Course Outcomes

On the successful completion of the course, students will be able to

K1, K2	CO1	understand and describe the significance of world civilizations
K4	CO2	write analytically about the various civilizations
K2	CO3	effectively communicate the causes for the success and failures of civilizati during class room discussions
K4, K5	CO4	critically examine the impact of civilization
K4, K5	CO5	evaluate and bring out the significant aspects of Indian civilization by referri to various sources

Mapping of COs with POs &PSOs:

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	S	S	S	M	M	S
CO2	S	S	M	S	S	M	M	M	S	S	S	M
CO3	S	M	S	S	S	M	S	M	S	S	M	M
CO4	S	S	S	S	M	M	M	S	M	S	S	S
CO5	S	S	M	M	S	M	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIE53	FUNDAMENTALS OF TOURISM IN INDIA	L	T	P	C
ELECTIVE -III			3	-	-	3
Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply**					
Course Objectives	**The Course aims to** ➢ introduce students to the basic concepts of tourism ➢ elaborate on the types of tourism ➢ present new perspectives in the components of tourism ➢ enable students to learn the concepts of management in tourism industry ➢ discuss the importance of tourism and job opportunities in the field.					

UNIT- I: Introduction on History of Tourism

History of Tourism - Socio–economic and cultural importance of Tourism - John Sargent committee- Implementation of the recommendations – Jha Committee – Recommendations- Types of Tourism -Components of tourism- Attractions- Accommodation-Accessibility- World Heritages in India

UNIT- II: Development of Tourism in India

Pre-Independence and Post-Independence Periods – Role of Private sector and Public sector - Motivation for Travel – Factors responsible for Travel - Indian Tourism Development Corporation- Department of Tourism –Ministry of Tourism- Functions- Tourism information offices – India and Abroad –Functions – Advertisement – Publicity – Public Relations –Tourism Policies- 1982, 1992, 2002. Development of Tourism in Tamilnadu- TTDC- functions- E-Governance-Virtual tour- Department of tourism- functions – Annual Tourism policies- Travel agencies

UNIT-III: Tourism Planning

Nature, Scope, Types of Tourism Planning–Components and various steps in the Tourism Planning Process-Importance of Tourism Planning –Role of Central and State governments- Public private partnership (PPP)

Unit-IV: Staffing and Job Design in Tourism

Direct and indirect jobs in Tourism- Nature and purpose of staffing–Human Resource Planning in tourism – Recruitment – Selection and training of personnel –Performance appraisal – Methods of performance appraisal - Leadership –Conflict management – Team management – Decision making

Unit –V: Impact of Tourism

Impact of tourism – Environment, Socio - Economic and Cultural- Positive and negative– International Understanding – Trade Promotion – Employment Opportunities- Regional development- negative- degrading the environment and culture –Health hazards – Abuse of Women and Children- changes in traditional life style.

Map

1, Mark World Heritage Sites in India
2, Mark World Heritage Sites in Tamilnadu
3, Mark Natural World Heritages in India

Text Book

1. Kaul, R.L, Dynamics of Tourism: A Triology, New Delhi 1985
2. A.K., Bhatia, Tourism Development – Principles and Practices, New Delhi, 1982.

Reference Books

1. Bhatia A.K. Tourism Development; Principle and Practices New Delhi- 1994
2. Holloway Christopher. J, The Business of Tourism
3. PranathSeth P.- Successful Tourism Management , New Delhi, 1987.
4. K.M., Menon, Tourism Management in India, Jaipur, 1999

Course Outcomes

On the successful completion of the course, students will be able to

KI, K2	CO1	learn the fundamentals of tourism
K2	CO2	understand various components of tourism
K2	CO3	assess the significant aspects of various tourism policies.
K2	CO4	evaluate the impact of tourism on environment and find solutions for sustainal tourism development
K3	CO5	develop knowledge and skills needed to get jobs in tourism related fields.

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	S	S	M	M	M	S
CO2	M	M	M	S	S	M	M	M	S	S	S	M
CO3	S	M	S	S	S	M	S	M	S	S	M	M
CO4	S	S	S	S	M	M	M	S	M	S	S	S
CO5	S	S	M	M	S	M	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIS53	COMPUTER APPLICATION IN HISTORY- THEORY	L	T	P	C
SBE-III			2	-	-	2

Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply**
Course Objectives	**The Course aims to** ➢ introduce students to the Computer Operation and its Techniques. ➢ elaborate on the various operating windows system ➢ present new perspectives in Software package ➢ enable students learn the knowledge of Communication Technology using computer technology in the study of history. ➢ discuss the internet technology of recent computer communication trends.

UNIT- I: Introduction to Computer

Introduction to computer and its components - viewing information on Internet (the web), sending mails, using internet banking services - Operating System; Basics of Popular Operating Systems

UNIT- II: Window Basics

Personal Computers – Input, Output and Storage Devices - - Moving Icons on the screen, Use of Common Icons, Status Bar, Using Menu and Menu-selection, Running an Application, Viewing of File, Folders and Directories, Creating and Renaming of files and folders, Opening and closing

UNIT- III: Operating System Basics

Various Operating System-Ms–Dos- Ms-Dos Environment - MS-DOS Memory Types - Directory Structure of Dos Windows - Advantage of Using Windows vs DOS- Customizing Windows Operating Systems, Unix - Main Features - Unix File System Linux - Technical Features of Linux- Components of a Linux System

UNIT- IV: Components of Computer System

Selection of Hardware & Software - Computer System, Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Computer Memory, Concepts of Hardware and Software; Concept of Computing, Data and Information; Applications of IECT; Connecting keyboard, mouse, monitor and printer to CPU - Basics of presentation software - Preparation and Presentation of Slides presentation - handouts.

UNIT- V Word Processor

Word Processing - MS- Office - Word Processing Basics; Opening and Closing of documents; Text creation and Manipulation; Formatting of text; Table handling; Spell check, language setting and thesaurus; Printing of word document

Text Book

1. V.K. Pandey, D.K. Dey, Understanding Computer Applications with Blue J Class- IX Paperback Arya publishing company,1 January 2021 .

Reference Books:

1. J.L. Ruff - Structuring the past the use of computer in History
2. Holgerson L.W. - CD Rom, Scholarly Research in Humanities
3. Hockey Susan - A Guide to Computer Applications in the Humanities.
4. Paul E. ,A History of Modern Computing Ceruzzi Published: Boulder,2004
5. Campbell-Kelly, Martin, A History of the Information Machine Published: Boulder, 2004

Course Outcomes

On the successful completion of the course, students will be able to

K1	CO1	gain knowledge on applications of computer
K2	CO2	know about the various use of computer
K2	CO3	know the significance of computers in history
K2	CO4	understand the impact of computers in modern world
K3	CO5	apply the skills and enable students to learn computers and get jobs

<u>Mapping of COs with POs &PSOs:</u>

CO/ P	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	M	M	S	S	S	M	S	M	S
CO2	S	M	M	S	S	M	M	S	S	S	S	M
CO3	S	S	M	M	M	S	S	M	S	S	M	M
CO4	M	M	S	S	S	M	S	S	M	S	S	S
CO5	S	S	M	S	M	S	M	M	S	M	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

SEMESTER – VI

COURSE CODE	U21HIT61	INTERNATIONAL RELATIONS SINCE 1945 A.D	L	T	P	C
CORE -XIII			5	-	-	4

Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate**
Course Objectives	**The Course aims to** ➢ introduce students to the definition and scope of the Internatio Politics. ➢ elaborate the various theories of International politics. ➢ present new perspectives in the post-world War II scenario International relations. ➢ enable students learn the impact of World War II in the Global Economics. ➢ discuss the role of world organizations in peace making process.

UNIT- I: Theories of International Politics

Definition and scope - Theories of international Politics - The Realist Theory, Systems Theory, Decision Making-Game Theory. International relations: Meaning – Scope – approaches to the study – Significance of the study- Concepts of International relations- Neo – Colonialism – collective security - Balance of Power.

UNIT –II: Balance of Power

Concepts of International Politics: Power - National interest - Balance of Power - Collective Security- NATO, CENTO, Warsaw Pact, SEATO, ANZ US. Old and New Diplomacy-practice Important theories – Game theory – Realistic theory - Systems theory – Decision making

UNIT- III:Post-II World War

The Post-II World War foreign policies of the major powers: United States, Soviet Union - China. and India's foreign policy and relations; India and the Super Powers-Oil Diplomacy, Palestine-Israel conflicts, West Asian conflict - Arms race, disarmament and arms control: - The Partial Test-Ban Treaty - The Nuclear Non-Proliferation Treaty - Comprehensive Test Ban Treaty - India's-Nuclear Policy — Terrorism- its impact — Afghanistan, Iraq — US War – Cold War.

UNIT –IV: New International Economic order

New International Economic order- GATT and its implications. The North South: "Dialogue" in the United Nations and Outside — Impact of Globalization- International Issues- Korean Crisis - Vietnam – Palestine Israel Problem – Gulf Crisis and Oil Diplomacy.

UNIT- V: International Organizations

Origin and Development of International Organizations - The United Nations and its Specialized Agencies- OAS (Organization of American States)- OAU (Organization of African Unity)- the Arab League- ASEAN- EEC- SAARC their role in international relations- U.N.O-Functions- Achievements- Disarmament - SALT treaties -NPT-CTBT and Atomic race.

Map

1, Mark SEATO countries

2, Mark ASEAN countries

3, Mark SAARC countries

Text Book

1. Indumati, (ed) The United Nations (1945-1995), University of Mysore, Mysore, 1995.
2. ShrikantParanjpe, U S Nonproliferation Policy in Action: South Asia. Sterling, New Delhi, 1987.

Reference Books

1. V.P. Dutt, India's Foreign Policy, Vani Educational Books, New Delhi, 1984.
2. David S. McLellan, William C. Olson and Fred A. Sondermann, The Theory and Practice of International Relations. Printice - Hall of India, New Delhi,1977.
3. Palmer Priestly and Perkins, Intemational Relations. Calcutta , 1969.
4. Pushpesh Pant, International Relations in the 21st Century, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2014.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	learn the theories, definitions and concepts of international politics
K4, K5	CO2	critically examine the impact of world wars that caused heavy loss to t humanity
K2	CO3	understand the balance of power
K4,K5	CO4	assess the new international economic order after class room teachings a references
K5	CO5	effectively argue the role of international organizations for global peace.

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S	M	S	S	S	M	S	S
CO2	S	M	M	S	S	M	S	S	M	M	S	S
CO3	S	M	M	S	M	M	S	S	S	M	S	M
CO4	S	S	M	S	M	M	M	S	S	M	M	S
CO5	S	S	M	S	M	M	M	S	S	M	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT62	HISTORY OF SCIENCE AND TECHNOLOGY, 1800 - 2000	L	T	P	C
CORE -XIV			5	-	-	4

Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**
Course Objectives	**The Course aims to** ➢ introduce an interest in the students to know more about Scientific and Technological innovations ➢ elaborate on the technological development. ➢ present new perspectives in the services of scientists in promoting India as a potential nation ➢ enable students learn the evolution of Science and Technology in World Nation. ➢ discuss the development of Indian Science.

UNIT -I: Science and Technology in Renaissance Period
Progress in Astronomy – Copernicus – Galileo - Leonardo da Vinci - John Gutenberg - Science and Technology in the 17th and 18th century - Royal Society in London - French Royal Academy of Science - Isaac Newton –Robert Boyle - William Harvey - Marcello Malpighi - Invention in Textile Industry - Steam Engine –John Hunter - Edward Jenner.

UNIT- II: Science and Technology in the 19th Century
Science and Technological Development in the 19th Century.- Charles Darwin – Faraday - James Clark Maxwell - John Dalton – James Simpson - Louis Pasteur - Telephone –Telegraph – Thomas Alva Edison - Alfred Nobel

UNIT- III: Science and Technology in the 20th Century
Impact of Two World Wars – Albert Einstein and Theory of Relativity – Roentgen – Marie Curie –Radio – Television – Radar – Computer. Atomic Science in the 20th century– Lord Ruther Ford – History of Atom Bomb – Hydrogen Bomb and Atomic Energy.

UNIT- IV: Development of Modern Science
Space Age –Achievements of Russia and USA – Penicillin - Alexander Fleming - History of Blood Transfusion –Blood Groups - Gene Technology - Laser Technology - Human Diseases - Communicable and Non-Communicable - Prevention and Remedies

UNIT- V: Science and Technology in Modern India
Progress of Science and Technology in Modern India –Space Research – Atomic Energy Commission – Green Revolution – Defense Research and Development Organisation - Pioneer

of Indian Science - J.C.Bose - P.C.Roy - C.V.Raman – Chanderasekhar - Swaminathan – Ramanujan - Abdul Kalam - Space Science- Information Technology-Bio- Tech – Medicine

Text Book

1. Vairavel, N, History of Science and Technology, AnanthamPublications , Madurai.1997.
2. KalpanaRajaram, Science and Technology in India, Spectrum India, New Delhi, 1993.

Reference Books

1. Anthony, H.D, Science and its Background, Macmillan &Co.Ltd., London, 1963.
2. Arthur Eddington, New Pathways in Science, University Press, Cambridge. 1947.
3. ChattopadhyayaDebiprasad, History of Science and Technology in India, Firma KLM, Calcutta.1991.
4. Subbarayappa, B.V, A Concise History of Science in India, Indian National Science Academy, NewDelhi,1989
5. Varghese Jeyaraj, S, History of Science and Technology, Anns Publications, Uthamapalayam. 1997.

Course Outcomes

On the successful completion of the course, students will be able to

K1	CO1	know more about scientific and technological innovations
K2	CO2	understand importance of science and technology
K4, K5	CO3	assess the contributions of indian scientists
K5	CO4	analyse the significance of science and technology
K6	CO5	forecast the global effects of science and technology

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	S	S	S	M	S	S
CO2	S	S	M	S	M	S	M	S	S	S	M	M
CO3	S	M	S	S	S	M	S	M	S	S	M	M
CO4	S	S	S	S	M	M	M	S	M	S	M	S
CO5	S	S	M	M	S	M	S	M	S	M	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT63	HISTORY OF EUROPE 1789 - 1945	L	T	P	C
CORE -XV			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze** **K5 Evaluate**					
Course Objectives	**The Course aims to** ➢ introduce students to the age of revolutions ➢ elaborate on the unification of Italy and Germany ➢ present new perspectives in the liberal movements in Europe ➢ enable students learn the causes and nature of revolution in Modern Europe. ➢ discuss the impact of Great Depression in Europe.					

UNIT I: The French Revolution

The French Revolution - Causes- course and results- Role of women- Declaration of the Rights of Man and Citizens 1789- National Assembly – Revolutionary Government. Napoleonic Era 1789- 1815 – Napoleon Bonaparte –Ruler-French Consulate – Emperor – Wars - Continental System – Causes for failure – Domestic Reforms-– Downfall

UNIT - II: Diplomacy and Revolution

Vienna Congress – Metternich - Holy Alliance – Concert of Europe – Revolutions of 1830 and 1848 –Causes and Results - Napoleon III –Foreign policy - His Wars – Failure -Industrial Revolution in Europe- Its Stages – Socialist and Labour Movements in Europe.- Capitalism - Karl Marx -Communism

UNIT - III: Emergence of Nationalism

Unification of Italy – Mazzini – Cavour – Garibaldi – Victor Immanuel II - Unification of Germany – Bismarck – Wars – Achievements - Mazzini-Garibaldi -The Unification of Italy - Otto Von Bismarck,- Unification of Germany – The European Powers - Ottoman Empire 1815-1914

UNIT IV: First World War

Europe on the eve of First World War – Treaty of Berlin – System of Secret Alliances – Balkan Crisis – Causes for World War – Entry of US into First World War – Results of War – Paris Peace Conference – Treaty of Versailles- The Russian Revolution of 1917 –Fall of Tzar - Rise of Lenin - Communism

UNIT - V: Second World War

League of Nations -An estimate of League of Nations - Great Depression of 1929-32 - Totalitarianism in Europe and Germany - Second World War- Causes - Course and Consequences-Advances in technology and warfare- U.N.O. Functions .

Map

1. Places associated with French revolution
2. Places associated with World war-1
3. Places associated with World war 11

Text Books

1. Rao, B.V, History of Europe, Sterling Publishers, New Delhi, 2002.
2. Dharmaraj, J, History of Europe1789 to Present Day, (Tamil), Tensy Publication, Sivakasi, 2015.

References Books

1. Daniel Ziblatt, StructuringtheState: The Formation of Italy and Germany and the Puzbzleof Federalism, Princeton University Press, New Jersey, 2006.
2. Fisher, H.A.L, History of Europe, Vol II Surjeeth Publications, Delhi, 1994.
3. Grant, A.J, Europe in the 19th and 20th century, Longman Publication, New Delhi, 1980.
4. Nandha,S.P, History of Modern Europe and the World, Anmol Publication , New Delhi, 2000.
5. Sreenivasa Murthy, History of Europe 1789 to 1916, Himalaya Publication, New Delhi, 1992

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	gain knowledge about the history of europe and different concepts
K2, K3	CO2	understand and apply the concepts of diplomacy and democracy
K4,K5	CO3	analyze the causes for the first and second world war
K4, K5	CO4	critically examine the key role played by the leaders in the history of europe
K5	CO5	discuss the impact of world wars.

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	S	S	S	M	M	S
CO2	S	S	M	S	S	M	M	M	S	S	S	M
CO3	S	M	S	S	S	M	S	M	S	S	M	M
CO4	S	S	S	S	M	M	M	S	M	S	S	S
CO5	S	S	M	M	S	M	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT64	HISTORY OF INDIA 1947 - 1985	L	T	P	C
CORE -XVI			5	-	-	4

Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**
Course Objectives	**The Course aims to** ➢ introduce students to the contemporary history of India so as to become responsible citizens. ➢ elaborate on the current problems in India so that they could find answer to them. ➢ present new perspectives in the development of independent India. ➢ enable students to learn about various legislations which are relevant to them. ➢ discuss the growth of Indian education with new perspectives.

UNIT I: Integration of India

India at the time of independence- Integration of Princely States – Role of Mountbatten – Role of Vallabhbhai Patel -Linguistic Re - Organization of States and Union Territories –Administration of Prime Ministers – Domestic policies

UNIT II: Social Welfare Programs

Constitutional Safeguards–Codification of Hindu Law –Women and Law-Legislations Related to Physically Challenged - Welfare of SC and ST – Welfare of the Minorities – Welfare of the Aged - Tribal Welfare - Women and Child Welfare- Transgender

UNIT III: Economic Reforms

Five Year Plans - Nationalisation of Banks –AgrarianPolicy–Irrigation and water sharing between states- - Green Revolution – White Revolution – Blue Revolution - Industrial Policy - Export and Import Policy - Labour Policy - Globalisation –Development of Transport and Communication.

UNIT IV: Educational Reforms

National Policy of Education–Dr. Radha Krishnan Commission -Mudaliar Commission - Kothari Commission - Elementary - Secondary – University and Higher Education - Growth of Universities and UGC – Vocational and Technical – Women Education – Rural Education – Medical and Engineering education.

UNIT V: Foreign Policy of India

Panchasheel- Role of India in Non-Aligned Movement - UNO -Commonwealth and SAARC – Relationship with USA - Soviet Union - U.K - China - Pakistan and Sri Lanka.

MAP

1. India at the time of independence

2. India in 1956

3. India in 1985

Text Book

1. Mahajan, V.D, History of Modern India 1919 - 1974, Vol. I & II, S. Chand and Company, New
2. Dharmaraj, J, Contemporary History of India, (Tamil),Tensy Publications, Sivakasi, 2015. Delhi, 1983.

Reference Books

1. Anup Chand Kapur and K.K.Misra, Select Constitutions, S.Chand& Company, New Delhi, 2002.
2. Bipan Chandra, India after Independence 1947 - 2000, Penguin Books India Ltd. New Delhi, 1999.
3. Anlet Sobithabai,W, Contemporary History of India, Sharon Publications, Marthandam, 2002.
4. Jawaharlal Nehru, India's Foreign Policy, Government of India Publication, New Delhi, 1983.
5. Motilal Bhargava, History of Modern India, The Upper India Publishing House, Lucknow, 1977.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	gain knowledge about the history of modern india.
K2	CO2	understand and interpret the the history of modern india,
K4	CO3	critically examine the welfare policies
K4, K5	CO4	assess the growth of education and industryandyou'll understand the mechanism driving change and its significance in the present time.
K6	CO5	demonstrate the knowledge and understanding of modern india that enable them to participate in competitive examinations

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	M	S	S	S	M	M
CO2	S	S	S	M	S	S	M	S	S	M	S	S
CO3	S	S	S	M	M	S	M	S	S	S	S	M
CO4	S	M	S	S	S	M	M	S	S	M	M	S
CO5	S	S	M	M	S	S	S	S	M	M	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIT65	HISTORY OF FAR EAST SINCE 1900	L	T	P	C
CORE -XVII			5	-	-	4
Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze**					
Course Objectives	**The Course aims to** ➢ introduce students to the historical background of the China and Japan. ➢ elaborate on the emergence of China and Japan as important countries in Asia ➢ present new perspectives in the history of China, Japan and other Asian Countries ➢ enable students learn the development of Asia in international level. ➢ discuss the Open door policy of Far Eastern countries with world countries					

UNIT- I: History of China

China A Brief early history– The Manchu Dynasty – the opening of China – The First Opium War –Causes , course and result- The Taiping Rebellion – The Second Opium War – China 1860 - 1890 – Frontier relations between China and neighboring countries – Sino Japanese War 1894-1895.

UNIT- II: Open Door Policy

The Battle of Concessions – USA and the Open Door Policy – Hundred Days Reforms – The Boxer Rebellion – Manchu Reforms – Dr.SunYatSen and Revolution of 1911 – Yuan Shi Kai – China and First World War – Second World War.

UNIT- III: Growth of Communism in China

Birth and growth of Communism in China – Kuomingtang – Chiang Kai Shek _ - Manchurian Crisis - conflict between the CCP and KMT – Sino Japanese War 1937 –Civil War 1945-1949- The establishment of People‟s Republic of China - Mao Tse Tung – The People‟s Government at Peking – The Cultural Revolution –-Reorganization of Communism – Domestic, Economic and Political Reforms-China's Relations with India, USA and USSR

UNIT- IV: Japan

Japan: The Opening of Japan – Perry and Harris Mission – Meiji Restoration- Meiji Reforms – Constitution of 1889 – Anglo Japanese Alliance 1902 – Russo-Japanese War 1904-1905 – Japan and First World War.

UNIT- V: Japan in Second World War

Japan and Second World War – defeat and surrender of Japan – Post War Japan – Reconstruction of Japan after Second World War – Disarmament and demilitarisation — New political system –Economic and Industrial Remodelling - Japan's relation with other countries – Growth of Science and Technology in Japan.

MAP

1. Far east
2. Mark important cities of Japan
3. Historical places in China
4. Places related to Second World war in Japan

Text Book

1. Thiagarajan J. – History of China from 1800- 1900 A.D Vikas Publication Madurai,2007.
2. Rajayyan, K, A History of the United States, Madurai Publishing House, Madurai, 1981.

Books for Reference

1. Subramanian. N, A History of USA, Ennes Publication, Udumalpet, 2006.
2. Sinha. P and Surya. P – China and Japan in Ancient power politics
3. Kenneth E. Hendrickson Jr, The Spanish-American War, Greenwood Press, London, 2003.
4. Richard Zuczek, Encyclopaedia of the Reconstruction Era Vol – II, Greenwood Press, London, 2006.

Course Outcomes

On the successful completion of the course, students will be able to

K1	**CO1**	know the overview of far-east countries
K2	**CO2**	understandabout how nations developed, about heroes of the past, and much more.
K2	**CO3**	analyse the cultural revolution and the factors responsible for the economic development of china
K4	**CO4**	review the growth of japan
K3	**CO5**	discuss about how nations developed, about heroes of the past and develop knowledge needed to face competitive examinations

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	S	S	S	M	M	S
CO2	S	M	S	M	S	M	S	S	S	S	S	S
CO3	S	S	S	M	M	S	S	M	S	S	S	S
CO4	S	S	M	S	S	S	S	S	M	M	S	S
CO5	S	S	M	M	S	S	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIE64	ELEMENTS OF HISTORIOGRAPHY	L	T	P	C
ELECTIVE- IV			3	-	-	3

Cognitive Level	**K2: Understand** **K3: Apply** **K4 Analyze**
Course Objectives	**The course aims to** ➢ understand the meaning, scope and purpose of History ➢ know about the Contributions of .various historians ➢ understand the methodology of historical writing. ➢ equip students with the various methods and principles historiography ➢ create research interest

UNIT- I: Introduction on Historiography

Definition of History and Historiography-History: Nature and Value –Scope and Purpose of History – History and its Allied subjects - Branches of History – Social - Political – Military - Cultural and Constitutional History– Geography- Economics – Literature-Women.

UNIT -II: Significance of History

The importance of the study of History – History is Science or Art - History as both Science and Art - History as a Social Science - Uses and Abuses of History – Lessons of History –Limitations of History.

UNIT III: Eminent Foreign Historians

Practitioners of History - Greco-Roman - Herodotus- St. Augustine - -- Leopold Von Ranke – G.M. Trevelyan - A.J. Toynbee- Herodotus – Thucydides – Gibbon – Ranke – Toynbee- IbnKhaldun- Karl Marx -Their Contributions to Historical Writing

UNIT -IV : Eminent Historians who wrote about India

Historiography and Historians: Puranas and History-Buddhist and Jain Historiography - Kalhana-Alberuni-Amir Khusru - Barani- IbnBatuta - AbulFazl -Modern Indian Historians – Jadunath Sarkar, - J.S. Mill - V.A.Smith - D.D.Kosambi - South Indian Historians : K.A.N. Sastri, K.K. Pillai. Kalhana - AbulFazal - Alberuni - J.N Sarkar - D.D. Kosambi - K.K.Pillai - K.A.N. Sastri - RomilaThapar., K.Rajayyan

UNIT –V: Research Methodology

Historian at Work - Historical Research -Requisites of a Research Scholar -Selection of the research topic-review of literature-collection of data- Primary and Secondary - Heuristics – Criticism – Synthesis – Exposition – Documentation –Subjectivity - Objectivity in Historical Writing –research format- chart, tables – appendices-Foot Notes- Bibliography

Text Book

1. Sreedharan, E, A Text Book of Historiography (500 BC – AD 2000), Orient Black Swan, Delhi, 2004.
2. Subramanian, N, Historiography and Historical Methods, Ennes Publications, Vadipatti, 1993

Reference Books

1. Arvind Sharma, Our Religions, Charles Scribner's Sons, New York, 1993.
2. Harper Collins Floud, Roderick. An Introduction to Quantitative Methods for Historians. London, 1983.
3. RanajitGuha, Subaltern Studies ,Vol. I, IV and VI, Delhi:, 1994.
4. E.J. Hobsbawm, "Karl Marx's Contribution to Historiography in Ideology and Social Science" Suffolk, 1972.
5. Rajayyan, K, History Its Theory and Method, Ratna Publications, Madurai, 1999.

Course Outcomes

On successful completion of the course, the students will be able to

K2	CO1	know the historical development of historiography
K2	CO2	understand the various definitions and types of historiography
K3	CO3	apply the knowledge in historiography
K4	CO4	critically assess the emerging trends in historiography
K2	CO5	understand the functions of historiography

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	S	S	S	M	M	S
CO2	S	M	M	M	S	M	S	S	S	M	S	S
CO3	S	S	S	M	S	S	S	S	M	M	S	S
CO4	S	S	M	S	S	S	S	S	M	M	S	S
CO5	S	S	M	M	S	S	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIS64	ARCHIVES KEEPING	L	T	P	C
SBE –IV			2	-	-	2
Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**					
Course Objectives	**The Course aims to** ➢ introduce students to the origin of Archives in Ancient period. ➢ elaborate on the development of Archives. ➢ present new perspectives in the values of Archives Keeping ➢ enable students learn the Archival keeping method in Ancient and medieval period ➢ discuss the classification of Archives.					

UNIT- I: The Origin of Archives
History of Archives - Archives Keeping in Ancient times - Creation of Archives Meaning – Origin and Growth of Archives –Ancient, Medieval and Modern – Archives Keeping - Europe and India – Importance of Archives.

UNIT –II: Establishment of Archives
Organization of Archives – Regulation – Administration of Archives. Creation of Archives – Classification – Recent Development – Registry Archives - Libraries – Racking – Shelves and other materials

UNIT – III: Protective Measures of Archives
Preservation of Archives – Scientific Methods – Functions of Archives- Preservation of Archival materials – Preventive measures – Methods of Preservation – Lamination – Microfilming – Book Bindings – Reprography - Records maintenance

UNIT – IV: Usage and Access to Archives
Uses of Archives – Rules Regulating the Access of Public Archives in India – Other Countries. Administration of Archives – Functions of Archives – Publication - Facilities to Researchers - Modern Methods in Archives Keeping – Uses of Archives – Rules and Regulations.

UNIT – V: Private and Government Archives
Role of Private Archives - Functions of Private Archives - National Archives in India – State Archives in Tamil Nadu - Archival organizations – National Archives of India – Tamil Nadu Archives- Private Archives – International Council of Archives – Indian Historical Records

Commission - The Historical Manuscripts Commission – Role of Archives in the present day World.

Text Book

1. Sushil Kumar, Archives Principles and Practices, Gyan Publishing House, New Delhi,2011
2. Mukerjee, B.B, Preservation of Library Materials, Archives and Documents, World Press Private Ltd, Calcutta, 1973.

Reference Books

1. Alan Ward, A manual of sound archive administration, Gower Publication & Co, Ashgate, 1990.
2. Back E.A, Book Worms, The Indian Archives, Vol.1, National Archives of India, New Delhi, 1947.
3. Baliga,B.S, Guide to the Records Preserved in the Madras Record Office, Foreign and Colonial Compiling and Publishing Company, London, 1915.
4. Hilary Jenkinson, A Manual of Archives Administration. Lund Humphries Publishers, London, 1965.
5. Laura Millar, Archives: Principles and Practices, Facet Publishing House, 2010.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	define the basic principles and practices of archives
K2	CO2	know the techniques of preservation of archival materials
K4, K5	CO3	critically comment on new perspectives in archives
K2	CO4	understand the value and uses of preservation of data
K6	CO5	create archives with private collections and also enable to get job in archive

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	S	S	M	M	S	M
CO2	S	M	M	M	S	M	S	M	M	M	S	M
CO3	S	S	M	S	M	S	M	S	S	M	M	S
CO4	S	M	S	S	M	M	S	M	S	M	S	S
CO5	S	S	S	M	S	M	M	S	M	S	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

NON MAJOR ELECTIVE

COURSE CODE	U21HIN31	EVENT MANAGEMENT	L	T	P	C
SEMESTER - III			2	-	-	2

Cognitive Level	**K1:Knowledge** **K2: Understand** **K4 Analyze** **K5 Evaluate** **K6 Create**
Course Objectives	**The Course aims to** ➢ learn the conceptual understanding of Management concepts. ➢ understand the contemporary issues in Management Studies. ➢ help the students to analyze and interpret the events successfully. ➢ train the students to join jobs in Management Sectors and Strategica development. ➢ apply event management skills and technological development future studies and Job.

UNIT- I: Principles of event Management

Principles of event Management Introduction to Event Management, Concept and Type of events- Code of ethics –Dress Code.

UNIT-II: Event Planning

Event Planning Aim of event- Develop a mission- Establish Objectives -Preparing event proposal- Use of planning tools –Lay out of the plan-Feasibility- Keys to success-SWOT Analysis.

UNIT-III: Team Management

Team Management Managing team- Leadership skills- Protocols, Staging, Staffing Group development- Communication -Managing meetings- Crowd management.

UNIT-IV: Safety and Security

Event Safety and Security-Security- Occupational safety- Major risks and emergency planning- Incident reporting- Emergency procedures - Event Accounting and Costing- Budget- break even point- cash flow analysis-Profit and loss statement - balance sheet- Panic payments –Financial control systems.

UNIT-V: Event Management System

Event Management System - Control Process – Methods, Tools and Techniques of Control – Design of techniques – Choices in Control, Comparative Management Styles and approaches Organizational Creativity and Innovation – Management– Entrepreneurial Management – Benchmarking –Select Cases of Domestic and International Corporations.

Text Book

1. Charles W.L. Hill, Gareth R.Jones. Strategic Management An integrated approach, Cengage Learning Publication , New Delhi
2. Stephen P. Robbins and David A, Fundamentals of Management, Pearson Education Publication, New Delhi, 3rd Edn. 2001.

Books for Reference

1. Anton Shone and Bryn Parry, Successful Event Management, Sage Publication , New Delhi, 2002.
2. Arthur A.Thomson, A.J. Strick land III, John E. Cambel , Crafting and Executing Strategy, Pearson Educational Publication , New Delhi , 2004.
3. Peter F. Drucker, The Practice of Management, Sage Publication New Delhi, 2006.
4. Tim Hannagan, Management Concepts and Practices, Mac Millan Indian Publication , New Delhi ,1997.
5. Peter Eichhorn and Lan Towers, Principles of Management: Efficiency and Effectiveness in the Private and Public Sector, Springer International Publishing House , New Delhi2018.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	define managerial skills
K2	CO2	explain the impact of event management in tourism industry
K2	CO3	understand the managerial skills needed for event management
K4, K5	CO4	examine the hard and soft skills
K6	CO5	describe the types of skills

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	M	S	S	M	S	S
CO2	M	S	S	M	S	S	S	S	M	S	S	M
CO3	S	S	S	S	S	S	M	M	S	S	M	S
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	M	S	S	S	M	M	S	S	S	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21HIN42	HISTORY FOR COMPETITIVE EXAMINATION	L	T	P	C
SEMESTER - IV			2	-	-	2

Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze** **K5 Evaluate** **K6 Create**
Course Objectives	**The Course aims to** ➢ introduce students to the basic principles and practices of learning skills in various subjects ➢ provide elaborate information for competitive examinations ➢ motivate students to prepare thoroughly for facing examinations and interviews ➢ enable students to gain knowledge in different field, strategic thinking and hard work. ➢ discuss about various competitive examinations.

UNIT- I: Ancient India

The prehistoric period- Indus valley Civilization - Vedic period- Jainism and Buddhism- Magadha period -Persians andMacedonian Invasions - The Mauryan empire- Gupta dynasty- feudalism-The Vardhanas – The Rajputs –The Southern Dynasties -Nayaks of Madurai– VisvanathaNayak - MuthuVirappaNayak - Career and achievements of ThirumalaNayak –Rani Mangammal – Meenakshi - Nayaks of Tanjore - SevappaNayak – RagunathaNayak – VijayaraghavaNayak - Nayaks of Senji- Vaiyappa - TubakiKrishnappa, Krishnappa I, KrishnappaNayak II – Nayak Administration – Socio-Economic conditions under the Nayaks – Language and Literature – Art and Architecture.

UNIT- II: Establishment of Maratha Rule

Marathas Rule and Setupatis of Ramnad : Establishment of Maratha Rule–Marathas of Tanjore – Ekoji – Serfoji – Tukoji – Serfoji II – Sivaji III - Setupathis of Ramnad–RagunathaSetupati I – KilavanSetupati.The Coming of Islam-The Mughal Dynasty (1526-1540 and 1555 – 1857)- Regional powers during Mughal period- Art and Architecture - impact of Mughal rule

UNIT-III: English – The Anglo-French Conflict

Advent of the Europeans–ThePortuguese – The Dutch –The French – The English – The Anglo-French conflict – Tamil Nadu under the ArcotNawabs – The Carnatic Wars and Effects – Mysore Wars– Poligari System - South Indian Rebellion, 1801 – Vellore Mutiny, 1806.

UNIT- IV: Advent of Europeans

The British Land Revenue Administration–Zamindari – Ryotwari - Famine and Relief Measures - Education under the Company – Growthof Language and Literature in 19th and 20th Centuries – Organizations of Judiciary under the Company– Local Self Administration under the Company– Society, Commerce, Trade, Communication and Transportation.

UNIT- V: Indian National Movement

Political and Social Awakening of Tamil Nadu–Nationalism – The Madras MahajanaSabha – The Indian National Congress – Swadesi Movement -Home Rule Movement – Genesis, Growth and Decline of Justice Party – Working of Diarchy - Non Cooperation Movement – Swaraj Party - Civil Disobedience Movement and March to Vedaranyam– Achievements and Failures of Congress Ministry 1937 – 1939 – Towards Independence 1939-1947. Industrial revolution – Causes, Course and Results of World war 1 and II- rise of Dictatorship- Major Agencies of the United Nations-NAM

Text Book

1. Gowri, K., Maduraiunder East India Company 1801-1857, Raj Publishers Madurai, 1987.
2. Venkatesan, G, History of Modern Tamil Nadu From 1600 – 2011 A.D., Narmatha Publications, Rajapalayam, 2017.

References Books

1. Kalidos, R., History and Culture of Tamils (From Prehistoric times to Present rule), Vijay Publishers, Dindigul, 1976.
2. MangalaMurugesan, K., Self Respect Movement, ThendralPathipakam, Chennai, 1982.
3. Rajayyan, K, History of Tamil Nadu 1565 – 1982, Ratna Publications, Madurai, 1982.
4. Rajayyan, K., Tamil Nadu – A Real History, Ratna Publications, Trivandrum, 2005.
5. Varghese Jeyaraj, S, Socio-Economic History of Tamil Nadu, 1565-1967, Enns Publications, Uthamapalayam, 2017.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	better focus on the history of India
K2	CO2	understand the evolution of Indian history
K3	CO3	identify the questions for competitive examinations in each unit
K4, K5	CO4	examine the trend in freedom movement and the factors responsible for its success.
K6	CO5	create confident in them

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

VALUE ADDED COURSE

COURSE CODE	U21HIV51	HISTORY OF SCIENCE AND TECHNOLOGY, 1800 - 2000	L	T	P	C
SEMESTER - V			30			2
Cognitive Level	**K1:Knowledge** **K2: Understand** **K3: Apply** **K4 Analyze** **K5 Evaluate**					
Course Objectives	**The Course aims to** ➢ introduce an interest in the students to know more about scientific and Technological innovations ➢ elaborate on the technological development. ➢ present new perspectives in the services of scientists in promoting India as a potential nation ➢ enable students learn the evolution of Science and Technology in World Nation. ➢ discuss the development of Indian Science.					

UNIT – I: Science and Technology in Renaissance Period

Progress in Astronomy – Copernicus – Galileo - Leonardo da Vinci - John Gutenberg - Science and Technology in the 17th and 18th century - Royal Society in London - French Royal Academy of Science - Isaac Newton –Robert Boyle - William Harvey - Marcello Malpighi - Invention in Textile Industry - Steam Engine –John Hunter - Edward Jenner.

UNIT- II: Science and Technology in the 19th Century

Charles Darwin – Faraday - James Clark Maxwell - John Dalton – Mandeeleev - James Simpson - Louis Pasteur - Telephone –Telegraph –Thomas Alva Edison - Alfred Nobel - Science and Technological Development in the 19th Century.

UNIT- III: Science and Technology in the 20th Century

Impact of Two World Wars – Albert Einstein – Roentgen – Marie Curie – Rutherford – Radio – Television – Radar – Computer.Atomic Science in the 20th century - Albert Einstein and theory of Relativity – Lord Ruther Ford – History of Atom Bomb – Hydrogen Bomb and Atomic Energy.

UNIT- IV: Development of Modern Science

Space Age –Achievements of Russia and USA – Penicillin - Alexander Fleming - History of Blood Transfusion –Blood Groups - Gene Technology - Laser Technology - Human Diseases - Communicable and Non-Communicable - Prevention and Remedies - Psychology –Sigmund Freud

UNIT- V: Science and Technology in Modern India

Space Research – Atomic Energy Commission – Green Revolution – Defense Research and Development Organisation - Pioneer of Indian Science - J.C.Bose - P.C.Roy - C.V.Raman – Chanderasekhar - Swaminathan – Ramanujan - Abdul Kalam - Progress of Science and Technology in Modern India – Atomic Energy Commission- Space Science- Information Technology-Bio- Tech – Medicine

Reference Books

1. Chattopadhyaya Debiprasad, History of Science and Technology in India, Firma KLM Publication, Calcutta,1991.
2. Kalpana Rajaram, Science and Technology in India, Spectrum Publication, New Delhi, 1993.
3. Subbarayappa, B.V, A Concise History of Science in India, Indian National Science Academy, NewDelhi,1989
4. Vairavel, N, History of Science and Technology, Anantham Publications , Madurai,1997.
5. Varghese Jeyaraj, S, History of Science and Technology, Anns Publications, Uthamapalayam, 1997.

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand the importance of Science and Technology
K6	CO2	demonstrate the logic and growth of Science and Technology
K2	CO3	discuss the factors influences the developement of Science and Technology
K3	CO4	analyse the significance of Science and Technology
K5	CO5	forecast the global changes and effect of Science and Technology

Mapping of Cos with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	S	S	S	M	M	S
CO2	S	S	M	S	S	M	M	M	S	S	S	M
CO3	S	M	S	S	S	M	S	M	S	S	M	M
CO4	S	S	S	S	M	M	M	S	M	S	S	S
CO5	S	S	M	M	S	M	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

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MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

DEPARTMENT OF HISTORICAL STUDIES AND TOURISM MANAGEMENT

M.A HISTORY

SYLLABUS TO BE IMPLEMENTED FROM THE

ACADEMIC YEAR

2021-2022

(CHOICE BASED CREDIT SYSTEM)

Mother Teresa Women's University, Kodaikanal
Department of Historical Studies and Tourism Management
Choice Based Credit System (CBCS)
(2021-2022 onwards)
M.A. History

1. About the Programme

Considering the need for revising and updating the Syllabi from time to time, and as per the UGC/TANSCHE guidelines, the M.A. History Programme offers updated and broad-based curriculum keeping the up-gradation of the students' knowledge and skills.The Programme is offered through semester pattern with credit system. The Programme contains 10 core papers with 4 credits each, 03 elective papers with options and 4 credits each, 03 supportive courses with 02 credits each, co curricular and extracurricular activities in the first three semesters for 12 credits and one projectin the last semester for 8 credits. The project in the final semester enhances student's research attitude and prepares them for Doctoral Research. The Programme focuses on recent trends in travel and tourism and updates the students with thorough knowledge in the two fields for their better career opportunities.

2. Programme Educational Objectives (PEOs)

The Programme has been designed to enable the students to

PEO1	understand the different concepts of history, travel, and tourism.
PEO2	gain profound knowledge of historical events, recent trends in tourism and travel.
PEO3	differentiate the features of good governance and civic responsibilities and wrong policies and gain administrative skills
PEO4	write well in a variety of formats including essays, research papers and projects opportunity to pursue research, get jobs in schools, colleges, museums, archives and libraries and prepare for various competitive examinations.
PEO5	train the students with communicative and employability skills for better placements in the government and public sectors.

3. Eligibility: B.A. History

4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.
ii. **Medium of Instruction:** English
iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	13	25	13	25
External	38	75	38	75

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**
  Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 90**

- **Project Report**

  A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

  There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

9. Programme Outcomes (POs)

On successful completion of M.A. History Programme, the students will be able to

PO1	be familiar with the main currents in Indian and world History.
PO2	understand the strategies for the success of kings and leaders, social reforms, constitutional rights and legislations ,Human Rights and thereby become responsible citizens with independent thinking and decision-making ability.
PO3	analyze the present social, political, religious and economic conditions with the help of lessons learnt from history .
PO4	develop their ethical and social values, could gather knowledge about the heritage and traditions of our country and the others, and demonstrate a sense of societal and ethical responsibility.
PO5	gain new ideas and experiences from classroom and outside learning and develop independent and critical thinking.
PO6	secure sufficient knowledge and skills to face various competitive examinations, acquire communication and soft skills, and the ability to function effectively in both private and public sector and display distinct leadership traits.
PO7	apply the knowledge and skills to succeed in their career/ professional development or pursue research programmes.

10 . Programme Specific Outcomes (PSOs)

At the end of the program, the student will be able to

PSO1	understand different concepts in history.
PSO2	gain profound knowledge of historical events.
PSO3	differentiate the features of good governance and civic responsibilities and wrong policies and gain administrative skills.
PSO4	write well in a variety of formats including essays, research papers and projects
PSO5	opportunity to pursue research, get jobs in schools, colleges, museums, archives and libraries and prepare for various competitive examinations.

M.A HISTORY-CURRICULUM

S.No	Course Code	Course Title	Credits	Hours		CIA	ESE	Total
				L	P			
Semester I								
1	P21HIT11	**Core – I** History of Tamil Nadu upto 1565 A.D	4	6	-	25	75	100
2	P21HIT12	**Core – II** History of India upto 1526A.D	4	6	-	25	75	100
3	P21HIT13	**Core – III** History of Ancient World Civilizations	4	6	-	25	75	100
4	P21HIT14	**Core IV** Archaeology	4	5	-	25	75	100
5	P21HIT15	**Core V** History of America from 1900 - 2000 AD	4	5	-	25	75	100
6	P21HIS11	**Supportive Course I** General Studies	2	2	-	25	75	100
		Total	**22**	**30**		**-**	**-**	**600**
Semester II								
7	P21HIT21	**Core VI** History of India, 1526-1950	4	5	-	25	75	100
8	P21HIT22	**Core VII** History of Tamil nadu 1565 to 1947	4	4	-	25	75	100
9	P21HIT23	**Core VIII** History of Feminism and Women's Movement, 1800-2000	4	4	-	25	75	100
10	P21HIT24	**Core IX** Historiography and Historical Methods	4	4	-	25	75	100
11	P21HIT25	**Core X** Archives Keeping	4	5	-	25	75	100
12	P21HIN21	**NME- I** Tourism Packaging	4	4	-	25	75	100
13	P21CSS22	**Supportive Course II** Computer Skill for Web Designing and Video Editing	2	4	-	25	75	100
		Total	**26**	**30**		**-**	**-**	**700**
Semester III								
14	P21HIT31	**Core XI** Constitutional History of India, 1773-1950	4	6	-	25	75	100
15	P21HIT32	**Core XII** Freedom Movement in Tamil nadu	4	5	-	25	75	100
16	P21HIT33	**Core XIII** History of Contemporary World	4	5	-	25	75	100
17	P21HIT34	**Core XIV** Foreign Policy of India	4	4	-	25	75	100
18	P21HIT35	**Core XV** Human Rights	4	4	-	25	75	100
19	P21HIT36	**Core XVI** History of Contemporary India	4	4	-	25	75	100
20	P21WSS33	**Supportive Course III** Women Empowerment	2	2	-	25	75	100
		Total	**26**	**30**				**700**
Semester IV								
21	P21HIE411/ P21HIE412	**Elective –I** Economic History of India 1857-1947 / International	4	4	-	25	75	100

		Relations Since 1945 A.D / Any MOOC Course$						
22	P21HIE421/ P21HIE422	**Elective –II** Museology / History of Far East Since 1900 / Any MOOC Course$	4	4	-	25	75	100
23	P21HIR41	Project	8	22	-	25	75	100
		Total	**16**	**30**				**300**
Total			**90**	**120**				**2300**

Non Major Elective (NME Offered by Department of Tourism Management and Historical Studies

NME -P21HIN21 Tourism Packaging

Additional Credit Courses

1. **P21HIV11 -** Value Added Program I-Two Credits (First Semester)
2. **P21HII21 -** Internship/Industrial Training – Two Credits- (Second Semester)
3. **P21HIO31 -** Online Courses-Two Credits- (Third Semester)
4. **P21HIV42 -** Value Added Program II-Two Credits (Fourth Semester)

*Those who have CGPA 9 and want to do the Project in Industry /Institution during 4th semester, these two elective papers in IV semester can be opted in third semester itself

$For Elective – I/Elective –II the students can also take either one 4 –credit course or two - credit courses in MOOC, with the approval of Department Committee.

Outside class hours (Attendance compulsory)

- Health, Yoga and Physical fitness.
- Library information access and Utilisation
- Employability Training.
- Students Social Responsibility.

SEMESTER – I

COURSE CODE	P21HIT11	HISTORY OF TAMILNADU UPTO 1565 A.D	L	T	P	C
CORE I			6	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate				
Learning Objectives		The Course aims to 1. understand the Geographical features and various sources of Tamil Nadu 2. learn the Political, Social and Economic conditions of ancient Tamil Nadu 3. understand the antiquity of Tamil Nadu 4. interpret the administrative history of ancient Tamilnadu 5. examine the socio - political- cultural life of Ancient Tamil People				

Unit I: Pre-Historic Period to the Kalabhras

Sources –Archaeological remains –Numismatic evidences – Epigraphic records –Sangam Literature- Tolkappiyam – Purananuru –Tirukkural, Silapathikaram and Manimekalai – Foreign Accounts- The Periplus of the Erythraean Sea Geographical Features - Classification of Land –the Pre and the Proto-Historic Periods – People – Race – Language – Religion – Sangam Age – Cheras, Cholas, Pandyas and the Feudatories – Political Social and Economic Organizations – Fine Arts Age of the Kalabhras – Identity –.legacy of Kalabharas

Unit II: The Pallavas and the Early Pandyas

Origin – Early Pallavas and Later Pallavas –Political history- Political Social and Economic Conditions – Religion –Growth of Literature and Education – Architecture – Sculpture – Paintings – Mamallapuram- The First Pandyan Empire – Sources – Triangular conflict between Pallavas,Pandyas and Western Chalukyas – Administration – Architecture—Status of Jainism and Buddhism - Bhakti Movement - Alwars and Nayanmars- Emergence of Saivism – Sankara'sAdvaida Philosophy –Language and literature

Unit-III : Imperial Cholas

Sources - Age of the Imperial Cholas –Extent of the Chola kingdom- Political History – Vijayalaya Line – Chalukya Line – Administration – Local Self Government- Kudavolai system- Social and Economic Life – Status of women- Trade and Commerce – Indian Feudalism – Slavery – Religion – Literature – Education – Architecture – Sculpture – Paintings – Cultural Expansion -Ramanuja- Vishishtadvaita -Sri Vaishnavism- Patronage of Temples – Monasteries- Decline of Jainism and Buddhism.

Unit-IV: The Second Pandyan Empire

Sources - Inscriptions and Copper plates – Archaeological remains – Coins –Literature- Foreign evidences - Chola to Pandya transition- Triangular Contest between Cholas,

Pandyas and Hoysalas – The Ascendency of the Pandyas – Decline – Social and Economic Life – Religion – Literature – Architecture – Sculpture – Paintings- Temple Centered Culture – Craftsmen – Internal and External Trade- Trade Guilds.

Unit V: The Nayaks and other Kingdoms

Muslim Invasions – The Madurai Sultanate – Impact – Kumara Kampana's Invasion – Tamilagam under Vijayanagar rule – Women – Gangadevi- "Maduravijayam"- Battle of Talikotai -The Nayaks of Madurai, Tanjore and Senji – The Marava Kingdoms of Ramnad and Sivaganga – The Tondaimans of Pudukottai – The Marathas of Tanjore. – Political, Social, Economic and Cultural contributions –Landing of Portuguese.

Text Books

1. NilakantaSastri. K.A, A History of South India from Pre - Historic times to the Fall of Vijayanagar Empire , Allied Publishes, Madras 1971
2. Devanesan, History of Tamil Nadu, Benu Publication, Marthandam, 2004.
3. Subramanian, N. Social and Cultural History of Tamil Nadu. Ennes Publication, Udumalpet, 1985

Reference Books

1. Champakalakshmi, R. Trade, Ideology and Urbanization: South India BC 300 – AD 1300, OUP, Delhi, 1996.
2. Karashima, Noboru, South Indian History and Society: Studies from Inscriptions AD 850 – 1800, OUP, Delhi, 1984.
3. A. Krishnaswami, Topics in South Indian History , From Early Times upto 1565 A.D, The University of Michigan, 1975
4. Chandrasekaran,P, History of Tamil Nadu Up to 1565, ManjuPathippakam, Rajapalayam,2001.
5. Subramanian, N, Original Sources for the History of Tamil Nadu, Ennes Publications, Udumalaipet, 1994

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	better focus on the ancient Tamil history
K2	CO2	understand the contributions of sangam poets to the literature , culture and the status of women
K3	CO3	learn the ethics and values ancient people had and adopts the suitable ones
K4	CO4	assess the art and architecture and understand the skills of the architects
K5	CO5	demonstrate skills to learn more about Tamilnadu history which is useful for preparation of competitive exams and jobs.

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	M	M	S
CO2	S	S	M	S	M	S	S	M	S	M	M	S
CO3	S	S	M	S	M	M	S	M	S	S	M	M
CO4	S	W	M	S	S	M	S	M	S	M	M	M
CO5	S	M	M	S	S	M	S	S	S	M	M	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 Mark

COURSE CODE	P21HIT12	HISTORY OF INDIA UPTO A.D 1526	L	T	P	C
CORE II			6	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyse K5: Evaluate				
Learning Objectives		The Course aims to 1. learn the history of Rajputs and their culture 2. understand the diplomatic history of Delhi Sultanate, Mughals and the Vijayanagar Empire 3. help the students to analyze and interpret the administration of Deccan kings 4. assess the impact of the Mughal invasion 5. evaluate the evolution of Indian Architecture				

Unit- I: Ancient India

Geographical features- Land- Sources and People –Types of sources – Literature – Vedic literature-Epics- Buddhist and Jain literature- Inscriptions- Archaeological remains- Copper Plates- Coins- Art and Architecture - Sculptures and paintings-Travelogues of Foreign travellers

Pre- history : Paleolithic Period (Old Stone Age, Mesolithic Period (Late Stone Age): Neolithic Period (New Stone Age, Chalcolithic Period (Stone Copper Age): Iron Age -– Indus Valley Civilization – Vedic Civilization and Culture – Social and Political Institutions, Economic conditions, Religious and Philosophical Ideas.

Unit –II: The Rise of Jainism, Buddhism and Mauryas

Teachings of Jainism and Buddhism – The Hindu Religious Movements – Bhagavatism or Vaishnavism and Saivism- Mahajanapadas – The Rise of the Magadha Empire – The Invasions of the Persians and the Greeks – The Foundation of the Mauryan Empire – Political Condition – Administration – Economic Condition – Religion and Culture – Architecture. The Sungas and the Kanvas of Magadha – The kingdoms of the South – the Satavahanas – Chedi dynasty of Kalinga – The kingdom of the North West – Sakas, Parthians, Kushanas – Political Condition – Administration – Economic Condition – Religion and Culture.

Unit- III: Important Ruling Dynasties

Emergence of the Gupta Empire – Extension of the Empire – Political condition – Administration – Economic Condition – Religion and Culture – Hun Invasions – Causes for the Downfall – Deccan in the Gupta Age – Vakatakas – Northern India after the Guptas – Vardhana Empire – Political condition – Administration – Economic Condition – Religion and Culture- The Rajputs – The Empire of Kanauj – The Pratiharas – The Gahadvalas – The Palas and The Senas of Bengal – The Chauhanas of Delhi and Ajmer – The Kingdom of Kashmir – The Chandelas of Bundelkhand – The Paramaras of Malwa – The Kalachuris of Chedi – The Guhilas of Mewar – The Toramanas of Delhi – Important Ruling Dynasties in Central India – The Chalukyas of Vengi, Badami, Kalyani – The Rashtrakudas – Political

condition – Administration – Economic Condition – Religion and Culture -Art and Architecture

Unit-IV: Coming of the Arabs, Turks and Sultanat

The Arab invasion – The Arabs in Sindh - Muhammud-bin-Qasim – Turkish invasions – Rise and fall of the Ghaznavides – Establishment of Turkish rule in India – India's contacts with the outside world – Political History of Indian States in the East and the South – East – Hindu Kingdoms of Suvaranadvipa, Champa, Kambuja, Burma – Indian Culture in the East and the South East Asia. Rise of Delhi Sultanate – Slave dynasty – Khalji Dynasty – Mongol invasions and their effects – Tughlaq Dynasty – Timur Invasion and its Effects – Sayyid and Lodi dynasty – Causes for the Downfall of the Delhi Sultanate. Administrative Measures – Economic Reforms – Revenue and Financial Administration – Education and Literature – Art and Architecture – Religion – Bhakthi Movement and Sufism.

Unit-V: **Condition of India**

Condition of India on the Eve of Babur's Invasion - Transformation of Indian society Social stratification and Caste system – the Muslim aristocracy – Status of women – Social Customs and manners- Economy - Agriculture **–I**ndustries – Economic policies of the Sultanate – Zagirdari system- Market regulations of Alauddin Khalji- Revenue and Taxation- Impact on Hindu society. Society in the Vijayanagar Empire – Political history- Caste system – Status of women – Social customs and manners – Feudal economy – Industries – Guilds – Internal and External trade – Art, Architecture and Literature- Status of women

Text Books

1. Lunia, B.N. Evolution of Indian Culture, Lakshmi Narayan Agarwal12th Edition, 2008,
2. Sharma R.S., Perspectives in the Social and Economic History of Early India, Sage Publication, 1970

Reference Books

1. Basham A.L. : Cultural History of India, Rupa&Co., New Delhi, 2003.
2. Basham A.L. : The Wonder that was India – Vol. I, Rupa&Co., New Delhi, 2003.
3. Chattopadhyaya. B.D., The Making of Early Medieval India, Vikas Publication, 2007
4. Sunil Kumar :The Emergence of Delhi Sultanate, Permanent Black, Ranikhet, 2007
5. Thangamani, Pon .A Political and Cultural History of Ancient India upto 1206, PonniahPathipagam, Chennai, 1992

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	better focus on the history of india
K2	CO2	understand the administration, indian culture ,literature and architecture
K5	CO3	demonstrate skills to critically assess the relationship between the ruling dynasties and the sultanates
K4	CO4	evaluate the status of the ancient society
K3	CO5	gain sufficient skills to face various competitive examinations and job

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 Mark

COURSE CODE	P21HIT13	HISTORY OF ANCIENT WORLD CIVILIZATIONS	L	T	P	C
CORE III			6	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyse K5: Evaluate				
Learning Objectives		The Course aims to 1. learn the civilizations of various countries 2. understand the value of civilizations 3. help the students to analyze and interpret the evolution features and legacy of World civilizations 4. assess the evolution of civilizations in various countries 5. evaluate the culture, religion , economy, customs and traditions.				

Unit- I : Rise and Growth of Civilizations

Civilization - Meaning and Definition – Causes for the growth of Civilization – Difference between Civilization and Culture - The world before Man - Concepts and terms Defined- Evolution – Worship, Architecture, Heritage, Death pits, Epics and Epigrams - Empire – Immortals, Writing - Cuneiform – Hieroglyphics – Alphabets – Phoenicians – Hebrews – Jews – Christians – Hittites- The Illiad – Odyssey – Marathon Run – Democracy.

Unit –II : Sumerian Civilization

Sumerian Civilization- Features – Legacy – Babylonian - Hanging Garden- People – Government– Socio-Economic condition – Art –Religion – Literature - Tigris and Euphrates Civilizations 500-539 B.C.E – Separate city Kingdoms – The First war for Water – Important cities –Royal cemetery- Social – Political and Economic life-Sumarian Law – The Code Hammurabi - Religion and Morality - Gender – Class – Knowledge – Technique - Egyptian Civilization – The first king or Pharaoh – The Government – Socio-Economic condition – Art – Religion and Literature.

Unit –III: Greek Civilization

Greek Civilization – City States – Athenian Democracy – Legacy in the field of Art – Architecture – Philosophy – Education and Science - Great Alexander Invasion - Roman Civilization - Domination of Rome on Ancient World for 500 years –Political Legacy – Roman Law – Legacy in the field of Art – Architecture – Religion – Philosophy – Education and Science - Persia –Cyrus II Darius - Parthians – **Sasanian** King **Khosrow II** - Arab conquest – Socio – Political, Religious and Economic life - Place of Assembly - Gardens – Royal Road – Worship of the Sun God -Mediterranean coast Civilizations - Hebrews - Shem – Migrations – Canaan – Promised Land Jews – Jehovah - Relations of Hebrews with Hittites - King David – King Solomon – Jerusalem – Psalms – Prophet – Messiah - Jesus of Nazareth – Christians – Phoenicians

Unit IV: Byzantine Civilization

Byzantine Civilization - Emperor Constantine I -Emperor Justinian – Theodosius I Government – Socio and Economic Conditions – Contribution to Art – Religion and

Philosophy- Feudalism – Features – Merits and Demerits – Manorial System – Fall of Constantinople- – Minoan Civilization - Trojan warChinese Civilization – Shang Dynasty - Chou Dynasty -- Han Dynasty - The Great wall of China – Socio – Economic, Political aspects - Silk weaving . Inscriptions – Confucius – Taoism

Unit-V: Middle Ages

Middle Ages – Rise and Spread of Christianity –Rise and Spread of Islam – Feudalism – Origin, Merits and Demerits – Crusades Transition to Modern Age – Renaissances in Italy – Causes and Results – Geographical Discoveries of 15th and 16th Centuries – Impacts – Reformation and Counter Reformation

Text Books

1. Shara, S.K. Five Great Civilizations of Ancient World, Education Publication, New Delhi 2017
2. Edward D'Cruz : A Survey of World civilization, Lalvani Publishing House, Bombay, 1970

Reference Books

1. Hawkes, J., The First Great Civilization: Life in Mesopotamia, the Indus and Egypt, Sage Publication, New Delhi, 2004.
2. J.E. Swain, A History of World Civilization, Eurasia Publishing House(Pvt.) Ltd., New Delhi, 1997.
3. Dharmaraj, J, History of World Civilizations, (Tamil), Tensy Publications Sivakasi, 2015.
4. Manoj Sharma, History of World Civilizations, Anmol Publications Pvt. Limited, New Delhi, 2005.
5. Philip J. Adler, Randall L. Pouwels, World Civilizations, Wadsworth, Boston, 2008.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	world civilizations and culture
K2	CO2	understand the evolution of civilization
K4	CO3	evaluate the impact of renaissances and reformation
K3	CO4	discuss the tyes of civilization
K5	CO5	develop knowledge to face competitive examinations

<u>Mapping of COs with POs& PSOs</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	S	S	S	S	M	M	S
CO2	S	S	S	M	M	S	M	M	S	S	M	S
CO3	S	M	S	S	M	M	S	S	S	S	M	M
CO4	S	S	M	S	S	S	S	M	M	S	M	S
CO5	S	S	M	S	S	M	S	S	M	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	P21HIT14	ARCHAEOLOGY	L	T	P	C
CORE IV			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyse K5: Evaluate				
Learning Objectives		The Course aims to 1. learn the importance of archaeology in the study of history. 2. understand the different methods of archaeological excavation. 3. analyse and interpret the various archaeological sources. 4. trace the Importance of Epigraphy and Numismatics 5. gain skills to get jobs in that field and apply the techniques and strategies in the field of the Archaeological Excavations				

Unit –I : History and Archaeology

Archaeology as a source of history – Kinds of Archaeology – Purpose of Archaeology – Definition and scope -Archaeology and other Subjects — Archaeology and History – Archaeology and Culture ,Environment and Natural Sciences – Kinds of Archaeology – Economic Archaeology – Ethno Archaeology – Underwater Archaeology – Arial Archaeology – Salvage Archaeology – Functions of an Archaeologist – Value of Archaeology – Methods and Principles of Archaeology.Epigraphy and its importance – Brahmi Scripts – Asokan Script – Tamil Brahmi Script – Types of inscriptions with special reference to Tamil Nadu- Copper Plate Grants -its nature and importance

Unit- II: Evolution of Archaeology

Exploration – Methods of site survey – Excavation – Kinds of Excavation – Prehistory - Palaeolithic culture in India – Mesolithic Age – Neolithic Culture - History of Archaeology – Geological evolution – Antiquarian evolution and the theory of evolution - 20th century developments - Archaeology in India – British Archaeologists -Sir William Jones - Alexander Cunningham – Fleet and Taylor – Robert Bruce Foote – James Burgess – Lord Curzon – Sir John Marshall – Sir Mortimer Wheeler – Development since Independence.

UNIT –III: Principles of Exploration and Excavations

Methods of Excavation and Dating –Excavations of Indus sites – Harappa, MohenjoDaro – Surface Exploration – Methods - Equipment and Record – Survey of Prehistoric sites- Methods of site survey - Topographical feature – State of preservation – Excavation - Pre-Historic Sites: Proto-historic Sites:-Historic Sites- Laying of the Trenches – Photography and Surveying – Interpretation - Publication

Unit- IV: Archaeological Survey of India (A.S.I)

Excavations– Staff and Equipment –their functions – Director - Assistant Director – Excavation Assistant – Site Supervisors - Trench Recorders – Pottery Assistant – Antiquity Assistant – cum – Curator – Photographer surveyor – Draftsman – Foreman – Field Chemist

– Laborers - Tools and Equipment –Tent equipment – water facilities –Transport –Surveyors equipment – photo equipment – Excavation equipment – Important sites - Study of Antiquities – Stone – Bone – Metals - Pottery and others

Unit- V: Dating methods

Source for history – Numismatics –Numismatics as a source of history – Coins of the Mauryas, Kushanas, Guptas, Pallavas, Pandyas, Cholas and Vijayanagar rulers - Foreign Coins found in India - Archaeology and other sciences –Archaeology- Geology – Dating methods – Radio Carbon Dating – Thermo Aluminiscence dating – Archaeo – magnetism – Potassium – Argon dating – Archaeology and Chemistry – Flourino dating – Pollen analysis – Dendro – chronology –Anthropology - Statistical methods – computer science - Preservation: Antiquities – Wood – Bone – Ivory – Metal – Stone - Other objects – Monuments - Principles of Conservation

Text Book

1. K.Rajan, Archaeology, Principles and Methods, Mano Pathippakam, Thnajavur, 2002

Reference books

1. Rajan. K, Understanding Archaeology, Field Methods: Theories and Practices, Mano Pathippakam, Thanjavur,2016.
2. Venkatraman. R, Indian Archaeology: A Survey, Ennes Publication, Udumalpet, 1985.
3. Childe, V. Gordon, A Short Introduction to Archaeology, Collier, New York, 1960.
4. Daniel, E. Glyn, A Hundred and Fifty Years of Archaeology, Pelican Books, London,1975.
5. A.L. Basham, The Wonder that Was India, Fontana Books in association with Rupa& Co., Delhi, London, 1967.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	define archaeology and trace the evolution of archaeology
K2	CO2	explain the impact of archaeology in the field of history
K2	CO3	understand the archaeology&its functions
K4	CO4	examine the techniques of archaeology, appraisal and compensation
K5	CO5	become eligible to get jobs in the field of archaeology

<u>Mapping of COs with POs & PSOs</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	S	M	M	S	M	M	S	S	M	S
CO3	S	M	S	S	M	M	S	S	S	S	M	M
CO4	S	S	M	S	S	S	S	M	M	S	M	S
CO5	S	S	M	S	S	M	S	S	M	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	P21HIT15	HISTORY OF AMERICA FROM A.D. 1900 To 2000 A.D.	L	T	P	C
CORE V			5	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyse** **K5: Evaluate**				
Learning Objectives		**The Course aims to** 1. introduce students to the events contributing to the development of the United States. 2. elaborate the interpretations of major historical events in American history from Reconstruction to the Second World War 3. present new perspectives in foreign policies of America 4. enable students to learn the diplomatic relations of India and America. 5. discuss the transfer of knowledge of Information Technology of America to other countries of the world.				

Unit –I : Reconstruction and Reformation of America-

Problems of Reconstruction - Presidential Reconstruction – The Lincoln Plan– Lincoln's Services to the Nation – The Johnson Plan - Congressional Reconstruction - Congressional Plan -Impeachment of Johnson – Reconstructed Governments – Southern Reaction – Results of the Reconstruction – Industrial Revolution– Big Business and Trusts – Captains of Consolidation- Results of Consolidation – Agrarian Unrest and Populist Movement – The Populist Party - Anti –Trust Legislation – Demand for Trust Legislation – The Sherman Anti – Trust Act 1890 – Apartheid and Imperialism – Segregation of Indian Tribes – Ordeal of Indian Tribes – The Indian Wars – Reservations – Purchase of Alaska – President McKinley and Spanish War – The Cuban Question - Attitude of European powers – Treaty of Paris 1898

Unit II: America and Word Wars

Theodore Roosevelt(1900- 1908) - Domestic Policy - Square Deal and Progressive reform – First Administration – Second Administration - Foreign Policy - Big Stick Diplomacy – The Platt Amendment – The Venezuelan Crisis – Spoilation of Colombia – The Roosevelt Corollary – Relations with Japan – Relations with Europe - William Taft and Dollar Diplomacy– Woodrow Wilson and World War I– Progressive Reforms – Tariff and Trust Laws – Agricultural and Labour Reforms – Constitutional changes – The Federal Reserve Act – New Diplomacy and Foreign Policy – Relations with China and Japan –Caribbean Intervention – The Mexican Adventure - Wilson and Neutrality – Neutrality and Partiality – Issue of Neutral Right – Peace efforts – The USA at I World war - Diplomacy of peace – Retreat to Isolationism and Conservatism – Rejection of the League of Nations – Search for Collective security – The Washington Conference

Unit III: Foreign Policy of America

The Kellogg – Briand pact (1928) - Reaction against Progressivism – The Great Depression – Hoover and Depression(1928-1932) - Franklin D. Roosevelt – New Deal Legislation –

Relief Measures – Recovery Measures – Reform Measures - Good Neighbour Policy – Republican policy – Roosevelt's policy – Relations with Russia – United States at World War II - Issue of Neutrality - The Neutrality Acts – Roosevelt's policy – Major campaigns – War in Africa and Europe – Atlantic Charter – San Francisco Conference - Yalta Conference – Pan American movement – The Pan American conferences – The Pan American union.

Unit IV: America and Cold War

Dilemma of Entanglement – Harry s. Truman (1945- 1953)Truman and Korean war – Post war settlements – Rejection of Isolationism – The Korean war – Eisenhower (1953-1961) and policy of Containment – Internal Administration – Dulles and policy of Containment – Rebellion in Guatemala – SEATO – The Baghdad pact – The Kennedy Administration (1961-1963)– The Kennedy Programme - Forward policy – Johnson and Vietnam war – Rise and fall of Nixon(1969-1974) – The Ford Administration(1974-1977) - Judicial appointments – Domestic affairs - Rockefeller Commission - Cold war – SALT I – Helisinki accord - Vietnam issue - Middle Eastern Problem - Jimmi Carter (1977-1981) -Relations with congress - National Energy Act - Foreign affairs - Cold war – SALT II –Camp David accords – Iranian revolution and hostage crisis - Relation with Latin America – Panama canal treaties .

Unit V: Reagan Administration

Ronald Reagan– Domestic affairs – Reagan administration and taxation – social policies and civil rights –Foreign affairs- Escalation of the cold war - Reagan Doctrine – End of the cold war - Détente – George Bush– Domestic affairs – Great Recession - September Eleven attack -War on Terror - War in Afghanistan – Bush Doctrine - Invasion of Iraq - Email controversy - Bill Clinton - NAFTA – Impeachment and acquittal – Foreign affairs

Text Books

1. Jeyapalan, History of United States of America, Atlantic Publications, New Delhi, 2016.
2. Subramanian, N A History of the USA. Ennes Publications, Udumalpet, 2006

Books for Reference

1. G. Clark, M.S. Neely and A. Hamby, Outline of U.S. History, Nova Science Publishers, New York, 2005
2. Howard Zinn, A People's History of the United States, Harper Perennial Modern Classics publishers, New York, 1980.
3. K. Rajayyan, A History of the United States, Ratna Publications, Tirunelveli, 2000.
4. William Muller, A New History of the United States, Nebu Press, Charleston , USA, 2011.
5. R.C. Majumdar and A.N. Srivastava, History of United States of America, SBD Publications & Distributors, New Delhi, 2001

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	better focus on the evolution of american history
K2	CO2	critically examine the foreign policy and domestic policy of america
K4, K5	CO3	evaluate the role of usa in first and second world wars
K3	CO4	develop leadership traits and skills by taking lessons from us history
K5	CO5	gain knowledge needed to face competitive examinations .

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

COURSE CODE	P21HIS11	GENERAL STUDIES	L	T	P	C
SUPPORTIVE COURSE I			2	-	-	2
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyse K5: Evaluate				
Learning Objectives		The Course aims to 1. acquire knowledge about various sources of India 2. identify pre-historic sites, tools, special features of Indus Valley Civilization, 3. review the freedom Movement in India 4. get exposure to different aspects of history and thereby enabling to prepare for various competitive examinations 5. become skilled to get job in private or public sector				

Unit- I : Ancient History

Sources – Archaeological - Literary sources and Foreign accounts on Indian history – Pre-historic and Proto-historic period – beginning of agriculture in Neolithic and Chalcolithic Periods – Indus Valley Civilization – origin – date – extent of civilization – characteristics – decline – Art and architecture – significance – Megalithic cultures in South India – Pastoral and farming – settlements – development of agriculture – specialization in arts and crafts – trade and commerce – barter system – industrial development.

Unit- II : British India and Freedom Movement

Early Resistance to the Colonial Rule – Political consolidation of the India - English East India Company – South Indian Rebellion, 1800-1801 –Emergence of Nationalism – Impact of Western Education –socio – religious reform movements of the 19th Century – role Pre – Congress Associations - Indian National Congress –Emergence of Extremist ideology – Prominent leaders – Lord Curzon - partition of Bengal - effects – Swadeshi Movement – Revolutionary movement – prominent leaders of the revolutionaries in abroad – The Gadder Party – Revolutionary movement in Pondicherry- Non cooperation movement- Civil Disobedience movement- Quit India movement.

Unit –III: Indian Constitutional Acts

Minto-Morley Reform Act 1909-Government of India Act 1919 –circumstances to introduce the Act -Provisions - Nature and working of Diarchy in the Provinces - importance - Government of India Act 1935 - Provincial Autonomy - The constitutional development between 1935 and 1947 - the August offer - Cripps Proposal - Wavell Plan - The Cabinet Mission Plan - Mountbatten Plan - The Indian Independence Act 1947.

Unit- IV: The physical features of India

Geological development-Political Geography-Physiographic regions: Cratons- Regions- The Himalayan Mountains.- The Northern Plains-Indian Desert-Peninsular Plateau-Indo Gangetic Plain- Coastal Plains and ghats- Islands- Natural resources – Ecological resources- Water bodies- Wetlands- Renewable Water bodies- Mineral Oil- Minerals and Ores- Climate- Geology

Unit -V : Economic Planning in India

Economic Planning in India – Features of planning – Objectives of planning – Achievements and failures of planning – Brief summary of the First plan – the Second plan – the Third plan – the Fourth plan – the Fifth plan – the Sixth plan – the Seventh plan-the Eighth plan- the Nineth plan-the Tenth plan - the Eleventh plan - Twelfth plan.Events of national and international importance - Indian Polity and Governance – Constitution - Political System - Panchayat Raj - Public Policy - Rights - Indian Federation - Fundamental Rights - Fundamental Duties - The Directive Principles of State Policy - the party system - Emergency Provisions – Amendments –Economy –Industries Business- Science and Technology-IT revolution

Text Book

1. Luniya, B.N., Life and Culture in Ancient India, Evolution of Indian Culture, Lakshmi Narain Publication, Agra, 2001.

Reference Book

1. Sharma, L. P., History of Ancient India, Konark Publishers Ltd, New Delhi, 1997.
2. Thangamani, Pon .A Political and Cultural History of Ancient India upto 1206, PonniahPathipagam, Chennai, 1995
3. Agarwal R.C Constitutional development and National Movement in India Vikas Publishing House, New Delhi, 1992.
4. Kosambi,D.D. The Culture and Civilisation of Ancient India in Historical Outline, Vikas Publishing House, New Delhi, 1977.
5. Sharma,R.S. Material culture and social formation in Ancient India, Mac millan1983.

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand the fundamentals of Indian history and geography
K1	CO2	acquire knowledge about various sources of India
K4	CO3	examine the role of Indians in freedom movement
K5	CO4	review the Government planning
K3	CO5	apply the knowledge to get jobs in private or public sector

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	M	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	S	S	S	M	S	M	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

SEMESTER -II

COURSE CODE	P21HIT21	HISTORY OF INDIA 1526 - 1950	L	T	P	C
CORE VI			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K4: Analyse K5: Evaluate K6: Create				
Learning Objectives		The Course aims to 1. study the impact of the First Battle of Panipat 2. understand the diplomatic history of Delhi Sultanate, Mughals and the Vijayanagar Empire 3. examine and interpret the administration of Muslim kings 4. train the students to know social structures 5. apply the interest in Persian and Indian Architecture				

Unit –I: The Mughals

End of Delhi Sultanate - First Battle of Panipat-Babur -Humayun- ShershahSuri– Civil, Military and Revenue Administration -Akbar – Second battle of Panipat- Emperor Hemu-Relationship with the Rajputs -Jahangir – Shah Jahan –Aurangzeb –- Aurangazeb's Military Achievements – Causes for the downfall of Mughal Empire – Nadir Shah's Invasion and Ahmed Shah Abdali's Invasion and its Effects- Administration – Society – Economy and Revenue Administration – Art and Architecture –Rajput Policy – Religious Policy – Deccan Policy – Mansabdari System -Peasants – Women –Literature.

Unit- II: The Kingdoms of Deccan

The Kingdoms of Deccan - The Hoysalas –Vijayanagar Empire – Krishnadevaraya – Administration – Social life and arts under Bamini and Vijayanagar Empire - The rise of Marathas - Shivaji – Maratha administration – The coming of the Europeans - The Portuguese – Anglo – French rivalry – The Carnatic Wars – First three Peshwas – Third battle of Panipat - Social and Cultural Life of the Marathas- Ruling Class- Society- Customs-Status of Women.

Unit- III: The Rise of British

The rise of the British Power - The company's rule in India-Black Hole Tragedy-Battle of Plassey -Battle of Buxar- Robert Clive's second Governorship of Bengal-Dual Government of Bengal-Treaty of Allahabad -Warren Hasting's Reforms-The Rohila War- Trial of Nandakumar -Case of Chet Singh- First Maratha War-Treaty of Salbai-Rise of Hyder Ali-First Mysore War- Second Mysore War- Sir John Macpherson -Lord Cornwallis- Third Mysore War -Treaty of Seringapatanam-Reforms of Cornwallis-Permanent Settlement of Bengal-Sir John Shore- Lord Wellesley- Subsidiary System-Fourth Mysore War-Tipu Sultan-Second Maratha War-Treaty of Bassein -War with Holkar.-Lord Hastings-War with Nepal-Pindari War- Third Maratha War

Unit – IV: Lord Amhers

Lord Amhers-First Burmese War - William Bentinck-Reforms-Sir Charles Metcafe- Ranjit Singh-Lord Auckland- Lord Ellen borough-Lord Hardinge- First Sikh War- Treaty of Lahore- Second Sikh War. Lord Dalhousie-Doctrine of Lapse-Lord Canning- The Revolt of 1857-Causes-Course-Causes for the failure-Effects of the revolt -Queen Victoria's Proclamation(1858)- Lord Northbrook- -Lord Rippon-Local Self Government- Ilbert Bill Controversy

Social Reform Movement Bramho Samaj – Rajaram Mohan Roy- Abolition of sati- Arya Samaj Prarthana Samaj -Theosophical Society -The Indian National Association

Unit-V: Lord Dufferin

Lord Dufferin -Indian National Congress- Lord Curzon-Indian Universities Act(1904)-Partition of Bengal- Swadesi and Boycott Movement- Lord Minto II -Lord Chelmsford -Non- Cooperation Movement-Lord Irwin–Civil Disobedience Movement-First Round Table Conference (1930)-Lord Willingdon)-Second Round Table Conference(1931)-Third Round Table Conference (1932)-White Paper Lord Linlithgow-August Offer –individual Satyagraha- Sir Stafford Cripps Mission -Quit India Movement-Lord Wavell-Wavell Plan -Lord Mountbatten – Partition of India- India's Independence- Making of Indian Constitution.

Text Book

1. Mahajan.V.D.-Modern Indian History from 1707 to the Present Day, S.Chand and Company Limited, New Delhi,1990.

Reference Books

1. Francois Bernier, Travels in the Mughal Empire, Asian Educational Services, New Delhi, 2010
2. JadunathSarkar, The Fall of the Mughal Empire, 4 Vols , Orient Blackswan Publication, New Delhi, 2008
3. Mahajan, V.D, Modern Indian History, S.Chand&Company Ltd, New Delhi, 2012.
4. Noboru Karashima , A Concise History of South India : Issues and Interpretations, Oxford University press, Chennai, 2014
5. Srinivasa M.N, Social Change in Modern India, Orient Blackswan Publication, New Delhi, 2009

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	understand the resistance given by the Indian rulers to the Mughals and the Europeans.
K2	CO2	gain knowledge about the society and culture in India and the social reforms.
K6	CO3	assess the circumstances leading to the three battles of Panipat and its effect
K4	CO4	examine the evolution of Indian history, culture, art and architecture
K5	CO5	students would demonstrate skills to learn more about Indian history and in a better position to face competitive examinations and get jobs

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

COURSE CODE	P21HIT22	HISTORY OF TAMILNADU 1565 to 1947	L	T	P	C
CORE VII			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K4: Analyse K5: Evaluate K6: Create				
Learning Objectives		The Course aims to 1. learn the Political, Social and Economic conditions of Tamil Nadu 2. understand the antiquity of Tamil Nadu 3. analyze and interpret the history of Palayakararsof Tamil Nadu, Marathas of Tamil Nadu 4. examine the historical evolution of Tamil Nadu 5. equipthe students with needed knowledge to prepare for competitive examinations				

Unit I: Nayaks and Marathas

Battle of Thalaikottai- decline of Vijayanagar Empire-Nayaks of Madurai ,Senji and Tanjore – Political history- Administration- Revenue system – Army –Palayakkar system – Kavalkarar system – revenue of the Palayakkarars- society under the Nayaks- caste system – status of women – economic condition of the people- the religious condition.-- Marathas of Tanjore- Politics-administration- revenue system – army - society under the Marathas- status of women – economic and religious condition

Unit II: Maravars of Ramnad and Sivaganga

Maravars of Ramnad and Sivaganga -Political history -administration –revenue system – society – caste system- economic and religious condition- Nawabs –Politics and administration- revenue administration – army-judiciary- village administration –society – famines and diseases- caste system – status of women- economic and religious life- impact of Islam – Advent of Europeans- social impact of Europeans.

Unit-III: East India Company Robert Clive

East India Company Robert Clive- Anglo-French rivalry -Nawabs of Carnatic- End of Maratha rule-Anglo-Mysore Wars- Company's Acquisition of Tamil Country - South Indian Rebellion -Pulithevan- VeluNachiyar -Kattaboman- GopalaNaickar-Maruthu Brothers- Srirangam Declaration- Theeran Chinnamalai- Battle of Panchalamkurichi- Vellore Mutiny (1806) – Causes for the revolt, Course, Suppression of the revolt – Causes for the failure- Charter Acts - The British Land Revenue Administration - Ryotwari System - Organization of Judiciary - Growth of Education

Unit 1V: Socio Religious Movement

Socio Religious Movement - Socio - Political Organizations – Formation of Madras Native Association – Madras Mahajana Sabha- Vaikunda swamigal -- Vallalar –Samarasa Chutha Sanmarka Sangam - G.Subramania Iyer- Widow marriages- Intellectual Movement- Muthulakshmi Reddy- Sister Subbulakshmi– Annie Besant -The Theosophical Society- Women's India Association- Rukmini Lakshmi pathi-TVS.SoundaramRamachandran-

Movement for women's voting Right- Miss Amy Carmichael - MoovalarRamamirdhamAmmaiyar- Ambujammal – Progress of Education

Unit-V: Political Developments

Political Developments - Rise and Growth of Justice Party: Diarchy - Justice Party in Power, Achievements –Self-Respect Movement: E.V. Ramasamy, DravidaKalagham – The Congress Constructive programs –Congress No-Changers vs Congress Pro –Changers-Swarajist party – Provincial Autonomy-Congress Ministry (1937 – 1939): C. Raja Gopalachari – Governor's Rule (1939 – 1946)– Congress Ministry (1946 – 1947) – T. Prakasam – Independence

Text Book

1. Rajayyan, K, History of Tamil Nadu 1565-1982, Vikas publishers, Madurai, 1982

Reference Books

1. R.SathiyanathaAiyyar, History of the Nayka of Madurai (Reprint), University of Madras, 1984
2. K.K.Pillay, History of Tamil Nadu: People and Culture , IITS, Chennai, 2000
3. Burton Stein, Peasant State and Society in Medieval South India, OUP, New Delhi, 1980
4. V.T. Chellam, TamilNadu: History and Culture, MeyyappanPadippakam, Chidamparam, 2005
5. Varghese Jeyaraj, S. Socio-Economic History of Tamilnadu, Anns Publication, Uthamapalayam, 2017.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	gain knowledge about the rise and fall of various kingdoms
K2	CO2	understand the evolution of Tamilnadu history and culture.
K6	CO3	examine the brave resistance given by of the palayakkars.
K4	CO4	assess the political developments like formation of provincial organisations, emergence of the congress, justice party , swarajist party and electoral politics
K5	CO5	equip the students with needed knowledge to prepare for competitive examinations

<u>Mapping of COs with POs& PSOs</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	P21HIT23	HISTORY OF FEMINISM AND WOMEN'S MOVEMENT 1800-2000	L	T	P	C
CORE VIII			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K4: Analyse K5: Evaluate				
Learning Objectives		The Course aims to 1. learn the Universality of issues and factors pertaining to women. 2. understand the diversity and regional perspective of women. 3. trace out the legislations regarding the protection of women 4. apply rights and responsibilities in their life 5. enable the students to analyze and interpret self-esteem and initiate discussion on current issues.				

Unit- I : Theories of Feminism

Concept and Need for Women's Studies - Scope of Women's studies –Gender Studies as an Academic Discipline-– Feminist Theories – Kinds of Feminism – Liberal Feminism – Socialist Feminism – Marxist Feminism – Radical Feminism – Post modern feminist thinkers

Unit II : First Wave of Feminism in USA, U.K and France since 18 century

First Wave of Feminism in USA, U.K and France since 18 century: Enlightenment – Republicanism and Evangelicalism – Role of Women in the American War of Independence –Women in French Revolution – The Declaration of the Rights of Woman and of the Female Citizen 1791--Anti – slavery Campaign –Seneca Falls Convention 1848- Suffragette Movement – Trade Union Movement -Campaign for equal Rights- Anti – Feminist Reaction.

Unit III: Second Wave of Feminism in USA, and UK in the 1960s.

Emergence – Background to the sixties –President's Commission on the Status of Women 1961in USA - Betty Fridan's Feminine Mystique- Equal Rights Movement- Equal Pay Act 1963- Equal Rights Act 1964-National Organisation for Women (NOW)Protective Legislations - Equal Rights Legislations – Women in the trade Union in UK- Strike in the Ford Company 1968- Night Cleaners Campaign, 1970-72- International Women's Decade

Unit IV: Feminism in the Socialist countries

Feminism in the Socialist countries: Position of Women in early China and Russia – Women in the Russian Revolution- Its impact on Women – May 4th Revolution in China and its impact- Women in the Cultural Revolution – Modernization trends- Women's Movement – Equal Rights Legislations.

Unit V: Women's Movements in India

Women's Movements in India- Position of Women in Ancient and Medieval India – I Phase, Social Reform Movement and Social legislations in the 19th century – II Phase, Women's Movement and National Movement – III Phase, Women's Movement in the Post Independent Era –Equal Rights Legislations

Text Book

1. Susan Bassnett: Feminist Experiences: The Women's Movement in four Cultures (London: Allen and Unwin, 1986)

Reference Book

1. Agnew Vijay: Elite Women in Indian Politics (Delhi, 1986).
2. Andros Phyllis: The unfinished Liberation of Chinese Women-1949-1980) Indian University Press, Bloomington, 1983.
3. Altekar A.S. The position of Women in Hindu civilization, from pre-historic times to the present day. (MothilalBarasida, New Delhi, 1983)
4. Susan Shaw and Janet Lee, Women's Voices, Feminist Visions: Classic and Contemporary Readings, McGraw-Hill Professional Publication, New Delhi, 2011.
5. KaurManmohan – Women in Indian's Freedom struggle (Sterling, New-Delhi, 1992)

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	focus on the history of feminist theories
K2	CO2	know origin, growth and development of women's movement in various countries.
K2	CO3	understand about the various concepts relating to gender studies
K4	CO4	develop interest about women's issues and rights and become self-motivated and empowered
K5	CO5	evaluate competitive examinations and gain jobs

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	S	M	S	S
CO2	S	M	M	S	M	S	S	M	S	M	S	S
CO3	S	M	M	S	M	M	S	S	M	S	M	M
CO4	S	M	S	M	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

COURSE CODE	P21HIT24	HISTORIOGRAPHY AND HISTROICAL METHODS	L	T	P	C
CORE IX			4	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyse** **K5: Evaluate**				
Learning Objectives		**The course aims to** 1. acquaint the students with the methods of writing history 2. observe ,verify and interpret historical data 3. analyse the nature and scope of history. 4. know the contribution of Historians and their Historical writings through ages. 5. acquire detailed knowledge in Historical Research Methodology and persue research.				

Unit I: Meaning of History

Meaning of History – Definition – Scope - Purpose – Art or Science – Kinds of History – History and Allied Subjects - Uses and abuses of History – Lessons of History – Causation and Change- Role of Individuals – Role of Ideas – Concept of progress- Eminent Foreign Historians -Herodotus – Thucydides– Toynbee- Titus Livy, Ranke- Spengler -Tacitus -St. Augustine- Machiavelli - Gibbon –Kant, Hegel - James Mill - John Stuart Mill.

Unit II: Medievl Historians

Eminent Indian Historians and their contributions- Ancient Period - Medieval Period - Modern Period-Kalhana –AbulFazl –- JadunathSarkar-V.A.Smith. –NilakantaSastri.- K.Rajayyan-Recent trends- Marxist Historiography- Subaltern Studies – Women's history

Unit III: Historical Interpretation

Philosophy of History-Theological Interpretation-Secular Interpretation-Historical Determinism-Meaning-Free will Doctrine-Historicism and Relativism-Meaning-Merits and Defects-Dialectical Materialism-Dialectic of Marx-Fallacies of the Doctrine.

Unit IV: Historical Writing Methods

Historical Research –Selection of Topic –Identification-Requirements- Sources of History – Kinds of Sources- – Primary Sources – Secondary Sources – Conventional and Non conventional- Legends and Ballads-Archaeological Sources- Literary Sources - Sources of History of India – Sources of Ancient History – Sources of Medieval History – Sources of Modern History - Methodology of Research – Methods and Techniques - Research Problem – Hypothesis

Unit V: Methods of Data Collection

Requirements for Thesis –Pre-test-Pilot study-Research Design – Research Proposal – Collection of Data –Interview- Questionnaire method -Heuristics – Requisites for Investigation – Recording of Evidence – Card File - Analysis of Data - Authenticity of Facts – External Criticism – Meaning – Application of External Criticism – Internal Criticism – Negative Criticism – Positive Criticism - Objectivity and Subjectivity – Need for Objectivity

– Bias and Subjectivity – Essentials for Objectivity -Synthesis- interpretation- Exposition – Presentation of Thesis-— Preparation of Tables - Foot Notes – Abbreviations – Italics – Dates and Figures - MLA-APA Guidelines – Bibliography – Abbreviation.

Text Books

1. Manickam, S, Theory of History and Method of Research, Padumam Publishers, Madurai, 2000.

Reference Books

1. Chakravarty, History,Historical Thought and Historiography.Pearson Education Indiap publishers, Delhi, 2012.
2. Ernst Breisach, Historiography, Chicago: The University of Chicago Press, New Delhi, 2007
3. Gorge,H. S. Research Methodology In History.Alpha Publishing Corporation, New Delhi, 2011
4. Sreedharan, E, A Text Book of Historiography (500 B.C. – A.D. 2000), Orient Black Swan publishers , Delhi, 2004.
5. Venkatesan, G. Historiography, Narmatha Publication, Chennai, 2017.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	know about the historical development of historiography
K2	CO2	understand the various definitions and types of historiography
K5	CO3	evaluate the functions of historiography
K4	CO4	analyse the emerging trends in historiography
K3	CO5	apply the knowledge in historical researches and can pursue research degrees

<u>Mapping of COs with POs &PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	S	S	S	M	M	S
CO2	S	M	M	M	S	M	S	S	S	M	S	S
CO3	S	S	S	M	S	S	S	S	M	M	S	S
CO4	S	S	M	S	S	S	S	S	M	M	S	S
CO5	S	S	M	M	S	S	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	P21HIT25	ARCHIVES KEEPING	L	T	P	C
CORE X			5	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyse K5: Evaluate				
Learning Objectives		The Course aims to 1. highlight the facts pertaining to the nature and importance of Archives keeping and changes in modern trends. 2. learn the preservation of records of Archives keeping and records Management. 3. understand the functions and administration of National Archives and Tamilnadu Archives. 4. study the activities of various types of Archives 5. open different .avenues for jobs				

Unit- I: History of Archives

Meaning – Origin and Growth of Archives - History of Archives – Archives keeping in Europe through the ages – Ancient, Medieval and Modern archives - International Archives – Archives in India – Archival Keeping in India - Importance of Archives.

Unit- II : Establishment of Archives

Creation of Archives - Establishment of registry – Racking – Shelves and other materials – Archives and Libraries - Organization of Archives in India - Court Archives – Public Department – Revenue Department – Secret Department – Central Government Archives – Organization of Archives in European Countries – France - England – Archives in America – Canada - Creation of Archives – Classification – Recent Development.

Unit- III : Methods of Preservation

Preservation of Archival sources – Methods of Preservation – Preliminary and precautionary measures – Preventive measures – Factors of deterioration – Atmospheric factors – Temperature – Humidity – Sunlight – Dust – Impurities - Micro-organisms and pest – Pests - Wood Warm, other insects – Methods of Preservation and repair of Archival material.

Unit- IV: Functions of Archives

Functions of Archives - National Archives – Tamil Nadu Archives - Uses of Archives - Preservation of Archives - Record Room and Equipment - control of Insects and Mildew - Dust removal - Thymol fumigation - control of Acidity - Tissue Repair - Shiffon Repair - Lamination - Repair of Maps and Charts - Palm leave Manuscripts.

Unit- V: Archives in India

National Archives - Its origin - growth and activities – Tamil Nadu Archives- Its origin - growth and activities - Private Archives: Definition – Difference between private and public archives – Categories of Private Archives – Nehru Memorial Museum – IUCIS - Hyderabad – Parry and Company - Chennai – Asiatic Society of Bengal – Bengal Club – VishvaBharathi – Sringeri Mutt – Indo-Portuguese Archive - Goa – Arch Diocese of Madras – Archives of

Shenbaganoor in Kodaikanal – Problem of private archives – National Registrar of Private Records.

Text book

1. M. Sampathkumar, ―Nature and Scope of Archieve – A Study‖ in Historical Research Letter, Vol.18, IISTE, 2015.

Reference Books

1. C.L. Prajapathi, Conservation of Documents: Problems and Solutions, A Mittal Publication, New Delhi, 2005.
2. B.B. Mukherjee, Preservation of Library Materials, Archives and Documents, World Press, Calcutta, 1973.
3. Nelly Balloffet, Preservation and Conservation of Libraries and Archives, American Library Association, Chicago, 2005.
4. T.R. Schellenberg, Modern Archives - Principle and Techniques, The Society of American Archivists, Chicago, 2003.
5. Vijayalakshmi and S.C. Jindal, Digital Libraries and Digital Library Principles and Practivces, Vol.I, S.C. Jindal Isha Books, New Delhi, 2004.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	know the basic principles and practices of archives
K5	CO2	evaluate the archives functions
K4	CO3	critically comment on new perspectives in archives
K2, K1	CO4	describe the core concepts of archives
K3	CO5	develop knowledge and skills to get jobs and perform successfully

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	M	S	M	M	M	M
CO2	S	M	M	M	S	M	S	M	M	M	S	M
CO3	S	S	M	S	M	S	M	S	S	M	M	S
CO4	S	M	S	S	M	M	S	M	M	M	S	S
CO5	S	S	S	M	S	M	M	S	M	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

SEMESTER – III

COURSE CODE	P21HIT31	CONSTITUTIONAL HISTORY OF INDIA, 1773 to 1950	L	T	P	C
CORE - XI			6	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyse K5: Evaluate				
Learning Objectives		The Course aims to 1. trace the constitutional development in India 2. understand the fundamental duties and rights of citizens 3. review the powers of states and the centre. 4. get exposure to different aspects of constitutional history and thereby enabling to prepare for various competitive examinations 5. get sufficient knowledge to get job in private or public sector				

Unit- I: The East India Company Rule and Significance
The East India Company - the Regulating Act 1773 - Provisions - Defects of the Act - Bengal Judicature Act 1781 – Pitt's India Act 1784 - Circumstances – Provisions – Significance Charter Act of 1813, Charter Act of 1833, and Charter Act of 1853- Provisions – significance

Unit –II: Constitutional Development in British India
Queen's Proclamation of 1858 - significance – Passing of administration from East india Company to British Queen- Indian Councils Act 1861 and 1892 - Provisions - importance - Minto-Morley Reforms Act 1909 –Circumstances – special features - Provisions – significance

Unit –III: Government of India Act of 1919, 1935
Government of India Act of 1919 –circumstances to introduce the Act -Provisions - Nature and working of Diarchy in the Provinces - importance –Voting rights- Simon Commission – Recommendations- Communal Award- Poona pact- Government of India Act of 1935 - circumstances to introduce the Act – Important Provisions- Provincial Autonomy – Reservation of Seats in the legislature

Unit- IV: The constitutional development
The constitutional development between 1935 and 1947 - the August offer - Cripps Proposal - Wavell Plan –Simla Conference 1945- The Cabinet Mission Plan - Mountbatten Plan – Towards transfer of power- Partition of India- The Indian Independence Act of 1947

Unit- V: Formation of Constituent Assembly
Formation of Constituent Assembly – its works – Indian constitution- The salient features of the Indian Constitution – Union of States- Fundamental Rights - Fundamental Duties - The Directive Principles of State Policy - the party system – Provision for Constitutional Amendments- Powers of the States

Text Book

1. R.C. Agarwal and Mahesh Bhatnagar, Constitutional Development and National Movement of India, S. Chand and Company Ltd., New Delhi, 2006.

Reference Books

1. M.V. Pylee, Constitutional Government in India, Asia Publishing house , Bombay, 1967.
2. Sumita Singh, Constitutional Development in British India,Vikas Publications, New Delhi, 2012.
3. SibaranjanChatterjee, The Governor in the Indian Constitution, Mittal Publication, Calcutta, 1973.
4. IllbertCourteman, The Government of India, The Clarendon Press, Oxford, 1977.
5. PonThangamani, Indian Constitutional History – A.D. 1773 to 1950, PonnaiahPathipakam, Chennai, 2001.

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand the evolution of indian constitution
K1	CO2	acquire knowledge about various fundamental duties and rights
K4	CO3	examine the role of central and state governments in the governance of the country
K5	CO4	review the independence act
K3	CO5	apply the knowledge to get jobs in private or public sector

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	M	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	S	S	S	M	S	M	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	P21HIT32	FREEDOM MOVEMENT IN TAMILNADU	L	T	P	C
CORE XII			5	-	-	4
Cognitive Level		K2: Understand K3: Apply K4: Analyse K5: Evaluate				
Learning Objectives		The Course aims to 1. know the Causes and the effect of British Colonial Rule in Tamil Nadu. 2. understand the uprising of Palayakaras in the late eighteenth century in Tamil Nadu 3. bring out out the educational status in India 4. examine the role played by the freedom fighters of Tamil Nadu. 5. get exposure to different aspects of Tamilnadu history and thereby enabling to prepare for various competitive examinations and get jobs in private or public sector				

Unit I: Early Resistances

Socio Economic and political condition - Anti-colonial struggle – Early base – Early uprising – Causes – VeluNachiyar- Palayakkars –South Indian Rebellion – Vellore mutiny 1806 – Sepoy Mutiny – Spread of Western Education - Christian Missionaries - General awakening- Social reforms- Challenges to the British government.

Unit II: Indian National Congress

Emergence of nationalism –Formation of Nationalist Associations – Formation of the Hindu Literary Society of Madras- Madras Native Association 1852 – Madras MahajanaSahba in 1884 - Theosophical Society–Indian National Congress 1885 – Partition of Bengal - Moderate phase –Emergence of extremism - prominent leaders of both the School of Thought- Outbreak of Swadesi and Boycott Movement – Role of V.O. ChithambaramPillai – Subramania Siva and Subramania Bharati – Swadesi Steam Navigation Company- Tirunelvelli uprising –Revolutionary activities in Tamil Nadu – NilakandaBrahmachari - Ashe Murder – Vanchinathan of Sengottai

Unit III: Home Rule Movement

Annie Besant- Home Rule Movement – Home Internment of Annie Besant- Advent of Gandhi - Non – Co-operation Movement Picketing of Liquor and Foreign Cloth Shops- Congress Constructive program-Revival of Khadi-Padmasani Ammaiyar of Madurai–Neill statue Satyagraha - Boycott of Simon Commission- Madras Congress session

Unit-1V: Civil Disobedient Movement

Declaration of PurnaSwaraj- Civil Disobedient Movement –Vedaranyam Salt Satyagraha- Boycott of elections, College and schools-Boycott of Foreign cloths-C.Rajagopalachari- Ruckmini Lakshmipathi- Durgabai - Radhabai Subbarayan- Gandhi – Irwin pact - Round Table Conferences – Communal Award – Poona pact – White paper – 1933 – Government of India Act 1935 Revival of Civil Disobedience movement- Eradication of untouchability and Temple Entry movement

Unit-V: Satyagraha Movement

Circumstances leading to the Individual Satyagraha —Second world War – August Declaration of 1940 – Individual Satyagraha - Programs and action- Cripps proposal – "Do or Die" - Quit India Movement –Role of women in Quit India movement- Quit India movement – role of women – rise and growth of the leftist movement- Muslim League and demand for Pakistan –C.R. Formula- Role of Tamilnadu in Indian National Army- Captain Lakshmi- India wins independence

Text Book

1. Rajayyan, K, History of Tamil Nadu 1565-1982,Vikas publication, Madurai, 1982

Books for Reference

1. Chandra , Bipan, A History of Modern India, Orient Blackswan publishes, New Delhi, 2009
2. Baker,C.J The politics of South India 1920 – 37,Cambridge University press, London ,1976
3. Copley , ARH the Political Career C. Rajagoppalachari 1937 – 54 Macmillan Company of India Ltd,Madras, 1978
4. Ganeshen .A, The Press in Tamil Nadu and Struggle for Freedom 1917 -1937, Mittal publications, New Delhi, 1989
5. Kandasamy.P the Political Career of K.Kamaraj concept publishing company , New Delhi,2001

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand thecauses and the effect of British colonial rule in Tamilnadu.
K5	CO2	review the social status and social reforms
K4	CO3	examine the educational status in India
K2	CO4	understand therole played by the freedom fighters of Tamilnadu.
K3	CO5	apply the knowledge to get jobs in private or public sector

<u>Mapping of COs with POs &PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	M	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	S	S	S	M	S	M	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

COURSE CODE	P21HIT33	HISTORY OF CONTEMPORARY WORLD	L	T	P	C
CORE XIII			5	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyze** **K5: Evaluate**				
Learning Objectives		**The Course aims to** **1.** study the contributions of UNO and specialized agencies towards establishing peace in the world **2.** know the political and economic autonomy of the world countries. 3. understand the development of Nationalism in Contemporary world 4. understand the emergence of International organization **5.** discuss about the various diplomatic issues and Political conflict of world countries				

Unit-1: First World War

First World War- Causes- Course and result- League of Nations-Fall of Tsar of Russia-Russian communism: 1917-1939-Hitler and Nazism; Mussolini and Fascism, World Economic Depression: 1929-1933, the Commonwealth of Nations; the Statute of West-minister (1930), the world situation in 1939: -Outbreak of the Second World War, the role of the U.S.A. and Japan in the War - Colonization of Africa -the role of Africa in the Second World War – Formation of United Nations Organization.

Unit- II: Raise of Capitalism

Modern State and it evolution-Capitalism - Imperialism - Socialism and Nationalism - Elements of Modern Nation – State - Diplomacy - Balance of Power – UNO - Principal Organs – Achievements and Failures – India's Role in UN Peace Keeping – Specialized Agencies of UNO - UNICEF - UNESCO –WHO- ILO -Disarmament - Meaning – NPT-CTBT – UN & Disarmament-The Arab League (1945)- Organization of American States (OAS) (1948)– European Common Market (1957)- European Energy Commission (1958)-Organization of the Petroleum Exporting Countries (OPEC) (1960)- the Organization of African Unity (OAU) (1963) IMF, Common Wealth of Nations -Regional Associations EU-NAM

Unit- III: Cold wars

Cold war Era : Emergence of two blocs - Integration of West Europe and US Strategy – The Berlin Blockade- Communist East Europe – Truman's Doctrine – Marshall Plan – NATO – SETO – CENTO –Molotov Plan – Warsaw Pact - The Korean War –Vietnam war(1954- 1975): Causes- Course of the War- Battle of Dien Bien Phu (1954)- Geneva Conference (1954)- My Lai Massacre (1968)- Kent State Shooting (1970)- Cuban crisis (1962): Causes- Course of the Crisis- End of the Crisis- German problem (1971): Causes-Effects of cold war-Moscow's Crisis (1991)- Baltic Republics (1991)- Fall of USSR- Twin Tower Attack (2011- Reunification of Germany – Africa: Apartheid to Democracy

Unit IV: Globalization and World Organization

Globalization -The Earth Summits (1972)- Objectives - Basic issues of the North and the South - Outcome of the Earth Summit -)- the Association of South East Asian Nations (ASEAN) (1967).South Asian Association for Regional Co-operation (SAARC) (1985)- Common Wealth of Independent States (CIS) (1991)- European Union (EU)(1993)- European Economic Community (1993)- World Trade Organization (WTO) (1995)- Foreign policy of USA after 1945- Foreign Policy of UK after 1945

Unit V: Middle East Problem

Middle East Problem- Kashmir problem (1947)- Arab- Israel conflict (1948): Background of the Conflict- National Movements- Palestine problem (1948): Background of the problem- Jerusalem- Palestine Refugees- Palestinian Army- Oil diplomacy: Gulf war (1990): Causes- Course – Invasion of Kuwait (1990)- Battle of Khafji (1991)- Kuwait's Liberation (1991)- Consequences- Causes- Afghan Civil War - Sri LankaWar -Emergence of Third World

Text Book

1. Kulshreshta, K.K: A Short History of International Relations

Reference Books

1. Palmer and Perkins : International Relations: The World Community in Transition, Vikas Publication, 1982.
2. Harbutt, Frazer .J: The Iron Curtain: Churchill, America & the Origin of the Cold War, Concept Publishing Company, New Delhi, 1978.
3. Asit Kumar Sen: International Relations since World War I, Cambridge University, 1974.
4. Vinay Kumar Malhotra: International RelationsSumitGanguly and Rahul Mukerji. (2012). India since 1980. New Delhi: Cambridge University Press.
5. KP Mishra, Non-Alignment in Contemporary International Relation, Sage publication.New Delhi, 1970.

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand international relations
K1	CO2	know the causes , course and effects of various wars and cold war
K4	CO3	assess the functions of various international organisations
K5	CO4	develop administrative skills and leadership traits
K3	CO5	apply the knowledge to face competitive examinations and get jobs in private or public sector

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	M	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	S	S	S	M	S	M	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

COURSE CODE	P21HIT34	FOREIGN POLICY OF INDIA	L	T	P	C
CORE XIV			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate				
Learning Objectives		The Course aims to 1. know the evolution of India's Foreign Policy since Independence 2. understand the relationship of India with neighbouring countries 3. assess the economic significance of India's Foreign Policy 4. examine India's contributions to World peace. 5. enable students to face various competitive examinations				

Unit-I: Non-Alignment Movement and India

Evolution of Indian Foreign of Policy - Determinants of Indian Foreign of Policy -Continuity and change in Indian Foreign Policy- Ministry of external Affairs - India's Changing Relations with other Nations- Panchasheel, 1954- Non-Alignment and UNO- The role of India in the Non-Alignment Movement - Non Alignment Summit 1985 – Harare Summit 1986- Harare Summit 1986- Group of Fifteen Countries (G15) -Relevance of Non-Aligned Movement in the Contemporary World -– Common Wealth of Nations

Unit – II: India and Pakistan

India and Pakistan - Indo – Pakistan relations during the early years of independence – Kashmir issue – Indo – Pak war 1965 – Tashkent Declaration 1966 – Simla Agreement 1972 –Indo-Pakistan War 1971- Emergence of Bangladesh- Indo-Bangladesh relations - Issues and economic relations between India and Bangladesh-Partnership agreements

Unit-III: India and Sri Lanka

Problems of the Tamils in Sri Lanka –Kachtheevu to Sri lanka 1974 –Indo- Sri Lanka Accord 1987 (Rajiv-Jayewardene Accord) Role of IPKF – India – Sri Lanka relations - LTTE- Tamil – Singala War in 2009- Fishing disputes- Economic tie

Unit – IV: India – China Relations

India – China Relations- War- Pre Cold War Era- Post- Cold War Era- Afghanistan War– South East Asia and Burma- issues between India and Burma – Boundary with Nepal - issues between India and Nepal–Tibet- India and Maldives - Political, economic and cultural relations between India and Maldives - Japan

Unit –V: India and Cold Wars

India's Relation with USA and Russia - Pre- Cold War Era- Post- Cold War Era - Strategic Relationship - European Union - South Asian Association of Regional Co-operation (SAARC) - East and West Asia – African countries - Australia - India's Nuclear Policy-

Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and Comprehensive Nuclear-Test-Ban Treaty- The threat of terrorism- India ‘s contribution to World peace

Text Books:

1. David Scott (Ed), Handbook of India’s International Relations, London, Routledge,2011

Reference Books:

1. Ganguly, S (Ed), India as an Emerging Power,Portland, Franck class, 2003.
2. Pant, H, Contemporary Debates in Indian Foreign and Security Policy, London, Palgrave Macmillian,2008.
3. Tellis, A and Mirski, S (Eds), Crux of Asia; China, India, and the Emerging global Order, Washington, Carnegie endowment for international peace,2013.
4. Alyssa Ayres and Raja Mohan, C (Eds), Power Realignment in Asia: China, India and the United States, New Delhi, Sage, 2002.
5. Dutt, V.P, India’s Foreign Policy in a Changing World, New Delhi,NBT,2011

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand the evolution of India’s foreign policy since independence
K1	CO2	acquire knowledge about economic significance of India’sforeign policy
K4	CO3	examine the merits and demerits of India’s foreign policy
K5	CO4	reviewIndia’s contributions to world peace.
K3	CO5	apply the knowledge to face competitive examinations and get jobs in private or public sector

<u>Mapping of COs with POs &PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	M	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	S	S	S	M	S	M	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

COURSE CODE	P21HIT35	HUMAN RIGHTS	L	T	P	C
CORE XV			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate				
Learning Objectives		The Course aims to • know the powers and functions of the various commissions and organizations of Human Rights. • gain knowledge about Human Rights and its importance • examine the current issues relating to Human Rights • assess violation of Human Rights • get jobs / start a consultancy				

Unit-I: Historical Background

Concept of Human Rights - Definition of Human Rights –Theories and Classification of Human Rights -The origin and development - Western Political Thought and other Civilizations - First historical experience - Natural – Moral - Legal Rights – Three Generation of Human Rights -Civil and Political Rights -Economic social - Cultural Rights and Collective Solidarity Rights –

Unit- II: Evolution of the Concept of Human Rights

Ideologies and Issues: Human Rights as a product of Western Ideologies - Human - Rights and Social Revolution - Human Rights and Development - Domestic and International wars - the Liberal Conservative and Socialist Marxist outlook - from Magna Carta to Universal Declaration of Human Rights - The US Declaration of Independence - The French Declaration of Rights - US Bill of Rights - Geneva Convention 1864 – International Covenant on Civil - Political -Economic - Social and Cultural Rights

Unit –III: International Organizations and Human Rights

United Nation Organization - International Human Rights Documents and Declarations - Its categorizations - Social - Economic, Civil and Political rights - Major International Human rights documents and declarations -UDHR -International - Covenants on Economic and Social Rights - International Covenants on Political and Civil - Rights and other Covenant- UN Charter –UNESCO - Declaration of the Responsibilities of the Present Generations towards future generation of 1997- UN Commission on Human Rights – U N High Commission for Refugees –UNICEF - European Convention on Human Rights – Mexico Declaration on Human Rights – Helsinki Charter – Role of N.G.O's in the Protection of Human Rights

Unit- IV: Human Right violations

Human Rights and Social Justice - Basic and fundamental principles of Social Justice and Human Rights - Improvement in the advancement of the Principles of Social Justice and Human Rights - Emerging Issues and Human Rights - Globalization Environment and Livelihood issues - Terrorism and Human Right - violation of Rights of women –bonded

laborers – rights of the children – Fundamental Rights - Constitutional safeguards - Contemporary Challenges - Child Laborer – Women's Right – Problem of Refugees – Capital Punishment.

Unit –V: Human Rights Activities in India

Human Rights in India - National Human Rights Organizations - the Government agencies - Judicial Activism and Protection of Human Rights in India - Evolution of commissions of Human Rights - National SC/ST Commission - National Commission for Minorities - National Commission for Women - Protection of Human Rights Act 1993- National and State Human Rights Commission -Right to information Act - Human Rights Organizations and Movements - Sectorial Rights - Issues and Legal Protections - Women, Children, Dalits - Tribals and Rights of Differently Abled

Text Book

1. Agattiya Lingam: Manidaurimaigal, (Tamil), Tamil Puthakalayam, Chennai, 2004

Reference Books

1. Brij Kishore Sharma Human Rights Covenants and Indian Law PHI Learning Pvt Ltd., New Delhi, 2010
2. Deshmukh, K.L Human Rights and International Law Swasthik Publications, Delhi, 2011
3. MadhusudanPandit , Human Rights and Social Justice Swastik, Publications, Delhi, 2011
4. Rajeev, N.Pradhan, Human Rights and Civil Liberties Navyug Books, International, Delhi, 2011
5. Nirmal, C. J. Human Rights in India: Historical, Social and Political Perspectives, Oxford University Press, New Delhi, 2000.

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand the evolution of the concept and meaning of human rights
K1	CO2	acquire knowledge about various commissions and their achievements
K4	CO3	find out human rights violations and gain legal assistance
K5	CO4	review the legal protections pertaining to the marginalized
K3	CO5	apply the knowledge to get jobs in private or public sector/ start consultancy service

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	M	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	S	S	S	M	S	M	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	P21HIT36	HISTORY OF CONTEMPORARY INDIA	L	T	P	C
CORE XVI			4	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyze** **K5: Evaluate**				
Learning Objectives		**The Course aims to** 1. help the students understand India's domestic policy after independence 2. assess the impact of the partition of India 3. know the administrative structure of India 4. examine the economic development of India 5. equip the students with knowledge neede to face competitive examinations				

Unit –I: Formation of Indian Constitution.
Partition legacies; migration and resettlement. The making of the Constitution and establishment of the Republic- The integration of the Princely states- Reorganization of the states- national integration- unity in diversity- **Sardar Patel-** Political parties and major political developments - Provisional Parliament- First general elections and the formation of central and provincial governments-Secularism, structure of democratic institution- Political parties- the Congress, the Left- BJP- Regional parties

Unit II: Indian Governance:
Parliament - President -Central Government: Prime Minister - Council of Ministers - Department Boards - Centre State Relations -Planning and Financial Administration- All India Services- State Government: Legislative Assembly - Legislative Council - Chief Minister - Council of Ministers - Planning - State Public Services Commission- Union Territories: Lt. Governor - Chief Minister - Council of Ministers - Local Government: Rural Local Government - Urban Local Government .- Judiciary- Supreme court – Structure and powers- State High Courts – Union Public Service Commission- UGC

Unit –III: Agriculture and Economic Development
Nation building process-Zamindari abolition- Mixed economy- Industrialization and growth of capitalism-. Planned Economy of India - Planning Commission - Five Year Plans and Annual Plans - Nationalisation of Banks - Agrarian Policy - Land reforms and agrarian class structure-rural labour and migration -Bhoodan Movement -Green Revolution – River water Disputes – White Revolution – Blue Revolution - Industrial Policy - Export and Import Policy - Labour Policy - Globalisation –Development of Transport and Communication –

Unit- IV: Development of Education, Science and Technology
Education Policy - National Policy of Education – Dr. Radha Krishnan Commission - Mudaliar Commission - Kothari Commission - Elementary - Secondary – University and Higher Education - Growth of Universities and UGC – Vocational and Technical – Women Education – Rural Education - Progress of Science and Technology – MHRD- Atomic

Energy Commission (AEC) and its Programs - Indian Space Research Organization (ISRO) and its Programs.

Unit-V: Welfare Programmes of India

Electoral Government and Developmental Issues - Prime Ministers and Administrative Policies -Administration and Achievements - National Development Council and its Role Welfare Programme of the Government – The Integrated Rural Development Program (IRDP) – Jawahar Rozgar Yojana- People Movements and Welfare State - Central Social Welfare Board- Social Justice - Social Welfare Programmes- Mandal Commission and reservation policies- Women Welfare- Language policy- Steps towards eradication of Poverty and illiteracy; demographic trends- Ecology and environmentalism- Liberalization and globalization- Development of health and tourism infrastructure- Promotion of ICT and digitalization .

Test Book

1. Anand, V.K. Indian since Independence, Making Sense of Indian Politics, New Delhi: Longman, 2010.
2. Dharmaraj, J, Contemporary History of India, (Tamil),Tensy Publications, Sivakasi, 2015.

References

1. The Politics of Modern India since Independence , Edinburgh: Routledge,New Delhi , 2011.
2. Bipan Chandra, Aditya Mukherjee, Mridula Mukherjee, India since Independence, London, Penguin Books, 2008.
3. Christophe Jaffrelot, Religion, Caste and Politics in India, New Delhi: Primus, 2010.
4. AnletSobithabai,W, Contemporary History of India, Sharon Publications, Marthandam, 2002.
5. Parmila, N.K, India's Foreign Policy, Diplomacy in 21st Century, Mangalam Publications, New Delhi, 2011.

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand the structure of the government
K1	CO2	assess the socio-economic and political developments
K4	CO3	examine the development of science and technology
K5	CO4	review the progress of education
K3	CO5	apply the knowledge to face competitive examinations / get jobs in private or public sector

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	M	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	S	S	S	M	S	M	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

SEMESTER - IV

COURSE CODE	P21HIE411	ECONOMIC HISTORY OF INDIA, 1857 – 1947	L	T	P	C
ELECTIVE -I			4	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyze** **K5: Evaluate**				
Learning Objectives		**The Course aims to** 1. understand the Economic policy of the British Government 2. review the status of cottage industries in India 3. understand the process of De industrialisation , migration of labourers and the rise of modern industries 4. assess the agrarian trends in India during the Colonial period 5. equip the students with knowledge needed to face competitive examinations/ start women groups/ consultancy services				

Unit- I: Development of Economy

Indian Economy on the eve of the British Rule – Commercial and trade policies of the East India company- The Economic Policies of the British - The Economic Drain and backwardness- Revenue Settlements under the British Rule –Population of India during the British Rule- Traditional industries- De- industrialization-Collapse of cottage industries- Export of raw materials and import of finished products- Industrialization

Unit –II: Agriculture in India

Agriculture -Land - Crop and Soil diversity- Agricultural Techniques and Methods used in British India-Agriculture production and productivity in the colonial rule- Land Revenue Settlement of India during the British Rule- Agrarian trends in India during the Colonial period -Plantations in India Famines in Colonial India- Irrigation and water management – Construction of Dams -Cattle Wealth – Taxes –Commercialization of Agriculture – Cultivation of Cotton for export-Famines- Famine Administration –Condition of peasants and laborers

Unit –III: The rise of the modern industrial sector

Characteristics of Indian Industries at the time of British ruleRise of large scale industries in Colonial India-Industrialization -State Policies on Trade - Chief Trading Centers in North and South India – Trading Communities - Trading Networks - Indigenous and Major Industries – Cotton Industries , Textile , Jute , Iron and Steel , Sugar and Chemical – Occupational Structure of Colonial India- Supply of industrial labor- Labour problems – Women Labour- Labour disputes – Child Labour - Labour Legislations - Urbanization in The Colonial Period- Migration of Laborers to overseas-Internal migration

Unit- IV: Transportation and communication

Transportation - Various Trade Routes - Important Trading Centers - Chief Ports - Important Markets – Store houses - Transport and Communication – Roadways –Introduction of Railways – Waterways – Communication network- Post and Telegraph- Parcel services - Modernization and Development – Internal and external trade- .Capital flows and the colonial economy – changes and continuities

Unit –V: Development of Education, Science and technology

Spread of education- Higher education- Starting of Universities- Health Policy-Development of medical infrastructure and medical education-Science and Technology - Foreign Capital-Government and fiscal policy - impact of British Economic Policy in India- economic nationalism- Indian economy at the eve of independence

Text Books

1. Dharma Kumar: The Cambridge Economic History of India 1757-1970, Orient Longman, New Delhi, 1982
2. Nanda S.P : Economic and Social History of Modern India, Anmol Publications Pvt. Ltd., New Delhi, 1999

Reference Book

1. Grover : A New Look at Modern Indian History, S. Chand & Co., Ltd., New Delhi, 1999
2. Mehta Balraj : Crisis of Indian Economy, Sterling Publishers Pvt. Ltd., New Delhi, 1973
3. UshaSingh , Economy: Thought of Indian Society, Deep& Deep Publications, New Delhi, 1985.
4. Chandra, Satish (ed.), The Indian Ocean: Explorations in History,Sage publication, New Delhi 1979.
5. T.M. Srinivasan, Irrigation and Water Supply, New Era Publications, 1991.

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand the process of economic exploitation and collapse of cottage industries
K5	CO2	assess the development of modern industrial sector
K1	CO3	review the impact of migration and entry of women into labour force
K4	CO4	examine the development of education and intellectual awakening
K3	CO5	apply the knowledge to get jobs in private or public sector

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	S	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	S	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

COURSE CODE	P21HIE412	INTERNATIONAL RELATIONS SINCE 1945 A.D	L	T	P	C
ELECTIVE -I			4	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K4: Analyze** **K5: Evaluate**				
Learning Objectives		**The Course aims to** ➢ introduce students to the definition and scope of the International Politics. ➢ elaborate the various theories of International politics. ➢ present new perspectives in the post world War II scenario in International relations. ➢ enable students learn the impact of World War II in the Global Economics. ➢ discuss the role of world organizations in peace making process.				

UNIT- I Theories of International Politics

Definition and Scope - Theories of international Politics - The Realist Theory - Systems Theory - Decision Making - Game Theory - International relations - Meaning – Scope – approaches to the study – Significance of the study- Concepts of International relations- Neo – Colonialism – collective security - Balance of Power.

UNIT -II Balance of Power

Concepts of International Politics: Power - National interest - Balance of Power - Collective Security- NATO, CENTO, Warsaw Pact, SEATO, ANZ US - Old and New Diplomacy- practice Important theories – Game theory – realistic theory - systems theory – Decision making

UNIT- III Post-II World War

The Post-II World War foreign policies of the major powers - United States - Soviet Union - China. and India's foreign policy and relations - India and the Super Powers - Oil Diplomacy - Palestine-Israel conflicts - West Asian conflict Palestine- Israel confides- Arms race - disarmament and arms control - The Partial Test-Ban Treaty - The Nuclear Non-Proliferation Treaty - Comprehensive Test Ban Treaty - India's-Nuclear Policy - Terrorism its impact - Afghanistan - Iraq — US War – Cold War.

UNIT -IV New International Economic Order

New International Economic order - GATT and its implications - The North South - "Dialogue" in the United Nations and Outside - Impact of Globalization. International Issues- Korean Crisis -Vietnam – Palestine Israel Problem – Gulf Crisis and Oil Diplomacy.

UNIT- V International Organizations

Origin and Development of International Organizations - The United Nations and its Specialized Agencies- OAS- OAU- Arab League- ASEAN- EEC- SAARC their role in

international relations- U.N.O - Functions- Achievements- Disarmament - SALT treaties - NPT- CTBT and Atomic race.

Reference Books

1. Dutt V.P. , India's Foreign Policy, Sage Publication, New Delhi, 1984.
2. Indumati, (ed) The United Nations (1945-1995), University of Mysore Publication, Mysore, 1995.
3. David S. McLellan, William C. Olson and Fred A. Sonderman, The Theory and Practice of International Relations, Printice Hall of India Publishers, New Delhi,1977.
4. Shrikant Paranjpe, U.S. Nonproliferation Policy in Action, South Asia, Sterling Publishers, New Delhi, 1987.
5. Palmer Priestly and Perkins, Intemational Relations, Vikas Publishers Calcutta , 1969.
6. Pushpesh Pant, International Relations in the 21st Century, McGraw Hill Education (India) Pvt. Ltd., New Delhi, 2014.

Course Outcomes

On successful completion of the course, the students will be able to

K2	CO1	understand International relations
K3	CO2	make relations with other nations
K5	CO3	explain the International relations

<u>Mapping of Cos with POS & PSOs</u>

CO/ PO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	M	S	S	S	M	S	S	S	M	S	S
CO2	S	M	M	S	S	M	S	S	M	M	S	S
CO3	S	M	S	S	M	M	S	S	S	M	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	P21HIE421	MUSEOLOGY	L	T	P	C
ELECTIVE - II			4	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyze** **K5: Evaluate**				
Learning Objectives		**The Course aims to** 1. understand purpose of Museums 2. know about the methods significance of collection of museum objects 3. study the techniques of preservation, conservation and restoration of the artefacts 4. understand documentation system 5. equip the students with knowledge needed to face competitive examinations/ start women groups/ consultancy services				

Unit- I : National Museums

Definition - Museum Movement - Classification of Museums - National Museum - Provincial and Regional Museums - Local Authority Museum - University and College Museums - Private Museums, - Society Museums - Trustee Museums - Temple Museums - Palace Museums, - Museums of Business Organizations -Growth of Indian Museums - Antiquarian Laws in India

Unit- II : Museum and Materials Documentation

Museum Architecture - Collection of Museum Objects - Collection of Archaeological objects –Surface Collection – Excavation – Art and Purchase Committee Collections - Zoological and Botanical Materials - Ethnographic Materials– Documentation - Day Book – General - Accession Register - Section wise Accession Registers - Catalogues Card Indices- Museum Exhibition: Designing Showcases - Exhibits - Space - Lighting - Method of Presentation - Principles of Preservation - Labeling - Temporary Exhibition

Unit –III: Conservation and preservation

Conservation and care of Museum Objects- Nature of Materials - Causes of Deterioration - Climatic and Environmental Conditions - Humidity - Temperature - Pollution - Light - Chemical agencies of deterioration - Human neglect and ignorance - Vandalism - Biological agencies of deterioration - Care in handling the Museum objects - care in shifting and transportation - storing care of Individual Materials - Paintings - Textiles - Bone and Ivory - Leather Objects and Archival materials .

Unit –IV : Museum Administration

Museum Administration - Human Resources - National Museum - State Museums - Director or Commissioner - Curator - Staff - Technicians, Artists, Modelers, Technical Assistants – Electronics Experts - Computer Personnel - Gallery Guards - Masons – Carpenters - Sanitation workers – Duties and responsibilities.

Unit –V: Museum Research

Educational Programmes and Museum Research - Guided Tours - Museum School Services - Museum Loan or Extensions Service - Gallery Lectures - Training to College Students on reading epigraphy, Taxidermy and Conservation - Training on different types of painting - Summer camps - Museum Publication - News Bulletins, Research Journals - guide books - Catalogues, handbooks, brochures, pictures books

Text Book

1. Jeyaraj, V. Museology – Heritage Management, Government Museum, Chennai, 2005

Reference Books

1. Harinarayana&Jeyaraj : Care of Museum Objects, Government Museum, Chennai, 2002
2. Kannan R.: Present Trends in Museology, Government Museum, Chennai, 2004
3. Aiyappan, A &Satyamurthi, S.T Handbook of Museum Technique, Government Museum, Chennai, 1998
4. Jeyaraj, V Care of Archival Material (Tamil) Government Museum, Chennai, 1997
5. Aiyappan, A. and S.T. Satyamurthi, Handbook of Museum Technique, Government Museum, Chennai, rept., 1998.

Course Outcomes

On the successful completion of the course, students will be able to

K1	CO1	know the growth of museums and its functions
K4	CO2	assess museum techniques
K2	CO3	understand documentation system
K5	CO4	evaluate the present trends in museology
K3	CO5	apply the knowledge to get jobs in museums / pursue research

<u>Mapping of COs with POs &PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	S	M	S	S	S	S	M	M	S
CO2	M	S	M	S	S	S	M	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	W	S	W	M	S	M	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

COURSE CODE	P21HIE422	HISTORY OF FAR EAST SINCE 1900	L	T	P	C
ELECTIVE - II			4	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K4: Analyze** **K5: Evaluate**				
Learning Objectives		**The Course aims to** ➢ introduce students to the historical background of the China and Japan. ➢ elaborate on the emergence of China and Japan as important countries in Asia ➢ present new perspectives in the history of China, Japan and other Asian Countries ➢ enable students learn the development of Asia in international level. ➢ discuss the Open door policy of far Eastern countries with world countries				

UNIT- I History of China

Early history of China – The Manchu Dynasty – Opening of China - Causes for the out break of the First Opium War – The Taiping Rebellion – The Second Opium War – China in 1860s and 1890s – Frontier relations between China and neighboring Countries – China Japanese War of 1894 and 1895.

UNIT- II Open Door Policy

The Battle of Concessions – USA and the Open Door Policy – Hundred Days Reforms – The Boxer Rebellion – Manchu Dynasty - Reforms – Dr.SunYat Sen and Revolution of 1911 – Yuan Shi Kai – China and First World War .

UNIT- III Manchurian Crisis

Birth and growth of Communism in China – Kuomintang – Chiang Kai Shek _ - Manchurian Crisis - conflict between the CCP and KMT – China Japanese War of 1937 – Civil War of 1945 and 1949 - The establishment of People's Republic of China - Mao Tse Tung – The People's Government at Peking – The Cultural Revolution – Economic Development .

UNIT- IV Meiji Restoration

The Opening of Japan – Perry and Harris Mission – Meiji Restoration- Meiji Reforms – Constitution of 1889 – Anglo Japanese Alliance 1902 – Russo-Japanese War 1904-1905 – Japan in First World War.

UNIT- V Japan in Second World War

Japan in Second World War – defeat and surrender of Japan – Post War period of Japan – Disarmament and demilitarization – Democratization – New political system – Economic and Industrial Remodeling up to 1950.

Books for Reference

1. Subramanian. N, A History of USA, Ennes Publication, Udumalpet, 2006.
2. Sinha. P and Surya. P, China and Japan in Ancient power politics , Sage Publication , Madurai, 2011.
3. Thiagarajan J, History of China from 1800- 1900 A.D , Vikas Publication, Madurai, 2007.
4. Kenneth E, Hendrickson J, The Spanish-American War, Greenwood Press Publication, London, 2003.
5. Rajayyan,K, A History of the United States, Vikas Publishing House, Madurai, 1981.
6. Richard Zuczek, Encyclopedia of the Reconstruction Era Vol – II, Greenwood Press publication, London, 2006.

Course Outcomes

On the successful completion of the course, students will be able to

K2	**CO1**	know the overview of far-east countries
K2	**CO2**	understand the Cultural heritages of far east countries
K2	**CO3**	analyze the role of far east countries
K4	**CO4**	assess the varied physical features of far east countries
K3	**CO5**	review the different adventurous sports and wild life of far east countries

<u>Mapping of Cos with POs &PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	S	S	S	M	M	S
CO2	S	M	S	M	S	M	S	S	S	S	S	S
CO3	S	S	S	M	M	S	S	M	S	S	S	S
CO4	S	S	M	S	S	S	S	S	M	M	S	S
CO5	S	S	M	M	S	S	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

NON MAJOR ELECTIVE

COURSE CODE	P21HIN21	TOURISM PACKAGING	L	T	P	C
SEMESTER -II			4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyse K5: Evaluate				
Learning Objectives		The Course aims to 1. acquire knowledge of Tourism 2. know about the services providers of Tourism industries 3. present new perspectives in tourism packages 4. discuss the importance of tourism and job opportunities in the field. 5. enable the student to get placement in Tourism sector.				

Unit- I: Fundamentals of Tourism

Meaning - Nature - Factors influencing the Tourism promotion and its development – Significance of Tourism Management sectors - Need for Tourism Organization and its Functions - Planning- Directing - Kinds of Tourism – Basic Components of Tourism –. Road Transport – Railways and Air Travel - Kinds of Tour and Tourists - Tourist Guides - Tourist Centers of Tamilnadu and North India -Motivation-Groups and Teams - Receptionists and Customer Relation-Interaction -

Unit- II: Travel Agencies ,Travel Formalities and Itinerary

Types of Travel Agencies- Organization Structure and Working of Travel Agency- Travel Functions of Travel Agency – Travel Agency with Service Providers – Handling Client - Booking and functioning of Travel agency –Travel Formalities – Passport - Visa and Immigration – Customs formalities - Itinerary and travel plan –Scope – Significant - Components and element of effective Tour itinerary preparation – Systematic approach of itinerary preparation- Creation of Tour packages- Pricing policies – Quoting and pricing of tour package – Marketing for Tour Packaging in different types of Tourism Industry-ICAO and WTO

Unit- III : Types of Accommodation

Emergence of Hotels-Types of Hotels – Accommodation - Registration and Gradation of Hotels- Changing Profile of Accommodation Sector –- Supplementary accommodations – Motels – Structure of a hotel- Font Office- Housekeeping - Functions and Importance of Accommodation in Tourism Development

Unit- IV : **Tour Package in Indian Context**

Basic Elements in Tour package and itinerary - Ready made and tailor made itineraries- Contracts with different service providers- Marketing of Tour packages -Needs, Wants and Demands-Types of Products- Kinds of Products Marketing Agencies - Market Segmentation – Marketing Process and Functions – Global itineraries and pricing

Unit- V: Travel Intermediaries and Tour Operators

Travel Trade and Commerce – Trade Centers- Currency Exchange – Employment – Livelihood - Travel Intermediaries - Tour Operators – International Air Transport Association – World Tourism Organization– Travel Agent Association of India– Indian Association of Tour Operators - Tourism Offices in India - Indian Tourism Development Corporation– Tamil Nadu Tourism Development Corporation

Text Book

1. PranNath Seth, Successful Tourism: Fundamentals of Tourism, Sterling Publishers Pvt. Ltd, New Delhi. 2008.

Reference Books

1. A.K. Bhatia, Tourism Development, Principles and Practice, Sterling Publishers Pvt. Ltd, New Delhi. 2002.
2. M.L. Singla, ―Tourism and Hospitality Industry in India: An Appraisal, Journal of Hospitality Applications and Research, BIT Publishers, Ranchi, 2007.
3. A.K. Raina and S.K. Agarwal, The Essence of Tourism Development: Dynamics, Philosophy and Strategies, First Edition, Sarup and Sons Publishers, New Delhi, 2004.
4. PragatiMohanty, Hotel Industry and Tourism in India, APH Publishing Corporation, New Delhi, 2008.
5. Dirk.Glasser, Crisis Management in the Tourism Industry, Elsevier Publications,New Delhi 2006 .

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	understand the fundamentals of tourism
K1	CO2	know about the various packages
K1	CO3	know the service providers in tourism
K5	CO4	assess the perspectives in tourism packages
K3	CO5	apply the skills and enable students to get jobs in tourism

Mapping of COs with POs &PSOs:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	S	S	S	M	M	S
CO2	S	S	M	S	S	S	M	M	S	S	S	M
CO3	S	M	S	S	S	S	S	M	S	S	M	M
CO4	S	S	S	S	M	S	M	S	M	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark

No Correlation (N) - 0 mark

VALUED ADDED COURSE

COURSE CODE	P21HIV11	YOGA AND MEDITATION	L	T	P	C
SEMESTER - I			30			2
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate				
Learning Objectives		The Course aims to 1. know about Yoga and Meditation 2. perform Patanjali's yoga darshanam 3. practice Bhakti Yoga and meditation. 4. Create a Healthy and fit Society				

Unit - I : Darshanas
Introduction to shat darshanas – definitions, meaning of the term "Yoga" – development of yoga – yoga in Bahagavad Gita – Rules and Regulations for Practice of yoga - Yoga –Yogin – Guru – Shishya – Diksha – Eight Limbs of Yoga

Unit- II: Bhakti yoga
School of yoga: Bhakti yoga – Karma yoga – Jnana yoga – Mantra yoga - Kundalini yoga – Panchakosha theory -Study of Patanjali's Yoga Sutra.

Unit- III: Patanjali's yoga
Patanjali's yoga darshanam: Samadhi pada: yoga definition – Goal – Chittavritties – Concept of Iswara – Chittavikshepas Samadhi; SadhanaPada: Kriya yoga – Kleshas – Astanga yoga; VdhutiPada; dharana – dhyana- Samadhi – Samyama.

Unit- IV: Hatha- yoga
Hatha- yoga; meaning, definition – literature – components of hatha yoga ; SapataSadhanas; Shat Karmas - Asanas – AstaKumbhakas – Bandhas and Mudras – Naadaanusantana – yoga and died.

Unit –V : Methods of Meditation
Meditation; meaning, nature, methods and benefits – yoga and physical Education – yoga and Ayurveda - Yoga and Naturopathy – yoga Therapy – Scientific Research on yoga.

Reference Books
1. Sachitra yoga pradipika: B.K.S. Iyyangar
2. Yoga chaitanyaPradipika; Yogacharya Dr. RaparthiRamarao
3. Journey to real self ; Dr. RaparthiRamarao
4. Asana Pranayama Mudras Bandhas: SwamySatyanandaSaraswati.
5. B.K.S. Aiyangar- Light of Yoga
6. George Feuerstein - The Yoga Sutra of Patanjali

COURSE CODE	P21HIV42	GUIDANCE AND COUNSELLING	L	T	P	C
SEMESTER - IV			30			2
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze K5: Evaluate				
Learning Objectives		The Course aims to 1. understand our Own problem and getting best possible solutions. 2. develop to understand the concept of Guidance and Counseling. 3. know about different areas of counseling. 4. create awareness about working of Guidance organizations. 5. know about the basic needs of guidance services. 6. develop the knowledge about different fields of Guidance and Counseling.				

Unit-I : Nature and Functions of Guidance & Counseling
Definition, nature, functions, important, types and kinds of Guidance and counseling– getting appropriate information – Emotion – Self awareness- Self motivation- Self control- Capacity to communicate.

Unit–II: Communication Skill in Counseling
Difference between Guidance, counseling and psychotherapy – basic knowledge of psychology – ability to make rapport – communication skills – Observational power and empathy – Probing skill; through questioning and organizing facts.

Unit–III: Practicing ethical issues
Sensitivity and practicing ethical issues – Listening skills and patience – Honesty and confidentiality crisis management – facilitating self –disclosure – problem-solving – Ice breaking – monitoring and closure.

Unit–IV: Educational and occupational counseling
Educational and vocational and occupational counseling – Marital , family, group and Gerontological counseling. Current forms of e-counseling and Tele – counseling and their application in areas of rehabilitation.

Unit–V: Trauma counseling
Trauma counseling – Intra- Personal and Inter- Personal counseling – Crisis intervention – Counseling for different types people – Social work counseling – Special education counseling - Remedial service counseling child Guidance counseling – Human Rights and Child Rights counseling.

Text Book

1. Nathan Robert and Hill, Linda Career Counseling, SAGE Publications India Pvt, Ltd., 2012.

Reference Books

1. Nelson-Jones, Richard, Basic counseling skills, A Helper's Manual, SAGE Publications India Pvt, Ltd., 2008.
2. Nag,Dr.Suvir, Counseling and Guidance, Rita Publications, Kolkata, 2012.
3. McLeod, John, An introduction to Counseling, Rawat Publications, 2012.
4. Aggarwal, J.C. Career Information in Career Guidance : Theory and practice, Doaba publishing house, Delhi – 1998.
5. Kochhar, S.K. Educational Vocational Guidance in Counseling, Sterling Publishers, New Delhi – 2010.

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Department of Economics

MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL – 624 102

B.A. ECONOMICS

UNDER CBCS

(with effect from 2021-2022)

DEPARTMENT OF ECONOMICS

MOTHER TERESA WOMEN'S UNIVERSITY, KODAIKANAL – 624 102
DEPARTMENT OF ECONOMICS
Choice Based Credit System (CBCS)
(2021 -2022 onwards)
B.A. ECONOMICS

1. About the Programme:

B.A. (Economics) is a 3-years graduate degree course divided into 6 semesters, each semester spanning 6 months. The Economics as a branch of knowledge is growing in its significance in terms of practical applications. A wide range of its quantitative and qualitative tools necessary to understand the working of economic systems are helping to solve a wide area of real world issues. The knowledge on the subject enhances the critical thinking skills and quantitative reasoning, sharpens the ability to reason, provide a specialised knowledge and problem solving skills. All these are directed to attain the goals of social justice, equity and market intervention strategies helps to make the learner skills relevant to the requirements of the economist and in shaping macro environment. The course is designed to train students to analyse concepts and processes of the economy by educating them in areas such as Micro economics, Macroeconomics, Planning and Development, Monetary economics, Public Finance, International Economics, Indian Economic development etc. The undergraduate Programmes will prepare the students for both, academia and employability. The students can seek a career in the prestigious establishments like R.B.I., Planning Commission, Planning Board, Ministry of Economic affairs and the Indian Economic Service etc.

2. Programme Educational Objectives (PEOs)

PEO1	To apply Economic theories and make the students to understand the practical knowledge on present Economic System.
PEO2	To utilise the Economic concepts in the day-to-day life for better living.
PEO3	To Create strong subject knowledge in Economics to develop and uplift the Society
PEO4	To enhance the Entrepreneurial skills with Communication to excel their profession
PEO5	To train the students in Industrial, Agricultural and Service sector economics. This will be helpful for them to get into the concern sector for their Job Oriented goals.

3. Eligibility:

Candidate should have passed the 10th +2 from higher secondary examination Board or CBSE or other equipment examination.

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.
ii. **Medium of Instruction:** English
iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**10**	**25**	**10**	**25**
External	**30**	**75**	**30**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions (MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description

90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

9. Programme Outcomes (POs)

On completion of the programme, the students will be able to

PO 1	Enable to understand the basic Economic concepts and apply in the day to day life for better living.
PO 2	Enable the students to meet the specified needs to resolve complex economic problems
PO 3	Enable the students to find solutions for complex economic issues.
PO 4	Enable the students to understand the application of Statistics in Economics
PO5	Enable the students to adopt the techniques to understand resource allocation and Macro Economic policies in Indian Economy.
PO6	Enable the students to understand the computer application in Economics
PO7	Show Continuous improvement in their professional career through life-long learning, appreciating human values and ethics.

10. Programme Specific Outcomes (PSOs)

On completion of the programme, the students will be able to

PO 1	Gain knowledge in Economics and creation of domain knowledge will be effectively served to the students to understand the Society, Societal complex problems and for attainment of Comprehensive Solutions.
PO 2	Gain basic knowledge in Economics, Mathematics, Statistics and Accountancy. This type of getting knowledge may helpful to students to clear any kind of basic Competitive Examinations.
PO 3	Understand the importance of business in economic development and learn the Business Environment and Policy.
PO 4	Utilise Entrepreneurial skills with Communication to excel their profession in the competitive world.
PO 5	Acquire knowledge in contemporary economic issues and problems and find solutions to solve the economic problems.

B.A. (ECONOMICS) CURRICULUM

Course code	Title of the course	Credits	Hours		Int	Ext	Total
			T	P			
FIRST SEMESTER							
U21LTA11	**Part I** Tamil I / French I	3	6	0	25	75	100
U21LEN11	**Part II** Communicative English I	3	6	0	25	75	100
U21ECT11	**Core I** Micro Economics–I	4	5	0	25	55	100
U21ECT12	**Core II** Economics of Planning and development	4	6	0	25	55	100
U21ECA11	**Allied I** Economic Statistics–I	4	5	0	25	75	100
U21EVS11	Environmental Studies	2	2	0	25	75	100
U21PEAS11	Professional English-I	4	6	0	25	75	100
Total		**24**	**36**				**700**
SECOND SEMSTER							
U21LTA22	**Part I** Tamil II / French II	3	6	0	25	75	100
U21LEN22	**Part II** Communicative English-II	3	6	0	25	75	100
U21ECT21	**Core III** Microeconomics–II	4	5	0	25	75	100
U21ECT22	**Core IV** Monetary Economics	4	5	0	25	75	100
U21ECA22	**Allied II** Economic Statistics-II	4	5	0	25	75	100
U21VAE21	Value Education	3	3	0	25	75	100
U21PEAS22	Professional English- II	4	6	0	25	75	100
Total		**25**	**36**				**700**
THIRD SEMESTER							
U21LTA33	**Part I** Tamil III/ French III	3	6	0	25	75	100
U21LEN33	**Part II** General English-I	3	6	0	25	75	100
U21ECT31	**Core V** Macroeconomics–I	4	5	0	25	75	100
U21ECA33	**Allied III** Principles of Accountancy–I	4	5	0	25	75	100
U21ECE311/ U21ECE312	**Elective I** Principles of Management/ Micro Finance and Women Empowerment	3	4	0	25	75	100
U21CSS31	**SBE-I Job Oriented Course-I** Computer Skills for Office Management	2	0	2	25	75	100
	NME-I	2	2	0	25	75	100
U21PEAS33	Professional English-III	4	6	0			100
Total		**25**	**36**				**800**
FOURTH SEMSTER							
U21LTA44	**Part I** Tamil IV/ French IV	3	6	0	25	75	100
U21LEN44	**Part II** General English II	3	6	0	25	75	100

U21ECT41	**Core VI** Environmental Economics	4	4	0	25	75	100
U21ECT42	**Core VII** Macroeconomics – II	4	4	0	25	75	100
U21ECA44	**Allied IV** Principles of Accountancy-II	4	4	0	25	75	100
U21ECE421/ U21ECE422	**Elective II** Marketing/ Export Procedure and Documentation	3	3	0	25	75	100
U21MSS42	**SBE-II Job Oriented Course-II** Managerial Skills	2	0	2	25	75	100
	NME-II	2	2	0	25	75	100
U21PEAS44	Professional English-IV	4	6	0			100
	Total	**29**	**37**				**900**
	FIFTH SEMESTER						
U21ECT51	**Core VIII** Indian Economic Development- I	4	5	0	25	75	100
U21ECT52	**Core IX** Mathematical Economics-I	4	5	0	25	75	100
U21ECT53	**Core X** International Economics	4	5	0	25	75	100
U21ECT54	**Core XI** History of Economic Thought	4	5	0	25	75	100
U21ECT55	**Core XII** Agricultural Economics	4	5	0	25	75	100
U21ECE531/ U21ECE532	**Elective III** Human Resource Management/ Population Studies	3	3	0	25	75	100
U21ECS53	**SBE-III** Economics of Tourism	2	2	0	25	75	100
	Total	**25**	**30**				**700**
	SIXTH SEMSTER						
U21ECT61	**Core XIII** Indian Economic Development- II	4	5	0	25	75	100
U21ECT62	**Core XIV** Mathematical Economics-II	4	5	0	25	75	100
U21ECT63	**Core XV** Public Finance	4	5	0	25	75	100
U21ECT64	**Core XVI** Industrial Economics	4	5	0	25	75	100
U21ECT65	**Core XVII** Rural Economics	4	5	0	25	75	100
U21ECE641/ U21ECE642	**Elective IV** Labour Economics / Health Economics	3	3	0	25	75	100
U21ECS61	**SBE-IV** Business Communication	2	2	0	25	75	100
U21EAS61	Extension Activities	3	0	-	25	75	100
	Total	**28**	**30**				**800**
	Grand Total	**156**	**205**		**Grand Total**		**4600**

Non-Major Elective

The candidates, who have joined the UG Programme, can also undergo Non Major Elective offered by other Departments.

Non Major Elective (NME) offered by Economics Department

U21ECN31	**NME-I** Gender and Economy
U21ECN42	**NME-II** Economics for Competitive Examinations

Additional Credit Courses (Two Credit Courses)

1. **U21ECO31 -** Online Course – III Semester
2. **U21ECI41 -** Internship – IV Semester
3. **U21ECV51 -** Value Added Course – V Semester **– Entrepreneurship Development**

SEMESTER I

COURSE CODE	U21ECT11	MICRO ECONOMICS-I	L	T	P	C
CORE -I			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				
Learning Objectives		1. To enhance the knowledge of the students in the fundamental theories of micro economics. 2. To help the students to understand the subject matter of economics. 3. To enable the students to understand the laws of economics. 4. To enable the students to understand the theories of factors of production. 5. To impart the knowledge on cost and revenue concepts.				

UNIT I: Introduction to Micro economics

Definitions – Definition of Economics - Adam Smith - Marshall - Robbins - Samuelson - Nature and Scope of Economics - Micro and Macro approach - Inductive and deductive methods - Positive Vs Normative study - Static and Dynamic analysis - Economic Laws.

UNIT II: Basic laws of Economics

Utility Analysis - Law of diminishing Marginal utility – Law of Equi-marginal utility – consumer's surplus –Indifference curve analysis – Properties – Consumer' s Equilibrium – Price Effect – Income Effect and Substitution effect.

UNIT III: Demand

Meaning of Demand - Types of Demand – Law of Demand – Exceptions - Determinants of demand – Elasticity of demand –Types; price, Income and cross elasticity – Measurement Methods – Uses.

UNIT IV: Factors of production

Factors of Production - Land, Labour, Capital and Organization - Laws of returns - Law of variable proportions

UNIT V: Cost and Revenue concepts

Cost and Revenue - concepts of cost and revenue - Average, Marginal and Total cost - Nature of short run and long run average cost curves – Revenue and revenue curves - Importance of revenue curves.

TEXT BOOKS:

1. M. L. Jhingan, Micro economic Theory, Vrinda Publications, Delhi, 2014.
2. H.L Ahuja, Advanced Economic Theory, S.Chand & Co, 2009.

REFERENCE BOOKS:

1. Seth. M. L, Principles of Economics, Lakshminara Publications, 2012.

2. Sundaram K.P.M., Micro Economics, Rotan Prakshan Publications Ltd, 2014.
3. Pindy and Robinson, Micro Economic Analysis, 2013.
4. Dr. S. Sankaran, Micro Economics, Margham Publications, Chennai, 2010.
5. Misra and Puri, Advanced Micro Economics Himalaya Publishing House, Mumbai, 2016.
6. V. Lokanathan, Principles of Economics, Economic Analysis S. Chand & Co., New Delhi, 2014.

Course Outcomes:

On the successful completion of the course, students will be able to:

CO1	Understand the relevance of micro economics concepts to the economy.	**K1**
CO2	Apply their knowledge on the basics of Micro Economics	**K3**
CO3	Improve their attitude towards economic laws.	**K2**
CO4	Get involved in the application of economics for business decision, planning and forecasting.	**K3**
CO5	Analyse the economic relationship between the variables.	**K4**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	M	M	W	M	S	S	W	M	**M**	**M**
CO2	S	S	M	S	M	S	S	M	M	S	**W**	**S**
CO3	S	S	M	S	M	M	S	S	M	M	**S**	**S**
CO4	S	S	M	W	M	N	M	M	M	N	**S**	**M**
CO5	M	S	M	M	S	S	S	S	S	S	**N**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT12	ECONOMICS OF PLANNING AND DEVELOPMENT	L	T	P	C
CORE -II			6	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To make the students to understand the concepts of planning and development. 2. To make the students community to understand the factors determining development. 3. To make the students to understand the planning and growth models. 4. To enhance the knowledge of students on growth models. 5. To make the students to understand the causes of underdevelopment and measures to achieve .development				

UNIT I: Introduction to Planning

Planning – Definition – Characteristics – Objectives limitations – For and against planning.

UNIT II: Types of Planning

Types of planning; Democratic planning Vs Totalitarian planning; centralized Vs Decentralized planning; Material planning Vs financial planning; short term, medium & long term and perspective planning – Cyclical planning.

UNIT III: Planning Model

Meaning - P.C Mahalanobis two sector Model -Planning models and five year plans in India.

UNIT IV: Theories of Economic Development

Development – Economic Development – characteristics of UDCS Distinction between Growth and Development – Theories of under development – vicious circle of poverty - Dualistic Economics – Rostow stages of growth – the Lewis Model of unlimited supplies of labour.

UNIT V: Approach of Economic Development

Rosenstein Rodan and the three indivisibilities - Libenstein theory. The low level equilibrium trap – Balanced vs unbalanced growth.

TEXT BOOK:

1. Jhingan M.L., The Economics of Development and Planning, Vrinda Publications Private Ltd, India, 2014.

REFERENCE BOOKS:

1. Andrew Beer and Terry L.Clower, Globalisation, Planning and Local Economic Development, Routledge First edition, 2019.
2. Puri V.K. & S.K. Misra, Economics of Development and Planning: Theory and Practice, 16th edition, Himalayas Publishing House, Mumbai, 2016.

3. Alexander Eckstein, Planning and Economic Development in India, Cambridge University Press, 2011.
4. Marcelo M.Giugale, Economic Development, Oxford University Press Inc, 2014.
5. Giorgio Secondi, The Development Economics Reader, Taylor and Francis group India Private Ltd, Manohar, 2020.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Know the basics of planning and development and acquire in depth knowledge about types of planning and development.	**K1**
CO2	Improve their knowledge on the basics of planning models	**K2**
CO3	Develop their attitude towards economic growth models.	**K3**
CO4	Apply their knowledge on economics for business decision, planning and forecasting.	**K4**
CO5	Analyse the economic relationship between the planning and growth models.	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**M**	**S**	**S**	**S**	**W**	**M**	**S**	**S**	**M**	**S**	**S**	**S**
CO2	**M**	**M**	**M**	**S**	**W**	**M**	**M**	**S**	**S**	**W**	**N**	**M**
CO3	**S**	**S**	**S**	**W**	**M**	**M**	**W**	**S**	**S**	**W**	**M**	**M**
CO4	**S**	**S**	**M**	**M**	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**M**
CO5	**M**	**S**	**S**	**N**	**W**	**S**	**M**	**M**	**N**	**M**	**W**	**W**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECA11	ECONOMIC STATISTICS –I	L	T	P	C
ALLIED - I			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create				
Learning Objectives		1. To make the students community to understand the applications of statistics in economics. 2. To make the students to understand the application of statistics in research. 3. To make the students to understand the fundamentals of statistics. 4. To enhance the knowledge of the students on statistical investigation 5. To impart knowledge on data collection method				

UNIT I: Introduction to Statistics

Introduction – Meaning - Definition –Scope - importance of statistics - Limitations.

UNIT II: Sources of Data

Statistical Investigation and Sampling – Source of data – methods of collection of data – sample design – Theoretical basis of sampling – sample and population –Methods of sampling.

UNIT III: Frequency Distribution

Statistical presentation - Classification and Tabulation of data-Presentation of data – Diagrams and charts - Graphs

UNIT IV: Measures of Central tendency

Measures of central location – Averages – Arithmetic mean – Median – mode – Geometric mean – Harmonic mean – quartiles - Deciles and percentiles.

UNIT V: Measures of Dispersion

Measures of Dispersion – Range – Mean Deviation – Quartile Deviation and its coefficient – standard Deviation – Coefficient of Variation.

NOTE: Question Papers must contain problems to the extent of 60% of the marks allotted to the subject.

TEXT BOOKS:

1. Gupta S.P, Statistical Methods, Sulthan chand & sons, New Delhi, 2014.
2. Gupta S.C and Kapoor V.K, Fundamentals of Applied Statistics, Sulthan chand & sons, New Delhi, 2010.

REFERENCE BOOKS:.

1. Gupta S.C Fundamentals of Statistics, Himalaya Publishers 2020.

2. Gupta S.C and Indira Gupta Business statistics, Himalaya Publishers 2019.
3. Bhupendra T. Kesaria Numerical & Statistical Methods, Himalaya Publishers 2018.
4. Kathambarajan D. Economic & Business Statistics, Himalaya Publishers 2017.
5. Seemon Thomas Business Statistics, Narosa Publishing house, 2014.
6. Manoharan M Palani Paramount Publications, Palani, 2012.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Understand the application of statistics in other fields.	**K1**
CO2	Get knowledge of method of collecting data.	**K2**
CO3	Apply the skill of draw the various diagram and graphical representation.	**K3**
CO4	Analyse statistics in everyday life.	**K4**
CO5	Solve the problems in various measures such as central tendency, dispersion and standard deviation in statistics.	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**W**	**S**	**M**	**S**	**M**	**S**	**M**	**W**	**S**	**M**
CO2	**W**	**S**	**M**	**S**	**M**	**S**	**M**	**W**	**S**	**W**	**S**	**M**
CO3	**M**	**M**	**W**	**S**	**M**	**S**	**S**	**S**	**M**	**W**	**S**	**M**
CO4	**W**	**S**	**M**	**S**	**M**	**M**	**M**	**W**	**S**	**W**	**S**	**M**
CO5	**M**	**M**	**W**	**S**	**M**	**S**	**M**	**S**	**M**	**W**	**S**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

SEMESTER – II

COURSE CODE	U21ECT21	MICRO ECONOMICS –II	L	T	P	C
CORE -III			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K5:** Evaluate **K6:** Create				
Learning Objectives		1. To enhance the knowledge of the students in the subject matter of micro economics. 2. To help the students to understand the various forms of market structure in the economy. 3. To enable the students to understand the methods of factor pricing. 4. To enable the students to understand the theories of factor pricing. 5. To impart the knowledge on business decision making.				

UNIT I: Market Structure

Market Structure - Meaning - Types - Perfect Competition - Time Element Theory - Price and Output Determination - Equilibrium of the firm and industry in short and long run.

UNIT II: Price Determination under Monopoly

Meaning – Features of Monopoly – Price and Output Determination under Monopoly - Price Discrimination - Meaning – Price Discrimination under Monopoly.

UNIT III: Monopolistic Competition

Features of Monopolistic competition – Price and Output Determination under Monopolistic Competition - Selling Cost – Oligopoly – Meaning-Features-Kinked Demand Curve.

UNIT IV: Theories of Rent and Wages

Theories of Rent – Ricardian Theory of Rent - Modern Theory of Rent – Quasi– rent –Theories of Wages – The Subsistence Theory of Wages – Wage Fund Theory-Marginal Productivity Theory of Wages.

UNIT V: Interest and Profit

Interest - Gross Interest and Net Interest – Classical Theory of Interest - Neo - Classical Theory; Loanable fund Theory and Keynesian Theory of Interest - Profit - Gross and Net Profit - Theories of Profit – Schumpeter's Innovation Theory – Knight's Uncertainty Bearing Theory.

TEXT BOOKS:

1. M. L. Jhingan, Micro economic Theory – Vrinda Publications, Delhi .2014
2. HL AHUJA (2009) Advanced Economic Theory S.Chand & Co

REFERENCE BOOKS:

1. Misra and Puri, Advanced Micro Economics Himalaya Publishing House, Mumbai, 2016.
2. Dutt & Sundaram, Micro Economics, S. Chand & Co Ltd, New Delhi, 2015.
3. V. Lokanathan, Principles of Economics, Economic Analysis S. Chand & Co., New Delhi, 2014.
4. K.P.M. Sundaram, Micro Economics, Rotan Prakshan Publications Ltd, 2014.
5. Pindy and Robinson, Micro Economic Analysis, 2013.
6. M. L. Seth, Principles of Economics, Lakshminara Publications, 2012.
7. Dr. S. Sankaran, Micro Economics, Margham Publications, Chennai, 2010.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Understand the subject matter of micro economics.	**K1**
CO2	Classify the various forms of market structure in the economy.	**K2**
CO3	Apply the methods of factor pricing.	**K3**
CO4	Evaluate the theories of factor pricing.	**K5**
CO5	Take business decision wisely.	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	M	W	M	W	M	M	M	W	M	**S**
CO2	M	S	M	S	M	M	N	M	M	S	M	**M**
CO3	S	S	S	M	M	M	S	S	S	M	M	**M**
CO4	M	M	M	W	M	M	S	M	M	W	M	**W**
CO5	S	M	S	S	M	S	S	M	S	S	M	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT22	MONETARY ECONOMICS	L	T	P	C
CORE -IV			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To make the students aware of the present situations regarding monetary phenomena. 2. To enable the students to understand the fundamental concepts of money and banking. 3. To help the students to know about the existing monetary policy in India. 4. To help the students to understand the theories of trade cycle 5. To enable the students to understand the banking system in India.				

UNIT I: Evolution of money

Evolution of Money –Barter system and its defects – kinds of money – functions of Money – Benefits and Drawbacks of Money - Paper standard –Advantages and Disadvantages – Fiduciary system - Methods of Note Issue – Role of Money in Developing and Mixed economy.

UNIT II: Value of money

Value of money – depreciation and appreciation of money- Theories of Money – Irving Fisher's Quantity Theory of Money – Cambridge Equations – Superiority of Cambridge version over Fisher's version.

UNIT III: Inflation and deflation

Inflation – Meaning – Causes for Inflation – Types of Inflation – Effects of Inflation – Inflationary Gap – Anti-Inflationary Measures – Deflation – Meaning – Causes for deflation – Effects of Deflation.

UNIT IV: Trade cycle

Trade Cycle – Meaning – Characteristics – Causes – Phases of Trade cycle – Theories of Trade of cycle – Schumpeter's and Keynesian theory of Trade cycle.

UNIT V: Banking

Functions of commercial Banks – Role of Commercial Banks in Economic Development – Credit Creation – Functions of Central Bank – Recent trends in Banking: ATM, Debit card, Credit card, e-banking.

TEXT BOOKS:

1. Seth M.L., Money Banking and International Trade and public Finance, Lakshmi Narayan Agarwal, Educational Publishers, Agra, 2017.
2. Cauvery R., Sudha Nayak U.K., Kruparani N., and Manimekalai A., Monetary Economics, S,Chand & Co. Ltd, New Delhi, 2010.

REFERENCE BOOKS:

1. Indian Institute of Banking and Finance, International Finance, Taxmann Publ, 2021.
2. D.M. Mithani, Money, Banking, International Trade and Public Finance, Himalaya, 2017.
3. Suraj B Gupta, Monetary Economics: Institutions, Theory and Policy, S.Chand, 2010.
4. Sundaram K.P.M., Money Banking & Public Finance, Alfa Publications, 2009.
5. Steven N Durlauf & Lawrence E Blume, Monetary Economics, New Palgrave Pub, 2009.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Learn about the evolution of monetary system	**K1**
CO2	Examine the importance of money in the economy.	**K3**
CO3	Understand the meaning and theories of Trade cycle	**K2**
CO4	Examine the role of money in different business situations.	**K4**
CO5	Evaluate the role of banking system in the economy	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**S**	**S**	**M**	**M**	**M**	**W**	**W**	**W**	**W**	**M**	**M**
CO2	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**N**
CO3	**S**	**W**	**W**	**W**	**M**	**M**	**M**	**M**	**S**	**S**	**S**	**M**
CO4	**S**	**M**	**M**	**M**	**M**	**S**	**S**	**S**	**S**	**S**	**M**	**W**
CO5	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**W**	**W**	**N**	**S**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECA22	ECONOMIC STATISTICS–II	L	T	P	C
ALLIED -IV			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To make the students community to understand the applications of statistics in economics. 2. To make the students to understand the application of statistics in research. 3. To make the students to understand the application of statistics in other fields. 4. To enable the students to understand the correlation and regression techniques, 5. To help the students to understand the concept of probability and its applications				

UNIT I: Correlation and Regression

Correlation and Regression – Scatter Diagram, - Karlpearson's Coefficient of correlation – Spearman's Rank correlation –Regression lines – Regression equations.

UNIT II: Association of Attributes

Association of Attributes – Independence – Consistence association – disassociation – Yule's coefficient of association – simple cases.

UNIT III: Index Numbers

Index Numbers – definition and Classification - methods of constructing price and cost of living index numbers – problems in the construction of the index numbers – uses. Limitations

UNIT IV: Time Series

Time Series – Nature, Objectives and components, methods of Measurements of trend and seasonal Variations – Applications in Economics and Business.

UNIT V: Probability

Probability – definition – concepts Rules of probability – Addition and Multiplication Theorem.

NOTE: Question Papers must contain problems to the extent of 60 % of the marks allotted to the subject.

TEXT BOOKS:

1. Gupta S.P, Statistical Methods, Sulthan Chand & sons, New Delhi, 2014.
2. Gupta S.C and Kapoor V.K, Fundamentals of Applied Statistics, Sulthan Chand & sons, New Delhi, 2010.

REFERENCE BOOKS:.

1. Manoharan M Palani Paramount Publications, Palani, 2012.

2. Gupta S.C Fundamentals of Statistics, Himalaya Publishers 2020.

3. Gupta S.C and Indira Gupta Business statistics, Himalaya Publishers 2019.

4. Bhupendra T .Kesaria Numerical & Statistical Methods, Himalaya Publishers 2018.

5. Kathambarajan D. Economic & Business Statistics, Himalaya Publishers 2017.

6. Seemon Thomas Business Statistics, Narosa Publishing house, 2014.

Course Outcomes:

On the successful completion of the course, student will be able to:

CO1	Acquire knowledge on basic concepts of statistical methods relevant to economic problems.	**K1**
CO2	Apply the theoretical and practical knowledge to do applied statistical methods	**K3**
CO3	Analyse the Correlation and Regression.	**K4**
CO4	Acquire the knowledge on index numbers and time series.	**K2**
CO5	Practice association of attributes, time series and basic concepts of probability	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**M**	**S**	**M**	**M**	**W**	**S**	**M**	**W**	**S**	**M**
CO2	**S**	**M**	**W**	**S**	**M**	**M**	**S**	**W**	**S**	**M**	**S**	**M**
CO3	**W**	**S**	**M**	**S**	**M**	**M**	**M**	**W**	**S**	**W**	**S**	**M**
CO4	**S**	**M**	**M**	**W**	**S**	**S**	**M**	**M**	**S**	**M**	**W**	**M**
CO5	**S**	**W**	**S**	**M**	**S**	**M**	**M**	**M**	**W**	**W**	**S**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

SEMESTER - III

COURSE CODE	U21ECT31	MACRO ECONOMICS–I	L	T	P	C
CORE -V			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To help the students to understand the fundamental concepts of macroeconomics. 2. To create basic knowledge about macroeconomic policy and tools. 3. To Provide a strong foundation for the students to clarify the ideas of macro economics 4. To impart knowledge on the concepts of National Income 5. To provide knowledge on theories of employment				

UNIT I: Introduction to Macroeconomics

Meaning of Macro Economics - Difference between Micro and Macro Economics — Importance and Limitations of Macro Economics analysis – Circular Flow of Income – Two, Three and four Sector Models

UNIT II: National Income

Definition and concept – Per – capita income and Disposal personal income, Real income and National Income – Concept of National Product – GNP and NNP – Methods of Measuring National Income – Difficulties in the computation of National Income – National Income and Social Welfare – Uses of National Income – Social Accounting.

UNIT III: Theory of employment

Meaning of Full Employment – Kinds of Unemployment – Classical Theory of Employment – Say's Law of Market – Keynesian theory of Employment – Savings and Investment approach to under – employment equilibrium – A Comparison of Classical and Keynesian Theory of Employment

UNIT IV: Consumption function

Keynesian Psychological Law of Consumption – Significance of Keynes's Law – Propensity to consume – APC and MPC – Determinants of Propensity to consume.

UNIT V: Theories of Consumption Function

Propensity to consume - Absolute Income Hypothesis – Relative Income Hypothesis – Permanent Income Hypothesis – Life Cycle Hypothesis.

TEXT BOOKS:

1. Dr.S.Sankaran, Macro Economics, Margham Publication, 2016.
2. L.N.Dutta Modern Macro Economics, Publisher IK International Publishing, 2013.
3. H.L.Aguja Macro Economics Theory and Policy Publisher S.Chand, 2019.

REFERENCE BOOKS:

1. M.L.Jhingan, Macro Economic Theory, Publisher Vrinda Publication, 13th Edition, 2017.
2. Lovelean Gupta & Pradeep kumar Panda, Macro Economics, A Primer Publisher, Bharthi Bhawan, 1st edition, 2017.
3. M.L.Seth, Macro Economics, Lakshmi Narain Agarwal Pub, 2017.
4. David Romer, Advanced Macro Economics, McGraw Hill India Publisher, Edition 4, 2019.
5. Rana K.C. & Verma, Macro Economic Analysis, Vishal Publishing Co, New Delhi, 2014.
6. Rangaraj Narayan, Principles of Macro Economic Publisher, McGraw Hill Education, 2012.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Understand the evolution of Macro Economics and know the difference between micro and macroeconomics.	**K1**
CO2	Examine the various concepts of National income Accounting and issues related to measurement of National income, and also develop an environmental concern in economic activities	**K4**
CO3	Comprehend the classical theory of output, employment and income and consumption function.	**K2**
CO4	Apply the knowledge to understand the Consumption function and theories of consumption function.	**K3**
CO5	Create awareness on various concepts of investment, determinants of investment, role of MEC.	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**S**	**S**	**S**	**M**	**M**	**S**	**S**	**S**	**W**	**S**	**M**
CO2	**S**	**M**	**M**	**M**	**W**	**W**	**M**	**M**	**M**	**S**	**S**	**M**
CO3	**S**	**S**	**W**	**S**	**S**	**M**	**M**	**S**	**W**	**N**	**W**	**M**
CO4	**S**	**S**	**W**	**W**	**M**	**M**	**S**	**S**	**M**	**M**	**M**	**S**
CO5	**S**	**S**	**W**	**M**	**S**	**S**	**M**	**M**	**M**	**S**	**M**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECA33	PRINCIPLES OF ACCOUNTANCY–I	L	T	P	C
ALLIED -III			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K4:** Analyze **K5:** Evaluate **K6:** Create				
Learning Objectives		1. To help the students to understand the book keeping. 2. To enrich the knowledge of students in preparing journals, ledger and cash book. 3. To provide knowledge about bills of exchange. 4. To make the students to understand the fundamental principles of accounting 5. To provide knowledge on subsidiary books in accounting				

UNIT I: Introduction to Book Keeping

Meaning – scope and importance - Introduction to Book keeping – Journal – Ledger - double entry book keeping.

UNIT II: Subsidiary Books

Subsidiary books – purchase book, sales book, cash books-single column cash book, double column cash book and triple column cash book.

UNIT III: Capital and Revenue Expenditure account

Capital and Revenue Expenditure and Income, Final accounts and Balance sheet of sole Trading concerns–common adjusting Entries

UNIT IV: Bills of Exchange

Bills of Exchange – Account Entries

UNIT V: Average Due Date

Average Due Date

TEXT BOOKS:

1. Gupta R.L & Gupta V.K, Principles and Practice of Accountancy, Sultan Chand & Sons, 2019.
2. Maheswari S.N & Maheswari S.K, Financial Accounting, 5th edn, Vikas, 2012.

REFERENCE BOOKS:

1. Grewal T.S & Gupta S.C, Introduction to Accountancy, S. Chand, 2016.
2. Narayanaswamy R, Financial Accounting: A Managerial Perspective, 5th edn, PHI, 2014.
3. Vinayakam N & Charumati B, Financial Accounting, S. Chand, 2004.

Course Outcomes:

On the successful completion of the course the students will be able to:

CO1	Enhance their knowledge in preparing final accounts.	**K2**
CO2	Prepare various types of accounts.	**K4**
CO3	Understand the book keeping procedure	**K1**
CO4	Analyse the capital and revenue expenditure accounts	**K4**
CO5	Gain knowledge to evaluate verification and valuation of bills of exchange	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**S**	**M**	**M**	**M**	**M**	**W**	**S**	**S**	**S**	**M**	**M**
CO2	**S**	**M**	**M**	**M**	**S**	**S**	**S**	**S**	**M**	**W**	**M**	**N**
CO3	**S**	**M**	**S**	**S**	**S**	**M**	**M**	**M**	**W**	**M**	**M**	**S**
CO4	**S**	**M**	**M**	**M**	**S**	**S**	**M**	**W**	**W**	**M**	**M**	**S**
CO5	**S**	**S**	**S**	**M**	**M**	**M**	**S**	**S**	**N**	**M**	**M**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECE311	CHOICE -I	L	T	P	C
ELECTIVE -I		PRINCIPLES OF MANAGEMENT	4	-	-	3
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To make the students to understand the management concepts. 2. To Develop the skills of decision making, organizing and management of a business organization 3. To help the students to understand the principles of management. 4. To acquire knowledge of manpower planning, motivation theory and communication barriers and importance. 5. To understand the importance of leadership in business scenario				

UNIT I: Character and functions of Management
Management – Meaning and Definition – Characteristics Function Importance – Approaches to the study of management – Henry Foyol's Theory of management – F.W. Taylor's theory of scientific Management.

UNIT II: Managerial Planning
Managerial planning – Meaning & Definition – characteristics Objectives – steps in planning Process – Methods of planning – Planning tools- Significance – obstacles to effective planning.

UNIT III: Forecasting and Decision making
Forecasting - Concept - Techniques - Decision Making Need - Elements In Decision making – Decision making Process- Types - Factors involved in Decision Making - Decentralisation - Delegation of Authority - Span of Control.

UNIT IV: Directing and Controlling
Directing –Principles of Direction – Importance – Types –Motivation-Meaning-Importance. Controlling –steps in Control Process – Techniques of control – needs for control –Types of Managerial control.

UNIT V: Leadership
Leadership - Definitions - Characteristics - Distinction between leadership and management - Importance of Leadership - Formal and Informal Leaders - Functions and qualities of a Good Leader.

TEXT BOOKS:

1. Tripathi P.C & Reddy P.N, Principles of Management, 6th edn, Tata McGraw Hill, 2017.
2. T.Ramasamy, Principles of Management, Himalaya Publishing House, 2014.

REFERENCE BOOKS:

1. L.M. Prasad, Principles and Practice of Management, Sultan & Sons, 2019.
2. C.B. Gupta, Business Organisation and Management, Sultan Chand & Sons, 2019.
3. Ramesh B Rudani, Principles of Management, 2nd edn, McGraw Hill, 2019.
4. Dinker Pagare, Principles of Management, Sultan and sons Publications, 2018.
5. Lallan Prasad, S.S. Gulshan, Management: Principles & Practice, S. Chand & Co, 2011.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Improve their knowledge on the Management techniques	**K3**
CO2	Develop the skills of good managers.	**K5**
CO3	Apply the forecasting techniques in decision making	**K4**
CO4	Acquire knowledge of manpower planning, motivation theory and communication barriers and importance.	**K2**
CO5	Understand the importance of leadership in business scenario	**K1**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**S**	**M**	**S**	**S**	**S**	**M**	**W**	**W**	**S**	**S**
CO2	**S**	**S**	**S**	**M**	**S**	**M**	**S**	**W**	**M**	**N**	**S**	**S**
CO3	**M**	**S**	**S**	**W**	**S**	**M**	**S**	**W**	**N**	**M**	**M**	**S**
CO4	**M**	**S**	**S**	**W**	**M**	**W**	**S**	**M**	**N**	**S**	**S**	**S**
CO5	**S**	**S**	**S**	**N**	**S**	**M**	**M**	**W**	**N**	**M**	**S**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECE312	CHOICE -II	L	T	P	C
ELECTIVE -I		MICRO FINANCE AND WOMEN EMPOWERMENT	4	-	-	3
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To make the students to understand the factors determining women empowerment 2. To enable the students to understand the role of micro finance in poverty alleviation 3. To impart the knowledge on Women Empowerment 4. To enable the students to understand the role of banks in micro finance. 5. To make the students to understand the challenges to the Self Help Groups.				

UNIT 1: Empowerment of Women

Meaning – Factors determining Women Empowerment – Challenges - Role of Women Empowerment in the Indian Economy.

UNIT II: Micro Finance

Concept – Elements – Importance – History of Micro Finance – Role of Micro Finance in Poverty Alleviation – Role of Banks in Micro Finance.

UNIT III: Techniques of Women Empowerment

Women Empowerment Programmes – Women Empowerment through Micro Finance – Women and Child Development Welfare Programmes: Awareness Camps,.

UNIT IV: **Self Help Group**

Meaning – Activities of the Self Help Groups: Savings, Credit, Marketing and Insurance – Rules for the Formation of Self Help Groups – Role in Self Help groups.

UNIT V: **Evaluation of Self Help Group**

Need and Features of Evaluation of Self Help Groups – Role of Governmental and Non-Governmental Organisation in Strengthening Self Help Groups – Marketing Challenges to the Self Help Groups - Problems faced by Self Help Groups.

TEXT BOOK:

1. Subhas Chandra Parida & Sasmita Nayak, Empowerment of Women in India, Northern Book Centre, New Delhi, 2009.
2. Muralidhar A. Lokhande, Micro Finance and Women Empowerment, New Century Pub, 2014.

REFERENCE BOOKS:

1. Sukanta Sarkar & Mohammad Afsar Alam, Microfinance and Women Empowerment: A Geo-Economic Perspective, 2015.
2. Rama Raju P.S., Women Empowerment: Strategies and Interventions, Swastik Publications, New Delhi, 2014.
3. Ganesamurthy V.S, Empowerment of Women in India: Social, Economic and Political, New Century Publications, New Delhi, 2008
4. Das S.K, Nanda B.P and Rath J, Microfinance and Rural Development in India, New Century Pub., New Delhi, 2008.
5. Hajira Kumar and Jaimon Varghese, Women Empowerment: Issues, Challenges and Strategies: A Source Book, Regency Publications, New Delhi, 2005.

Course Outcomes

On the successful completion of the course, the students will be able to

CO1	Understand the factors determining women empowerment	**K1**
CO2	Examine the role of banks in providing micro finance.	**K3**
CO3	Gain knowledge on women empowerment programme	**K2**
CO4	Analyse the role of micro finance in poverty alleviation	**K4**
CO5	Evaluate the role of micro finance in women empowerment	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**S**	**M**	**S**	**S**	**S**	**M**	**W**	**W**	**S**	**S**
CO2	**S**	**S**	**S**	**M**	**S**	**M**	**S**	**W**	**M**	**N**	**S**	**S**
CO3	**M**	**S**	**S**	**W**	**S**	**M**	**S**	**W**	**N**	**M**	**M**	**S**
CO4	**M**	**S**	**S**	**W**	**M**	**W**	**S**	**M**	**N**	**S**	**S**	**S**
CO5	**S**	**S**	**S**	**N**	**S**	**M**	**M**	**W**	**N**	**M**	**S**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECN31	GENDER AND ECONOMY	L	T	P	C
NON MAJOR ELECTIVE-I			2	-	-	2
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To help the students to understand the importance of women development. 2. To help the students to understand the problems of women labourers. 3. To help the students to understand the health issues of women. 4. To impart knowledge on occupational pattern of women 5. To impart knowledge on women development programme.				

UNIT I: Women in organize sector

Women in organized and unorganized sector.

UNIT II: Occupational Pattern

Occupational pattern of women in India.

UNIT III: Problem and Working conditions

Problems and working Conditions of Indian women.

UNIT IV: Education Levels

Women and Education in different levels – primary, Secondary And tertiary.

UNIT V: Health status

Health status of women in India.

TEXT BOOK:

1. Mahajan V.S, Women's Contribution to India's Economic and Social Development, Deep and Deep Publication, Delhi 1989.

REFERENCE BOOKS:

1. Sriani A.K, Gender in Employment Policies and Programmes: What Works for Women?, ILO, 2017.
2. Pulla Rao D, Status of Women in Education, Employment and Social Exclusion: Essays in Honour of Prof. K.S. Chalam, Serials Pub, 2011.
3. OECD, Report on the Gender Initiative: Gender Equality in Education, Employment and Entrepreneurship, OECD Pub, 2011.
4. International Labour Office, Women in Labour Markets: Measuring Progress and Identifying Challenges, ILO, 2010.
5. Bandi S.A, Forms of Production and Women's Labour, Sage Pub, 1992.
6. Nirmala Banerjee, Indian Women in a Changing Industrial Scenario, Sage Pub, 1991.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Get knowledge on women development programmes.	**K2**
CO2	Identify the problems of women in organized and unorganized	**K3**
CO3	Understand the occupational pattern of women	**K1**
CO4	Assess the educational levels of women	**K4**
CO5	Gain knowledge on health status of women	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**
CO2	**S**	**S**	**S**	**W**	**S**	**S**	**S**	**M**	**M**	**M**	**S**	**M**
CO3	**S**	**W**	**S**	**M**	**S**	**S**	**S**	**W**	**S**	**W**	**S**	**M**
CO4	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**W**	**S**	**S**	**S**
CO5	**S**	**S**	**M**	**N**	**M**	**S**	**S**	**S**	**S**	**S**	**M**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

SEMESTER-IV

COURSE CODE	U21ECT41	ENVIRONMENTAL ECONOMICS	L	T	P	C
CORE- VI			4	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To help the students in gaining knowledge about environmental economics. 2. To make the students understand the Nature and Scope of environmental economics in India. 3. To know the basic Concepts in Ecology and Economic development 4. To make the students aware of the environmental problems 5. To make the students to understand the environmental protection measures				

UNIT I: Economics and Environment

Introduction - Economics and Environment – Definition – Scope – Role - Significance of Environmental Economics - Economic Growth and Development - Ecology and Economic Development - Relationship between Environment and the Economy - Environment and Economic System

UNIT II: Economic development and Quality of Environment

Economic Development and Quality of Environment- Environmental Issues in Developed and Developing Countries – Uses of Resources – Environmental Protection Laws- Environmental Education in Curriculum.

UNIT III: Cost Benefit Analysis

Cost Benefit Analysis – Environmental cost of Economic growth – Limits to growth –Pollution cost distribution- Effects- Plans – Total and Marginal Benefits of Pollution Control – Efficiency in Pollution- Pollution Control Boards.

UNIT IV: Environmental Policy

Environmental Policy - Constitutional Protection - Planning and Management - Role of Government - Public Awareness - Law and Environment

UNIT V: Global Warming

Meaning of Global Warming - Green House Effect - Contribution to Global Warming - Response to Green House Effect - Ozone Depletion - Climate Change - Contribution of Nation and State

TEXT BOOKS:

1. Sankaran.S., Environmental Economics, Margham Publications, Chennai, 2012
2. Eugine T., Environmental Economics, Virnda Publications, 2005.

REFERENCE BOOKS:

1. Karpagam,M, Environmental Economics: A Textbook, 3rd edn, Sterling Pub, New Delhi, 2019.
2. Subhashini Muthukrishnan, Economics of Environment, PHI, 2015.
3. Ganesamurthy, V.S., Environmental Economics in India, New Century Publications, New Delhi, 2009.
4. Jhingan M.L and Sharma C.K, Environmental Economics: Theory, Management and Policy, 2nd edn, Vrinda Publications, 2009.
5. Ulagnathan Sankar, Environmental Economics, Oxford University Press, New Delhi, 2003.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Gain knowledge about environmental economics.	**K2**
CO2	Understand the Nature and Scope of environmental economics in India.	**K1**
CO3	Apply the basic Concepts in Ecology and Economic development	**K3**
CO4	Aware of the environmental problems	**K4**
CO5	Evaluate global warming and take environmental protection measures	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	S	S	S	S	S	W	S	W	**S**	**M**
CO2	S	M	S	S	M	S	M	M	M	S	**W**	**M**
CO3	S	M	M	M	N	S	W	M	M	N	**S**	**S**
CO4	S	M	W	M	M	S	M	W	M	M	**M**	**M**
CO5	S	M	S	M	W	S	S	M	M	M	**M**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT42	MACRO ECONOMICS-II	L	T	P	C
CORE- VII			4	-	-	4
Cognitive Level		**K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To provide an elaborate understanding in the subject matter of macro economics. 2. To make the students to aware of the recent developments in the subject of macroeconomics. 3. To make the students to know about the relevance of macroeconomic concepts to the economy. 4. To make the students to understand the various phases of trade cycle and the theories of trade cycles. 5. To make the students to understand the role of monetary and fiscal policies in developing economy.				

UNIT I: Investment function

Investment function – Meaning – Types – Determinants of Investment – Difference between Autonomous Investment and Induced Investment – Factors determining Investment Function – Marginal Efficiency of Capital and Rate of Interest – Investment Demand Schedule.

UNIT II: Multiplier and accelerator

Multiplier – Static and Dynamic multipliers – Induced Investment and Accelerator – The interaction principle – Super Multiplier.

UNIT III: Trade cycle

Trade cycle: Meaning – nature – types and phases of a Trade cycle. Theories of trade cycle; Keynesian theory of trade cycle. Schumpeter's innovation theory –Hwatrey's theory - Hicks theory of trade cycle .

UNIT IV: Post Keynesian and macro analysis

Post Keynesian Macro Analysis – General equilibrium of monetary and real sector – contribution of Hicks, Hansen – IS and LM – Diagram.

UNIT V: Monetary and Fiscal policy

Macro-Economic policy: Meaning - Targets - instruments, objectives of macroeconomic policy - Fiscal Policy – Objectives – Role of fiscal policy in a developing economy – Effectiveness of monetary and fiscal policies.

TEXT BOOKS:

1. Sankaran S, Macro Economics, Margham Publication, 2016.
2. Ahuja H.L, Macro Economics Theory and Policy, S.Chand, 2019.

REFERENCE BOOKS:

1. Sinha V.C, and Ritu Shrivastava, Macro Economics, SBPD Pub, 2021.
2. David Romer, Advanced Macro Economics, M.C.Graw Hill, 4th edn, 2019.
3. M.L.Jhingan, Macro Economic Theory, Publisher Vrinda Publication, 13th edn, 2017.
4. Lovelean Gupta and Pradeepkumar Panda, Macro Economics, Bharthi Bhawan, 2017.

5. M.L.Seth, Macro Economics, Lakshmi Narain Agarwal, 2017.
6. Rana K.C. and Verma, Macro Economic Analysis, Vishal Pub, 2014.

Course Outcomes:

On the successful completion of the course the students will be able to:

CO1	Gain knowledge about recent developments in theories of macro economics	**K2**
CO2	Examine the working principles of Multiplier and Accelerator, Super Multiplier.	**K3**
CO3	Attain the knowledge in classical and Keynesian theories of income and employment	**K4**
CO4	Assess the various phases of trade cycle and the theories of trade cycles.	**K5**
CO5	Describe the role of monetary and fiscal policies in developing Economy.	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**M**	**M**	**W**	**W**	**M**	**M**	**M**	**M**	**M**	**M**
CO2	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**W**
CO3	**S**	**S**	**S**	**S**	**S**	**W**	**W**	**W**	**M**	**M**	**M**	**N**
CO4	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**M**
CO5	**S**	**M**	**M**	**M**	**M**	**W**	**M**	**M**	**M**	**S**	**S**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECA44	PRINCIPLES OF ACCOUNTANCY-II	L	T	P	C
ALLIED - IV			4	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K6:** Create				
Learning Objectives		1. To help the students to understand the concepts of accounting. 2. To help the students to understand the basic principles of accountancy. 3. To help the students to understand the application of financial accounting in business. 4. To help the students to understand the preparation of income and expenditure account 5. To provide knowledge on Insurance claims				

Unit-I Self Balancing Ledger

Self Balancing Ledger

Unit-II Preparation of final accounts

Preparation of Final accounts from incomplete records.

Unit-III Receipts and Payment accounts

Receipts and Payments accounts.

Unit-IV Preparation of Income and Expenditure Accounts

Preparation of Income and Expenditure Accounts from receipts and payment accounts

Unit-V Insurance claims

Insurance claims for loss of stock only.

TEXT BOOKS:

1. Shukla M.C, Grewal T.S, and Gupta S.C, Advanced Accounts-Vol.2, 19th edn, S.Chand, 2016.
2. Pillai R.S.N et-al, Fundamentals of Advanced Accounting-Vol.1, S.Chand, 2012.
3. Pillai R.S.N et-al, Fundamental of Advanced Accounting-Vol.2, S.Chand, 2010.

REFERENCE BOOKS:

1. Gupta S.C, Grewal T.S, and Shukla M.C, Shukla & Grewal's Financial Accounting, S.Chand, 2019.
2. Maheswari S.N et-al, Advanced Accountancy-Vol.1, 11th edn, Vikas, 2017.
3. Leslie Breitner and Robert Anthony, Essentials of Accounting, 11th edn, Pearson, 2011.
4. Mishra K.C and Guria R.C, Financial Management and Insurance Accounting, Cengage Pub, 2009.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Understand the procedures of book keeping.	**K1**
CO2	Prepare final accounts.	**K6**
CO3	Prepare journals, ledger and cash book.	**K6**
CO4	Assess the capital and revenue expenditure accounts	**K3**
CO5	Gain knowledge on Insurance claims	**K2**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**W**
CO2	**S**	**M**	**M**	**M**	**S**	**S**	**S**	**S**	**M**	**W**	**N**	**S**
CO3	**S**	**M**	**S**	**S**	**S**	**M**	**M**	**M**	**S**	**S**	**M**	**S**
CO4	**S**	**S**	**W**	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**S**	**S**
CO5	**M**	**S**	**S**	**S**	**N**	**M**	**M**	**M**	**M**	**W**	**S**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECE421	CHOICE -I	L	T	P	C
ELECTIVE-II		MARKETING	3	-	-	3
Cognitive Level		**K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To give solid understanding of key marketing concepts and skills. 2. To enable the students to understand the basic aspects of marketing. 3. To perform situation analysis to assess marketing opportunities 4. To make the students to learn about e-commerce and e-marketing. 5. To help the students in developing skills in marketing management				

UNIT I: Marketing Concepts

Marketing – Meaning and Definition – Planning – Planning process Types of Marketing Plan, Competitive Marketing Strategies, Interactions between Marketing Mix and Marketing Environment – Marketing objectives –Marketing organization – marketing risk.

UNIT II: Functions of Marketing

Functions of marketing – concentration – dispersion – Equalisation – buying and assembling – selling – transportation – storage – standardization – grading – AGMARK – ISI – ISO Certification.

UNIT III: Marketing Information System and Marketing Research

Marketing Information System – meaning and definition – characteristics – need – uses – components – marketing research – need – scope – kinds – procedure for marketing research.

UNIT IV: State Trading and Pricing

Policies State and marketing in India – State Trading – benefits – pricing policies – factors influencing price – marketable and marketed surplus – methods of sales promotion.

UNIT V: Commodity Exchange

Commodity exchange – Regulated markets – meaning – functions, working of commodity exchange - methods of trading. Recent Trends in Marketing - E-commerce, E-marketing, E-Retailing, Relationship marketing, Mobile marketing, Green marketing.

TEXT BOOKS:

1. Natarajan N, Marketing, Margham Publications, Chennai, 2017.
2. Philip Kotler and Kevin Lane Keller, Marketing Management, 15th edn, Pearson, 2015.

REFERENCE BOOKS:

1. Sherlekar S.A, Marketing: Principles and Management, Himalaya Pub, 2015.
2. Pillai R.S.N and Bagavathi, Marketing Management, 3rd edn, S.Chand, 2012.
3. Kathiresan S and Radha V, Marketing Management, Bhavani Pub, 2011.
4. Mamoria C.B et-al, Marketing Management, Himalaya, 2012.
5. Kapoor D.C., Marketing and Sales Management, Sultan Chand, 2017.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Gather, analyse and draw conclusions from market and environmental data.	**K2**
CO2	Develop marketing strategies such as segmentation, targeting and positioning to achieve company objectives.	**K5**
CO3	Build an effective marketing plan to promote a company product service.	**K4**
CO4	Make strategic recommendations and persuasively communicate their recommendations and rationale.	**K3**
CO5	Develop skills in marketing management	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**S**	**M**	**S**	**S**
CO2	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**M**
CO3	**S**	**W**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**M**	**M**
CO4	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**W**
CO5	**S**	**M**	**M**	**S**	**S**	**S**	**S**	**S**	**W**	**M**	**M**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECE422	CHOICE -II	L	T	P	C
ELECTIVE-II		EXPORT PROCEDURE AND DOCUMENTATION	3	-	-	3
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To improve the knowledge of the students in Export Marketing and procedure. 2. To equip the students to gain knowledge and skills in export documentation 3. To make the students to be aware of the importance of export licensing 4. To prepare the students to be aware of the export finance and post shipment finance. 5. To enable the students to understand the factors influencing the export marketing communication.				

UNIT I: Preliminaries for Export

Meaning and Definition of export – classification-Strategy and preparation for export marketing-Registration formalities-Export licensing—Selection of Export product-methods of exporting.

UNIT II: Export Documentation

Aligned Documentation system-certificate of origin-Commercial Invoice , Shipping Bill , Certificate of Origin – Consumer invoice- Pre-shipment procedure- Bill of lading-Types of marine insurance policies

UNIT III: Export Procedure

Steps in export procedure-Export contract-Forward cover—Export finance-Excise clearence-Pre-shipment inspection-Shipping and custom formalities

UNIT IV: Export Finance

Export Finance- Need and purpose- time and source – pre- shipment finance- packing credit – period of packing credit – packing credit to sub – suppliers – foreign currency – post shipment finance – export finance in India

UNIT V: Export Communication

Export Communication – communication process – factors influencing international marketing communication – Export marketing channels of communication - channel of distribution – selection of distribution channel.

TEXT BOOK:

1. Natarajan L, International Marketing, Margham Publications, Chennai, 2014

REFERENCE BOOKS:

1. Madhurima Lall & Sultan Ahmad, Export Import: Procedure and Documentation, Sultan Chand, 2021.
2. Balaji.C.D., International Trade, Margham Publications ,Chennai, 2018
3. John Daniels et-al, International Business, 16th edn, Pearson, 2018.
4. Gupta C.B, International Business, S.Chand, 2014.
5. Sankaran.S, International Trade, Margham Publications, 2011.
6. Kapoor D.C, Export Management, Vikas, 2007.

Course Outcomes

On the successful completion of the course, the students will be able to

CO1	Gain knowledge in export procedure.	**K2**
CO2	Understand the export procedure and policy decision	**K1**
CO3	Apply the Regulation and Prohibition measures of Export	**K3**
CO4	Evaluate India's Export finance	**K5**
CO5	Examine the factors influencing international marketing communication.	**K4**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**M**	**M**
CO2	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**M**	**N**	**S**	**S**	**W**
CO3	**S**	**M**	**M**	**M**	**S**	**S**	**S**	**M**	**M**	**M**	**N**	**S**
CO4	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**M**
CO5	**M**	**S**	**M**	**M**	**M**	**M**	**S**	**S**	**W**	**M**	**S**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation

COURSE CODE	U21ECN42	ECONOMICS FOR COMPETITIVE EXAMINATIONS	L	T	P	C
NON MAJOR ELECTIVE-II			2	-	-	2
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K5:** Evaluate **K6:** Create				
Learning Objectives		1. To enable the students to prepare for various competitive examinations. 2. To make the students to understand the nature of Indian economy. 3. To make the students to understand the current trends in Indian industrial sector. 4. To equip the students with the knowledge regarding the relationship between industrial growth and economic development. 5. To impart knowledge on New Economic Policy				

UNIT I: Features of Indian economy

Basic features of Indian economy

UNIT II: Demographic profile

Demographic Profile of Indian economy.

UNIT III: Agricultural sector

Agricultural sector in India

UNIT IV: Industrial sector

Industrial Sector in India

UNIT V: New economic policy

New Economic Policy in India

TEXT BOOKS:

1. Sankaran S, Indian Economy, Margham Publications, 2014.
2. Disha, Expert's Quick Indian Economy for Competitive Exams, Disha Pub, 2018.

REFERENCE BOOKS:

1. Sanjay Kumar, Objective Economics: Collection of highly useful questions for Competitive Exams, Ramesh Pub House, 2021.
2. Nitin Singhania, Indian Economy for Civil Services and Other Competitive Examinations, 2nd edn, McGraw Hill, 2021.
3. Pranave Nerurkur, Mastering Economy of India: Competitive Exams, Kindle edition, 2020.
4. John Kennedy M, Objective Economics for Competitive Examinations, Himalaya, 2020.

5. Laxmikanth M, Indian Polity for Civil Services and other State Examinations, McGraw Hill, 2019.
6. Pearson, Indian Economy: Objective Questions for all Competitive Exams, Planet knowledge first edition, 2015

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Aware of the present scenario in Indian economy.	**K2**
CO2	Understand the demographic profile of India	**K1**
CO3	Examine the status of agricultural sector.	**K3**
CO4	Equip with the knowledge regarding the relationship between industrial growth and economic development.	**K5**
CO5	Create awareness on New Economic Policy of India	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**M**	**M**
CO2	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**N**	**S**	**S**	**W**
CO3	**S**	**M**	**M**	**M**	**S**	**S**	**S**	**M**	**M**	**M**	**N**	**S**
CO4	**M**	**M**	**S**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**M**
CO5	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**W**	**M**	**S**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

SEMESTER-V

COURSE CODE	U21ECT51	INDIAN ECONOMIC DEVELOPMENT–I	L	T	P	C
CORE-VIII			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To make the students understand the structure of Indian economic development. 2. To help the students to understand the problems of Poverty on Indian economic development and how it should be eradicated. 3. To understand the Population Policy of India 4. To understand the progress of Human Development 5. To understand the Economics Reforms of our country.				

UNIT I: Nature and Characteristics

Characteristics of Indian Economy -present scenario – types of economy -Major issues of development - Determination of Economic Development – Economic and non – economic factors.

UNIT II: Occupational and Social Infrastructure

Economic Development and Occupational Distribution - Worker Participation rate- Concept of Social Sector - Social Infrastructure – Development of general Educational and health Infrastructure- Educational Policy - Health and Family Welfare programmes.

UNIT III: Demography

Demography details of India-population growth-trends- birth rate and death rate – causes for increase birth rate in India – measures to control population growth-population policy in India.

UNIT IV: Human Development

Concept of Human Development - Human Development Index - Gender Related Development Index – Human Poverty Index – National Human Development Report – Progress of Human Development in India.

UNIT V: Poverty and inequality

Concept of Poverty – Estimates of Poverty in India – Causes for Poverty - vicious circle of poverty - inequality – types of inequality-Economic Reforms and reduction of poverty and inequality- Sen poverty index -Gini co-efficient.

TEXT BOOKS:

1. Sankaran S., Indian Economy, Margham Publications, 2014.
2. Dutt R & Sundaram K.P.M, Indian Economy, S.Chand, 72nd edn, 2016.

REFERENCE BOOKS:

1. Dristi Experts and Manohar Pandey, Indian Economy, Dristi Publication, 2020.
2. Vaishnavi Shankar, Indian Economy, Kiran Prakashan Publication, 2019.
3. Government of India: India Vision, Academic Foundation, New Delhi.2020
4. Sanjiv Verma, The Indian Economy, Unique Pub, 2018.

5. Ramesh Singh, Indian Economy, 10th edn, McGraw Hill, 2018.
6. Bhole L.M, Financial Institutions and Markets, 6th edn, McGraw Hill, 2017.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Learn about the nature of the Indian Economy and its basic characteristics.	**K1**
CO2	Discuss the magnitude of Social infrastructure in Indian Economic Development.	**K2**
CO3	Analyse the availability of human resources and make use of it.	**K4**
CO4	Examine the extent of Poverty and inequality and overcome in the society.	**K3**
CO5	Evaluate the Power of Various transport system and its impact .	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**W**	**S**	**S**	**M**
CO2	**S**	**M**	**M**	**S**	**S**	**S**	**W**	**S**	**S**	**S**	**M**	**M**
CO3	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**M**	**N**
CO4	**M**	**S**	**W**	**S**	**S**	**S**	**S**	**S**	**S**	**W**	**M**	**M**
CO5	**M**	**S**	**M**	**M**	**M**	**N**	**S**	**S**	**W**	**S**	**S**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT52	MATHEMATICAL ECONOMICS–I	L	T	P	C
CORE-IX			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K6:** Create				
Learning Objectives		1. To enable the students to understand the fundamentals of mathematics. 2. To impart various mathematical methods. 3. To improve the mathematical knowledge of the students.. 4. To help the students to understand the relationship between economics and mathematics 5. To help the students to calculate the changes in basic economic variables				

UNIT I: Introduction

Use of Mathematical Techniques in Economics – Basic Rules of Arithmetic Operations – simple operations with common and decimal fraction – Algebraic Symbolism – Exponents and Radicals

UNIT II: Equations

Solution to linear equations – Linear Equation in one Variable –Simultaneous Linear Equation with Two and Three Variables

UNIT III: Application of linear equation in economics

Application of Linear Equation In Economics With reference to Linear demand function and Linear supply function only – Quadratic Equation (by using standard quadratic formula only)

UNIT IV: Logarithm

Logarithm – Definition – Formula (Product, Quotient, Exponent – No proof needed) – Calculation using logarithmic tables (simple problems only)

UNIT V: Set theory

Set Theory – Definition – Types of sets – Set operations - Union of sets – Intersection of sets - Difference of Sets- Complement of a sets - De-Morgan's law - Venn diagram (for 2 & 3 sets) – Problems for 2 sets and 3 sets and also using Venn diagram.

TEXT BOOKS:

1. Bose D, An Introduction to Mathematical Economics, Himalaya Publishing House, 2018.
2. Prabakar Pawas & Alka Budhiraja, A Text on Mathematical Economics, Academic Foundation, 1995.

REFERENCE BOOKS:

1. Kunt Sydsaeter & Peter J. Hammond, Mathematics for Economics Analysis, Pearson Publication, 2020.
2. Joshi R.C and Nancy, Mathematical Methods in Economics-II, Vishal Pub, 2019.
3. Agarwal C.S and. Joshi R.C, Mathematics for Students of Economics, The New Academic Publishing, 2017.

4. Nik Hashim Nik Mustapha, Mathematical Economics with Application, University Malaysia Teragganu Publication, 2015
5. Vali Shapoor, Principles of Mathematical Economics, Attantis, 2014.

Course Learning Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Apply mathematical formula in practical life.	**K3**
CO2	Understand the mathematical methods which are useful for economic study.	**K1**
CO3	Apply the Mathematics knowledge into Economics Theory	**K3**
CO4	Identify the relationship between economics and mathematics	**K2**
CO5	Calculate the changes in basic economic variables	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**S**	**W**	**M**	**M**
CO2	**S**	**S**	**S**	**M**	**S**	**M**	**M**	**S**	**M**	**S**	**S**	**S**
CO3	**S**	**S**	**M**	**S**	**S**	**M**	**W**	**M**	**S**	**W**	**N**	**M**
CO4	**M**	**S**	**S**	**W**	**S**	**N**	**S**	**M**	**W**	**M**	**S**	**S**
CO5	**S**	**M**	**S**	**S**	**M**	**M**	**W**	**W**	**S**	**S**	**M**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT53	INTERNATIONAL ECONOMICS	L	T	P	C
CORE-X			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K5:** Evaluate				
Learning Objectives		1. To enable the students to understand the working and application of open economic system. 2. To enable the students to understand the consequences of international trade. 3. To enable the students to understand the general concepts of international economics 4. To provide knowledge on the concepts of balance of payments and the terms of trade 5. To provide knowledge on exchange rate				

UNIT I: International trade

International Trade – Meaning – features Advantages and Disadvantages – Internal vs International Trade.

UNIT II: Theories of International trade

Classical Theory of International Trade – Hickscher Ohlin theory of International Trade – Free Trade vs Protection. Arguments for and Against Protection.

UNIT III: Balance of Payment

Balance of Trade and Balance of Payment – causes for Disequilibrium in balance of payments – Measures to correct it – BOP in India – Recent Position.

UNIT IV: Exchange rates

Foreign Exchange – Exchange rates - Determination – Theories – Mint Par Parity – Fixed and Flexible Exchange rates - Advantages and disadvantages.

UNIT V: International Financial Institutions

International Financial Institutions - Working of IMF, IBRD, IDA, International Liquidity, UNCTAD, New International Economic Order - WTO.

TEXT BOOKS:

1. Jhingan M.L, International Economics, 7th edn, Vrindha Pub, 2016.
2. Mithani D.M, International Economics, Himalaya Publishing House, Mumbai, 2015.

REFERENCE BOOKS:

1. Francis Cherunilam, International Economics, 6th edn, McGraw Hill, 2020.
2. Mannur H.G, International Economics, 2nd edn, Vikas, 2018.
3. Desai S.S.M, International Economics, Himalaya Publishing House, 2017.
4. Dominic Salvatore, International Economics: Trade and Finance, Wiley, 2014.
5. Gupta K.R, International Economics, Atlantic Pub, 2009.

Course Outcomes:

On the successful completion of the course, student will be able to:

CO1	Understand the significance of international trade.	**K1**
CO2	Identify the importance of comparative cost concept in international trade	**K3**
CO3	Examine the functioning of the international financial institutions	**K2**
CO4	Understand the concepts of balance of payments and the terms of trade	**K1**
CO5	Evaluate the importance of the concept of exchange rate in international trade	**K5**

Mapping :

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**M**	**S**
CO2	**S**	**S**	**S**	**W**	**S**	**S**	**S**	**M**	**M**	**M**	**S**	**M**
CO3	**S**	**W**	**S**	**M**	**S**	**S**	**S**	**W**	**S**	**W**	**S**	**M**
CO4	**S**	**S**	**S**	**S**	**S**	**M**	**S**	**S**	**W**	**S**	**S**	**S**
CO5	**S**	**S**	**M**	**N**	**M**	**S**	**S**	**S**	**S**	**S**	**M**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT54	HISTORY OF ECONOMIC THOUGHT	L	T	P	C
CORE-XI			5	-	-	4
Cognitive Level		**K1:** Recall **K3:** Apply **K4:** Analyze **K5:** Evaluate **K6:** Create				
Learning Objectives		1. To provide knowledge on basic concepts of economics. 2. To make the students to know about contribution of various economists. 3. To provide theoretical knowledge about recent Indian economics thought. 4. To make the analytical interest in the Marxian Economics. 5. To understand the application of economic theories.				

UNIT I: Ancient Economic Thought

Introduction – Ancient Economic Thought –The Greek. Plato – Aristotle – The Roman – Kautilya‘s Arthasastra – Thiruvalluvar.

UNIT II: Medieval Economic Thought

Medieval Economic Thought – St. Thomas Aquinas- Mercantilism- Sir Thomas Mun- James Steuart- Physiocrates–Quessnay- Jacques- Classical Thoughts- Adam Smith- Malthus.

UNIT III: Economic Ideas of Marx

Karl Marx ideas – Dialectical Materialism- Theory of Class Struggle – Theory of Value and Distribution - Theory of Surplus Value- Industrial reserve army- Marxian Prediction - Scientific Socialism

UNIT IV: Economic ideas

Alfred Marshal – Keynes - J.B.Clark - J.B.Say - J.S.Mill - Irving Fisher - A.C.Pigou –Walras – Pareto - Their theories and Economic ideas.

UNIT V: Recent Indian Economic Thought

Recent Indian Economic Thought – Dada BaiNaoroji - M.K.Gandhi– Nehru- B.R.Ambedkar - VKRV Rao – AmartyaSen

TEXT BOOK:

1. Loganathan V, History of Economic Thought, S.Chand, 2012
2. Ganguli B. N, Indian economic Thought: A 19th Century Perspective, Tata McGraw Hill, 2013.

REFERENCE BOOKS:

2. Sankaran S, History of Economic Thought, Margham Publication, 2014.
3 Seshadri G. B, Economic Doctrines, B. R. Publishing Corporation, 2014.
4 Jhingan M.L, Girija M, and Sasikala L, History of Economic Thought, 3rd edn, Kindle Edition, 2014.
5 Hajela T.N, History of Economic Thought, 18th edn, Ane Books, 2011.
6 Blackhouse R, A History of Modern Economic Analysis, Basil Blackwell Oxford, 2011.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Get knowledge about thinking of various school of economists.	**K1**
CO2	Evaluate of economic ideas.	**K4**
CO3	Develop a positive attitude towards economic ideas.	**K6**
CO4	Get analytical interest in the Marxian Economics.	**K5**
CO5	Understand the application of economic theories.	**K3**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**S**	**M**	**M**	**S**	**M**	**W**	**S**	**M**	**M**	**M**	**S**
CO2	**S**	**S**	**M**	**S**	**S**	**W**	**M**	**S**	**S**	**S**	**M**	**M**
CO3	**S**	**S**	**S**	**M**	**S**	**M**	**N**	**S**	**W**	**M**	**M**	**N**
CO4	**S**	**S**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**S**	**S**	**S**
CO5	**S**	**S**	**M**	**S**	**M**	**M**	**M**	**S**	**M**	**M**	**M**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT55	AGRICULTURAL ECONOMICS	L	T	P	C
CORE-XII			5	-	-	4
Cognitive Level		**K1:** Recall **K3:** Apply **K4:** Analyze **K5:** Evaluate **K6:** Create				
Learning Objectives		1. To make the students to understand the features of Indian Agriculture 2. To make the students to understand the role of Institutional agencies for Agricultural credit 3. To equip the students with the knowledge regarding the relationship between Agricultural economy and Indian economy 4. To engage the students in the analysis of debt crisis in the farm sector. 5. To impart knowledge on agriculture policy in India				

UNIT I: Agricultural and economic Development

Agricultural Development – Role of Agriculture in Indian Economy- Agricultural Development under Five Year Plans- Productivity in Agriculture – Causes for Low Productivity- Measures to improve Productivity.

UNIT II: Agricultural Productivity

Productivity in Indian Agriculture, Measuring Agriculture Productivity, Farm size, Cropping Pattern – Mechanisation – Advantages and Limitations- Farm Size and Efficiency - Agricultural Labour and Wages – women in Agriculture, wage discrimination. Green Revolution- Problems of small and marginal farmers.

UNIT III: Agricultural Price Policy

Size of land holdings- Tenancy systems and Land Reforms – Supply of Inputs: Irrigation, Power, Seed and Fertilizer – Pricing of Inputs – Agricultural price policy in India – Minimum support price – objectives of price policy, Food security in India, PDS– Crop Insurance.

UNIT IV: Agricultural Finance and Agencies

Agricultural Credit in India - Agricultural Indebtedness – causes – remedies - Institutional agencies supplying Agricultural finance: Co-operatives, Commercial Banks, and Regional Rural Banks, NABARD. Role of Rural Credit Institutions. NBFC and agricultural credit.

UNIT V: Agricultural Marketing

Agricultural Markets- Definition and Scope – Recent State of Agricultural Marketing- Role and Functions of efficient marketing system - Types of Agricultural markets – cooperative marketing and regulated markets - New Agricultural policy.

TEXT BOOKS:

1. P.K. Gupta, Agricultural Economics, Vrinda Publication, Reprint 2020.
2. Singh C.B, and Singh R.K, A Textbook of Agricultural Economics, Lakshmi Publications, 2011.

REFERENCE BOOKS:

1. Andrew Barkley and Paul W Barkley, Principles of Agricultural Economics, Routledge, 2020.
2. Gail L.Cramer, Krishna P. Pandel and Andrew Schmitz, The Routledge Handbook of Agricultural Economics, Routledge, 2019.
3. Reddy S.S et-al, Agricultural Economics, 2nd edn, Oxford Pub, 2019.
4. Dhingra I.C, The Indian Economy, 28th edn, Sultan Chand, 2014.
5. Agarwal A.N., Indian Economy: Problems of Development and Planning 37thedition, New Age International Publishers, 2014.
6. P.Mala, Agricultural Economics, Dominant Publishers, 2014.

Course Outcomes:

On the successful completion of the course, the students will be able to

CO1	Get knowledge on the status of agricultural sector	**K1**
CO2	Develop the skills in the measurement of productivity.	**K6**
CO3	Apply their theoretical knowledge in pricing of agricultural products.	**K3**
CO4	Analyse of debt crisis in the farm sector.	**K4**
CO5	Gain knowledge about agriculture policy in India	**K1**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**M**	**M**	**M**	**M**	**M**	**S**	**S**	**S**	**M**	**M**	**W**	**S**
CO2	**S**	**S**	**S**	**S**	**M**	**M**	**W**	**S**	**S**	**M**	**M**	**M**
CO3	**S**	**M**	**M**	**S**	**S**	**M**	**M**	**W**	**M**	**M**	**M**	**S**
CO4	**S**	**M**	**S**	**M**	**S**	**S**	**S**	**M**	**M**	**N**	**S**	**S**
CO5	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**S**	**S**	**M**	**M**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECE531	CHOICE -I	L	T	P	C
ELECTIVE-III		HUMAN RESOURCE MANAGEMENT	3	-	-	3
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To enhance the knowledge of students in theories of human resource management. 2. To make the students to understand the importance of human health. 3. To make the students to understand the importance of human capital in economic development. 4. To enhance the knowledge of the students on staff recruitment and selection, employee relations management, staff training and job evaluation. 5. To impart knowledge on the concept of employee empowerment				

UNIT I: Introduction to Human Resource Management

Definition and Concept, Features, Objectives, Functions, Scope and Development of Human Resource Management, Importance of Human Resource Management, Human Resource Practices,

UNIT II: HRM and Personnel Management

Introduction, Concept of Personnel Management, Personnel Management in India, Functions of the Labour Welfare Officer, Difference between Personnel Management and HRM

UNIT III: Human Resource Planning

Human Resource Planning - Concept -Objectives- Need-Process- Benefits- Problems - Factors in HRP.

UNIT IV: Job Analysis

Job Analysis- Job Description and work design-Recruitment- Concept and Types of Recruitment- Selection- Concept and Process of Selection- Training- Concept and Types of Training- Performance Appraisal-Concept and Methods of Performance Appraisal- Job evaluation.

UNIT V: Employee Empowerment

Introduction, Concept of Employee Empowerment, Process of Empowerment, Empowerment in Indian Scenario, Empowerment in Global Scenario.

TEXT BOOK:

1. Jaysankar J, Human Resource Management, Margham Publications, 2013.

REFERENCES BOOKS:

1. Rao V.S.P, Human Resource Management, 2nd edn, Taxmann Pub, 2020.

2. Chhabra T.N and Monica S Chhabra, Essentials of Human Resource Management, Sun India Pub, 2020.
3. Aswathappa K, Human Resource Management: Text and Cases, 8th edn, McGraw Hill, 2017.
4. Mira S Saiyadain, Human Resources Management, 4th edn, McGraw Hill, 2008.
5. Gupta, C.B, Human Resource Management, Sultan Chand & Sons, 2012.

Course Outcomes:

On the successful completion of the course, students will be able to:

CO1	Equip with the management skills and human behavioural knowledge for a career in human resource management.	**K5**
CO2	Get understanding in the intellectual, social and personal development .	**K2**
CO3	Practically manage and coordinate people to achieve strategic business objectives.	**K3**
CO4	Exercise staff recruitment and selection, employee relations management, staff training and job evaluation.	**K4**
CO5	Gain knowledge on the concept of employee empowerment.	**K1**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	M	S	M	S	M	W	S	M	S	M
CO2	S	S	M	W	N	S	M	M	M	N	S	S
CO3	S	M	S	S	M	M	S	W	S	M	S	M
CO4	S	M	M	W	S	M	M	M	M	N	S	M
CO5	S	S	M	M	N	S	S	M	W	N	S	S

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECE532	CHOICE -II	L	T	P	C
ELECTIVE-III		POPULATION STUDIES	3	-	-	3
Cognitive Level		**K1:** Recall **K2:** Understand **K4:** Analyze **K6:** Create				
Learning Objectives		1. To make the students to understand the relationship between population growth and economic development. 2. To help the students to understand the reasons for migration. 3. To understand the population policy in India 4. To equip the students with the knowledge regarding the population policy of India 5. To understand the population trends in India.				

UNIT I: Population Science, Demography and Development

Population and Economic development- Population and environment -Implications of population Growth on Regional imbalances-Population Science and Demography- Meaning and scope of demography; components of population growth .

UNIT II: Theories of population growth

Malthusian Theory of Population- Optimum Theory of Population- Theory of Demographic Transition.

UNIT III: Fertility, Nuptiality and Mortality

Fertility, Nuptiality and Mortality-Importance of study of fertility – Factors affecting fertility – Socio-economic factors. Nuptiality – Concept and analysis of marital status, Mortality – Death rates, crude and age-specific; Mortality at birth and infant mortality rate.

UNIT IV: Migration and Urbanization

Migration and Urbanization-Concept and types – Temporary, internal and international; International migration –Its effect on population growth and pattern; Factors affecting migration; Urbanization – Growth and distribution of rural- Urbanization in India.

UNIT V: Population Policy

Population Policy in India-Evolution of population policy in India – The shift in policy from population control to family welfare, to women empowerment; Family planning programmes. Population trend in India

TEXT BOOK:

1. Jhingan M.L, Bhatt B.K. and Desai J.N., Economic Planning and Development, 3rd edn, Vrinda Publication, 2019.
2. Jain R.K, A Textbook of Population Studies, Neha Publishers, 2013.

REFERENCE BOOKS:

1. Rajendra Kumar Sharma, Demography and Population Problems, Atlantic Pub, 2020.
2. Tim Dyson, A Population History of India: From the First Modern People to the Present Day, Oxford University Press, 2018.

3. Krishnamurthy Srinivasan, Population Centres in India: Shifting Trends, Policies and Programs, Sage, 2017.
4. Pathak K.B and Ram F, Techniques of Demographic Analysis, Himalaya, 2016.
5. Majumdar P.K, India's Demography: Changing Demographic Scenario in India, Rawat Pub, 2013.
6. Mahendra K Premi, India's Changing Population Profile, National Book Trust, 2011.

Course Outcomes

On the successful completion of the course, the students will be able to

CO1	Understand the growth of population in India	**K1**
CO2	Know about the theories of Population	**K2**
CO3	Understand the concepts of Fertility, Nuptiality and Mortality.	**K1**
CO4	Analyse the reasons for migration.	**K4**
CO5	Develop a proactive attitude towards the population policy	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**S**	**S**	**S**	**S**	**S**	**M**	**W**	**W**	**S**	**S**
CO2	**S**	**S**	**S**	**M**	**S**	**M**	**S**	**W**	**M**	**N**	**S**	**S**
CO3	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**W**	**M**	**M**	**M**	**S**
CO4	**M**	**S**	**S**	**S**	**M**	**W**	**S**	**M**	**M**	**S**	**S**	**S**
CO5	**S**	**S**	**S**	**N**	**S**	**M**	**M**	**W**	**S**	**M**	**S**	**S**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECS53	ECONOMICS OF TOURISM	L	T	P	C
SKILL BASED ELECTIVE-III			2	-	-	2
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				
Learning Objectives		1. To make the students to understand the role of tourism as an economic intervention and its significance in economy. 2. To make the students to understand the economic importance of tourism 3. To provide the knowledge about travel agents & tour operators 4. To emphasize on various tourism organization that brings about its development. 5. To give understanding in the global nature of the tourism Industry				

UNIT I: Economic importance of Tourism

Concepts- Definitions - Types of tourist- Types and Forms of Tourism;-Tourism system- Economic importance of Tourism – Contribution to National Income – Tourism and employment – Tourism and Foreign Gains.

UNIT II: Travel motivation

Factors influencing the growth of Tourism – Need for Rest and Relaxation – Travel Motivation – Participation in sports – Business activities.

UNIT III: Employment and Income creation

Employment and Income creation, Tourism Multiplier Effects, Balance of Payments, Foreign Exchange

UNIT IV: Tourism planning and tour operators

Tourism Planning- Need and Importance, Travel Agents and Tour operators -Role of Tourism Development Corporation in India.

UNIT V: Tourism Organizations:

Objectives and Role of ITDC- TTDC –IRCTC- IATO and Civil Aviation in development- Tourism in the Era of Globalisation.

TEXT BOOKS:

1. Jagmohan Negi, Travel Agency and Tour Operator, Kanishka Publishing House, 2012
2. Bhatia A.K, Tourism Development and Principles, Sterling Publishers, 2014

REFERENCE BOOKS:

1. Seth Praveen, Tourism: Today and Tomorrow, New Delhi, Anmol Publications, 2019.
2. Seth P.N and Bhat S.S, An Introduction to Travel and Tourism Management, Sterling Publication, 2017.
3. Bhatia A.K, Tourism in India, New Delhi, Sterling Publishers, 2016.
4. Ratan Deepsingh, Dynamics of Tourism, Kanishka Publishers, 2015.
5. Kaul R.N, Dynamics of Tourism, Sterling Publishers, 2013.
6. Singh P.K, Fifth Year of Indian Tourism, Kanishka Publishers, 2010.

Course Outcomes:

On the successful completion of the course, the students will be able to:

K3	**CO1**	Trace the impact of the tourism as a factor for development in all fields, viz., socioeconomic, ecological impacts.
K4	**CO2**	Analyse the impact of tourism on employment and income creation.
K2	**CO3**	Gain knowledge about travel agents and tour operators
K2	**CO4**	Get knowledge on various tourism organization that brings about its development.
K1	**CO5**	Understand the global nature of the tourism Industry

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**M**	**M**	**W**	**S**	**S**	**W**	**M**	**S**	**M**	**W**	**M**
CO2	**W**	**S**	**M**	**S**	**M**	**M**	**S**	**S**	**M**	**W**	**S**	**M**
CO3	**S**	**M**	**M**	**W**	**S**	**M**	**S**	**M**	**S**	**M**	**W**	**M**
CO4	**S**	**W**	**S**	**M**	**S**	**M**	**M**	**M**	**M**	**W**	**S**	**M**
CO5	**S**	**W**	**S**	**M**	**S**	**S**	**M**	**W**	**S**	**M**	**S**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

SEMESTER-VI

COURSE CODE	U21ECT61	INDIAN ECONOMIC DEVELOPMENT–II	L	T	P	C
CORE XIII			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				
Learning Objectives		1. To make the students to understand the status of Indian agriculture. 2. To enable the students to have an understanding of the various issues/components of the Indian Economy. 3. To provide knowledge on economic planning of India. 4. To impart the knowledge of economic reforms in India 5. To provide knowledge on inclusive growth				

UNIT I: Agricultural Scenario

Role of Agriculture in Indian Economy - Causes for Low Productivity - Measures to Improve Productivity – Green Revolution - New Thrust Areas in Agriculture - New Agricultural Strategy.

UNIT II: Unemployment in India

Meaning – Concepts of Unemployment – Types of Unemployment – Causes for Unemployment – Remedial Measures for Unemployment.

UNIT III: Planning in India

Meaning and Significance of Planning – Types – Objectives of Economic Planning – Strategies – Review of Indian Fiver Year Plans – Targets, achievements and failures**.**

UNIT IV: Economic Reforms

Internal and External Reforms – New economic policy and India- WTO and its impact on the different sectors of the economy – Financial Sector Reforms – inclusive growth- goals and achievement.

UNIT V: Industrial Scenario

Definition of cottage, Small, medium and large Scale – Importance - Problems – Remedies – Public Sector Undertakings (PSUs) Role of PSUs in India – Causes for the Failure of PSUs in India – KVIC in India – development of basic and heavy industries in India- New Industrial Policy 1991.

TEXT BOOKS:

1. Sankaran S., Indian Economy, Margham Publications, 2014.
2. Dutt R & Sundaram K.P.M, Indian Economy, S.Chand, 72nd edn, 2016.

REFERENCE BOOKS:

1. Dristi Experts and Manohar Pandey, Indian Economy, Dristi Publication, 2020.
2. Government of India: India Vision, Academic Foundation, New Delhi.2020
3. Vaishnavi Shankar, Indian Economy, Kiran Prakashan Publication, 2019.
4. Sanjiv Verma, The Indian Economy, Unique Pub, 2018.

5. Ramesh Singh, Indian Economy, 10th edn, McGraw Hill, 2018.
6. Mishra S.K, & Puri V.K, Indian Economy, Himalaya Publishing House, 2011.

Course Outcomes:

On the successful completion of the course, student will be able to:

CO1	Understand the agricultural scenario of India.	**K1**
CO2	Understand the concepts of unemployment and measures to solve the unemployment in India.	**K1**
CO3	Gain knowledge in economic planning of India.	**K2**
CO4	Examine economic reforms of India	**K4**
CO5	Get insights in the concept of inclusive growth	**K3**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**S**	**S**	**M**	**S**	**S**	**S**	**S**	**S**	**S**	**M**	**S**
CO2	**S**	**M**	**S**	**S**	**M**	**S**	**M**	**S**	**M**	**S**	**S**	**S**
CO3	**M**	**M**	**S**	**S**	**W**	**M**	**S**	**S**	**S**	**M**	**S**	**W**
CO4	**S**	**S**	**S**	**M**	**M**	**S**	**W**	**M**	**S**	**M**	**M**	**M**
CO5	**S**	**S**	**S**	**S**	**W**	**M**	**S**	**S**	**W**	**M**	**W**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT62	MATHEMATICAL ECONOMICS–II	L	T	P	C
CORE XIV			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze				
Learning Objectives		1. To enable the students to understand the fundamentals of mathematics. 2. To enable the students to understand the practical applications of mathematics in research. 3. To improve the mathematical knowledge of the students. 4. To provide the knowledge of application of derivatives in economic concepts 5. To develop the knowledge of Linear Programming				

UNIT I: Matrices

Matrices – Meaning – Types of Matrices – Operations of Matrices (Addition, Subtraction and Multiplication) – Transpose of Matrix- Inverse of matrix- Solution of linear equations by Crammer's rule

UNIT II: Analytical geometry of two dimensions

Equation of straight line- slope intercept form-point slope form-Two point form- Two intercept form-Concurrent lines- Two straight line.

UNIT III: Differentiation

Differentiation – Meaning – Basic Rules of Differentiation – Higher Order Differentiation (First and Second Order only) – Calculation Using Addition, Subtraction, Product Quotient and function of function rule)

UNIT IV: Application of derivatives in economics

Average Cost and Marginal Cost – Average and Marginal Revenues – Maxima and Minima – Profit and Sales Maximization

UNIT V: Linear programming

Linear Programming – Introduction – Meaning – Basic Concepts – Mathematical Formulation of Linear Programming – Problem and its Solution by graphical Method Only.

TEXT BOOKS:

1. Bose D, An Introduction to Mathematical Economics, Himalaya Publishing House, 2018.
2. Manoharan M, and Elango C, Business Mathematics, Palani Paramount Publications, 2018.

REFERENCE BOOKS:

1. Kunt Sydsaeter & Peter J. Hammond, Mathematics for Economics Analysis, Pearson Publication, 2020.
2. Joshi R.C and Nancy, Mathematical Methods in Economics-II, Vishal Pub, 2019.
3. Wilson Mion, Introduction to Mathematical Economics, 2018.

4. Agarwal C.S and. Joshi R.C, Mathematics for Students of Economics, The New Academic Publishing, 2017.
5. Nik Hashim Nik Mustapha, Mathematical Economics with Application, University Malaysia Teragganu Publication, 2015.
6. Sancheti D.C and Kapoor V.K, Business Mathematics, 11th edn, Sultan Chand, 2014.

Course Outcomes:

On the successful completion of the course, the students will be able to:

CO1	Gain the knowledge of matrix operation including addition, subtraction, multiplication and transposition	**K2**
CO2	Apply mathematical formula in practical life.	**K3**
CO3	Apply their acquired knowledge in research	**K3**
CO4	Understand the applications of derivatives in economic concepts	**K4**
CO5	Get knowledge in Linear Programming	**K1**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**N**	**N**	**W**	**S**	**W**	**M**	**N**	**N**	**S**	**W**	**N**	**M**
CO2	**M**	**M**	**M**	**M**	**M**	**M**	**W**	**M**	**S**	**M**	**W**	**M**
CO3	**S**	**M**	**M**	**M**	**W**	**M**	**W**	**M**	**S**	**W**	**W**	**M**
CO4	**S**	**M**	**W**	**M**	**M**	**S**	**W**	**M**	**S**	**M**	**N**	**W**
CO5	**W**	**N**	**N**	**S**	**W**	**M**	**W**	**M**	**S**	**N**	**N**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT63	PUBLIC FINANCE	L	T	P	C
CORE XV			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K4:** Analyze **K6:** Create				
Learning Objectives		1. To enable the students to understand the concepts of public finance. 2. To enable the students to understand and analyze the role and functions of the government and the impact of financial operations on economic activities. 3. To enable the students to understand the polices of government related to financial administrations. 4. To make the students to understand the concept of public debt with its causes, effects and management 5. To provide knowledge in the framework of budget and overview of current Union Budget.				

UNIT I: Scope of Public Finance

Public Finance – Definition- Scope- Public Finance and Private finance- Principles of Maximum Social Advantage- Public goods and Private goods

UNIT II: Sources of Public revenue

Sources of Public Revenue – Taxes – Canons of Taxation–Principles of Taxation Classification of Tax – Direct and Indirect taxes—A brief note on different taxes – GST in India - Effects of Taxes

UNIT III: Public Expenditure

Public Expenditure - Meaning - Definition – Causes for the growth of Public expenditure In India – Cannons of public Expenditure- Effects of public expenditure- Control of public expenditure.

UNIT IV: Public debt and Budget

Public debt – Meaning – classification of public debt –causes, effects and redemption of public debt - Budget - Meanings and objective of budget- structure of budget- et- Budgetary procedure in India- – A overview of Current Union budget.

UNIT V: Fiscal Federalism

Meaning – Principles of Fiscal Federalism – Objectives of Finance Commission – Recommendations of 13th, 14th and 15th Finance Commission – Co-operative Federalism- NITI Aayog - Centre State Financial Relations.

TEXT BOOKS:

1. Kavery, SudhaNaik , Public Finance (Fiscal Policy), S.Chand & Co, 2010.
2. Tyagi B.P, Public Finance, Jai Prakash Nath& Co., 2015.

REFERENCE BOOKS:

1. Varshney J.C, Public Finance, SBPD Publishing, 2021.
2. Seth M.L, Money, Banking, International Trade and Public Finance, Lakshmi Narain Agarwal Pub, 2020.
3. Mithani M.D, Money, Banking, International Trade and Public Finance, 20th edn, Himalaya Publishing House, 2018.
4. Hajela, T.N, Money, Banking and International Trade, 9th edn, Books Wagon Pub, 2016.
5. Hajela, T.N, Money, Banking and Public Finance, Ane Books, 2009.
6. Bhatia H.L, Public Finance, 30th edn, S.Chand, 2000.

Course Outcomes:

On the successful completion of the course, students will be able to:

CO1	Understand the importance of public finance in economic development	**K1**
CO2	Get in-depth knowledge in public expenditure especially the significance and effects of increase in public expenditure	**K2**
CO3	Examine the ways in which direct and indirect taxes are levied for augmenting financial resources towards economic development	**K4**
CO4	Understand the concept of public debt with its causes, effects and management	**K1**
CO5	Develop the framework of budget and overview of current Union Budget.	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	S	S	S	S	S	W	S	W	S	M
CO2	S	M	S	S	M	S	M	M	M	S	S	M
CO3	S	M	M	M	N	S	W	M	M	N	S	M
CO4	S	M	W	M	M	S	M	W	M	M	S	M
CO5	S	M	S	M	W	S	S	M	M	M	S	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT64	INDUSTRIAL ECONOMICS	L	T	P	C
CORE XVI			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K5:** Evaluate				
Learning Objectives		1. To make the students to understand the theories of industrial location. 2. To impart knowledge on industrial productivity. 3. To equip the students with the knowledge regarding the relationship between industrial growth and economic development. 4. To provide knowledge in industrial finance 5. To enhance the knowledge of the students in industrial policy of India				

UNIT I: Industrialisation

Industrialisation– pattern – rationalization of industrialization – Factors inhibiting industrialisation – Inter dependence of agriculture and industry

UNIT II: Location of Industry

Location of Industry - Factors determining Industrial Location - Theories of Industrial Location - Weber's Theory – Sargent Florence's Theory –Balanced Regional development of Industries – Need for balanced Regional development in India.

UNIT III: Industrial productivity

Industrial Productivity – Tools of Productivity – Factors influencing industrial productivity – Productivity Movement in India – National Productivity Council – Scientific Management.

UNIT IV: Industrial Finance

Industrial Finance 14-- hours Industrial Finance - Term Finance: Short Term, Long Term - Specialized Financial Institutions - IFCI - IDBI - ICICI.

UNIT V: Industrial polices

Industrial Policies - 1956, 1977, 1991 - Role of State - New Industrial Policy and Economic Reforms.

TEXT BOOKS:

1. Barthwal, R.R, Industrial Economics: An Introductory Textbook, 3rd edn, New Age International Pub, 2019.
2. Sivayya K.V and Das V.B.M, Indian Industrial Economy, 11th edn, S.Chand & Co., 2014.

REFERENCE BOOKS:

1. Kuchhal S. C, Industrial Economy of India, Chaitanya Pub. House, 2018.
2. Chernnila F, Industrial Economics: Indian Perspective, Himalaya Publishing House, Mumbai, 2016.
3. Devine P.J, An Introduction to Industrial Economics, George Allen and Unwin, 2012.
4. Sharma N. K, Industrial Economics, Anmol Publications Pvt. Ltd, 2010.

5. Sadhu A.N, and Singh A, Industrial Economics, Himalaya Publishing House, 2010.

Course Outcomes:

On the successful completion of the course, students will be able to:

CO1	Understand the causes for industrial disputes, and find out the measures for social security	**K1**
CO2	Identify the factors affecting the location of an industry	**K2**
CO3	Examine the need for industrial growth in India.	**K3**
CO4	Get knowledge about Industrial Productivity	**K2**
CO5	Get insights in to the Industrial policies of India	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	W	S	M	S	S	S	M	M	W	S	M
CO2	S	M	W	S	M	M	S	S	M	W	S	M
CO3	W	S	M	S	M	S	M	W	M	W	S	M
CO4	W	S	M	S	M	M	W	S	M	W	S	M
CO5	S	M	M	S	M	M	M	W	S	M	S	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECT65	RURAL ECONOMICS	L	T	P	C
CORE XVII			5	-	-	4
Cognitive Level		**K1:** Recall **K2:** Understand **K4:** Analyze **K5:** Evaluate **K6:** Create				
Learning Objectives		1. To provide the students with a thorough knowledge and understanding of the foundations of rural economics 2. To impart knowledge on concepts of the dimensions of rural development 3. To make the students to understand the challenges in rural development and strategies for rural upliftment. 4. To provide understanding in the causes and consequences of Rural Poverty, and the Poverty Alleviation Programmes 5. To enhance the knowledge about the tribal economy and analyse the tribal agricultural activities				

UNIT I: Rural Economy

Rural economy: Characteristics – Need for the study of Rural economy – Comparison of Rural Economy and Urban Economy. Concepts: Barter System, Non Monetized Sector – Agricultural Marketing –Farm and Non-Farm Income - Problems of Rural Economy.

UNIT II: Rural Unemployment

Rural Unemployment: Types, Structure, Causes of Unemployment and Remedial measures. Rural Employment Generation Programmes: NRLM, MGNREGA. Technology for rural growth: ICT, mobile, successful programmes.

UNIT III: Rural Credit

Rural indebtedness: Causes and effects of rural indebtedness, Remedies. Rural Credit - Need for Credit – Sources of Rural Credit. Unorganized credit: Money lenders. Organized: Indigenous Bankers - Co-operatives, Commercial banks - Regional Rural banks - Micro-Finance Institutions (MFIs) – NABARD

UNIT IV: Rural Poverty

Rural Poverty: Causes and Consequences - Rural Poverty Line – Estimates of poverty –Factors influencing Rural Poverty – Removal of Poverty - Rural Development in India.

UNIT V: Tribal Economy

Tribal Economy: Characteristics of Tribal economy – Distribution of Tribal population in India - Tribal Agriculture and allied activities: Horticulture, Floriculture, Animal husbandry, Forest and forest collection. Problems in Tribal areas

TEXT BOOKS:

1. Sankaran S. Rural Economics ,Margham Publications
2. Dutt R & Sundaram K.P.M, Indian Economy, S.Chand, 72nd edn, 2016.

REFERENCE BOOKS:

1. Amarjit Singh, Fundamentals of Agricultural Economics, Himalaya Publication, 2019.
2. Reddy K.V, Agriculture and Rural Development, Himalaya Publishing House, 2017.
3. Sharma R.K et-al, Agriculture at a Glance, Daya Publications, 2011.
4. Vasant Desai, Rural Development in India, 2nd edn, Himalaya Publication, 2010.
5. Choudrey, C.M. Rural Economics. Sunshine Publications, 2009.

Course Outcomes:

On the successful completion of the course, students will be able to:

CO1	Understand the concepts and problems of rural economy.	**K1**
CO2	Define the structure of rural unemployment and the technology used for rural growth.	**K2**
CO3	Examine the extent of rural indebtedness, and the measures to remove rural unemployment.	**K4**
CO4	Evaluate the causes and consequences of Rural Poverty, and describe the Poverty Alleviation Programmes	**K5**
CO5	Improve the knowledge about the tribal economy and analyse the tribal agricultural activities	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	M	N	W	N	S	S	N	W	N	S
CO2	M	M	S	W	S	N	W	S	M	N	W	S
CO3	S	S	S	N	S	N	W	S	N	M	M	S
CO4	M	S	S	N	S	N	W	M	N	M	S	S
CO5	M	M	M	N	S	N	M	M	N	M	W	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECE641	CHOICE -I	L	T	P	C
ELECTIVE-IV		LABOUR ECONOMICS	3	-	-	3
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K5:** Evaluate				
Learning Objectives		1. To give knowledge in labour market and policies of labour market 2. To impart knowledge on the concepts of wage determination 3. To make the students to understand the students the Indian labour laws 4. To provide knowledge on rural employment 5. To provide knowledge on child labour and bonded labour				

UNIT I: Labour Market and Policies

Labour Market- Nature and Characteristics, Demand for Labour in relation to size and pattern of investment, Choice of technologies and labour policies Supply of Labour, Growth of Labour Force.

UNIT II: Employment and Wage Determination

Employment and Development relationship- Employment Policy Wage Determination- Classical, Neo-classical and Bargaining theories; Concepts of minimum wage and efficiency wage; Non-wage component of labour remuneration,

UNIT III: Industrial and Agricultural Labour

Industrial Labour- Theories of labour movement, growth, pattern and structure of labour unions in India, Industrial Disputes and their settlements, trends in collective bargaining, Indian Labour laws in the context of international labour standards.

UNIT IV: Agricultural Labour Markets

Rural labour supply, interlocking of factor markets, nature and trends in rural employment, Agricultural wages in India, Non-agricultural rural employment

UNIT V: Social Security and Reforms

State and Social Security- Concepts and evolution, Social assistance and insurance, Review and Appraisal of State Policies, Special Problems- Child labour, discrimination, bonded labour Labour market Reforms- National Commission on Labour.

TEXT BOOKS: ·

1. Cahuc P, Carcillo S and Zylberberg A, Labor Economics, 2nd edn, PHI, 2014.
2. Bazen Stephen, Econometric Methods for Labour Economics, Oxford University Press, 2011.

REFERENCE BOOKS

1. Floro Caroleo et-al, Young People and the Labour Market, Routledge, 2018.
2. Saibal Kar and Debabrata Datta, Industrial and Labour Economics: Issues in Developing and Transition Countries, 5th edn, Springer, 2015.

3. Rajendra Prasad Singh, Agricultural Labour: Various Issues, Regal Pub, 2011.
4. Ehrenberg R and Smith R.S, Modern Labor Economics: Theory & Public Policy, Pearson, 2012.
5. Usha Sharma, Child Labour in India, Mittal Pub, 2006.
6. Jhabvala R. and Subrahmanya R.K, The Unorganised Sector: Work Security and Social Protection, Sage Publications, 2000. ·

Course Outcomes

On the successful completion of the course, the students will be able to

CO1	Understand the policies of labour market	**K1**
CO2	Gain knowledge about the concepts of wage determination	**K2**
CO3	Examine the application Indian labour laws	**K3**
CO4	Gain knowledge about rural employment	**K2**
CO5	Evaluate the cases and effects of child labour and bonded labour	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	M	N	W	N	S	S	N	W	N	S
CO2	M	M	S	W	S	N	W	S	M	N	W	S
CO3	S	S	S	N	S	N	W	S	N	M	M	S
CO4	M	S	S	N	S	N	W	M	N	M	S	S
CO5	M	M	M	N	S	N	M	M	N	M	W	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECE642	CHOICE -II	L	T	P	C
ELECTIVE-IV		HEALTH ECONOMICS	3	-	-	3
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K5:** Evaluate				
Learning Objectives		1. To impart the importance of health and education 2. To make the students to understand the role of health and education in human development 3. To impart knowledge on health care demand and the health insurance market 4. To make the students to understand the existing public policies in health sector. 5. To provide knowledge on rate of return to education and quality of education in India				

UNIT I: Health Education

Role of health and education in human development: health and education outcomes and their relationship with macroeconomic performance

UNIT II: Topics in Health Economic Theory

Demand for health, Grossman's model of demand for health, information asymmetry in healthcare demand, and the health insurance market, physician induced demand, adverse selection and moral hazard in health insurance

UNIT III: Economic evaluation of health care

Cost effectiveness and cost-benefit analysis; valuing life

UNIT IV: Public policy in the health sector

Externalities in health and health care; rationale for government intervention in the health sector

UNIT V: **Education**

Investment in human capital; rate of return to education: private and social; quality of education; signalling of human capital; theories of discrimination; gender and caste discrimination in India. Education sector in India: An overview.

TEXT BOOKS:

1. Bhattacharya J et-al, Health Economics, Palgrave Macmillan, 2014.

2. Ehrenberg R, and Smith R, Modern Labour Economics: Theory and Public Policy, 11th edn, Addison Wesley, 2012

REFERENCE BOOKS:

1. Kesavan Sreekantan Nair, Health Economics and Financing, New Century Publications, 2019.

2. Chee-Ruey Hsieh and Frank A. Sloan, Health Economics, The MIT Press, 2012.
3. Braverman J, Health Economics, Pharma Press, 2009.

Course Outcomes

On the successful completion of the course, the students will be able to

CO1	Understand the importance of human health and education	**K1**
CO2	Examine the role of health and education on economic development	**K3**
CO3	Gain awareness on health policies	**K4**
CO4	Get understanding in health care system in India	**K2**
CO5	Evaluate the rate of return to education	**K5**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	M	N	W	N	S	S	N	W	N	S
CO2	M	M	S	W	S	N	W	S	M	N	W	S
CO3	S	S	S	N	S	N	W	S	N	M	M	S
CO4	M	S	S	N	S	N	W	M	N	M	S	S
CO5	M	M	M	N	S	N	M	M	N	M	W	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

COURSE CODE	U21ECS61	BUSINESS COMMUNICATION	L	T	P	C
SKILL BASED ELECTIVE-IV			2	-	-	2
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create				
Learning Objectives		1. To help the students to understand the importance of business communication. 2. To improve the communication knowledge of the students. 3. To help the students to understand the steps in drafting the business letter. 4. To improve the knowledge of students on banking correspondence 5. To enhance the knowledge of the students on report writing				

UNIT I: Introduction

Business Communication –Meaning-objectives- Importance of business communication – Process and principles Modern Communication devices – Word processor- telex- Fax- E-mail- Tele conferencing – Telephone answering machine- Internet – websites and their uses.

UNIT II: Business Letter

Analysis of Business Letter- Layout – Kinds of Business letters- letter of enquiries- replies - Offers and Quotations – Offer orders – Cancellations – Replies- Circular- Complaints and Settlement-Sales letter.

UNIT III: Banking Correspondence

Bank Correspondence –correspondence with customers- Insurance Correspondence- Agency Correspondence- Correspondence relating to Exports and Imports

UNIT IV: Company Correspondence

Correspondence with share holders, Government Departments & Statutory Bodies- Application for appointment – Importance, Types, Structure – Oral Presentation -Planning for Oral presentation.

UNIT V: Report Writing

Report – Meaning , Importance, Principles governing the preparation of Report – Qualities of Good Report- Functions of a Report – Types of Reports- Reports by individuals, Committees.

TEXT BOOK:

1. Kathiresan and Dr. V. Radha, Business Communication, Prasanna Publishers, 2011.

REFERENCE BOOKS:

1. Bhatia R.C, BusinessCommunication,Annes Students Edition, 2019.
2. Kumkum Bhardwaj, Fundementals of Business Communication, Wiley, 2014.
3. Jain V.K, Business Ethics and Communication, S.Chand, 2008.

4. Jyoti Jai, Business Communication, Garima Publications, 2007.
5. Galgotia, Business Communication Skills, Galgotia Publication, 2006.

Course Outcomes

On the successful completion of the course, the students will be able to

CO1	Understand the importance of business communication	**K1**
CO2	Improve their communication skills in business	**K3**
CO3	Describe the steps in report writing	**K2**
CO4	Prepare the banking correspondence	**K4**
CO5	Create good report writing	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	M	N	W	N	S	S	N	W	N	S
CO2	M	M	S	W	S	N	W	S	M	N	W	S
CO3	S	S	S	N	S	N	W	S	N	M	M	S
CO4	M	S	S	N	S	N	W	M	N	M	S	S
CO5	M	M	M	N	S	N	M	M	N	M	W	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation N – No correlation

VALUE ADDED PROGRAMME

COURSE CODE	U21ECV51	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
SEMESTER - V			-	-	-	2
Cognitive Level		**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze **K6:** Create				
Learning Objectives		1. To enable the students to understand the traits and qualities of successful entrepreneur 2. To make the students to understand the problems faced by the entrepreneurs. 3. To promote the knowledge of the students in project management and marketing techniques. 4. To enable the students to understand the preparation of project proposal 5. To enhance the knowledge of the students on getting finance for setting new enterprises.				

UNIT I: Introduction

Entrepreneur – Meaning —Definition - Functions of Entrepreneur – Types – Role of Entrepreneurs in Economic Development – Entrepreneur and Manager – Traits and Qualities of Successful Entrepreneurs.

UNIT II: Entrepreneurship

Concept of Entrepreneurship – Motivation Theories – Motivating Factors Entrepreneurial Mobility – Factors Influencing Mobility.

UNIT III: Women entrepreneurship

Women Entrepreneurship – Concept, Types – Factors Influencing Women Entrepreneurship – Traits of women entrepreneur - Role and Functions – Growth of Women Entrepreneurship in India – Problems of Women Entrepreneur – Steps to Promote Women Entrepreneurship in India.

UNIT IV: Small scale industries

Meaning of Small Scale Industries – Types of SSI – Role of SSI in Economic Development – Problems of SSI – Project Report – Contents – Formulation.

UNIT V: Institutional arrangement

Institutional Arrangement for Entrepreneurship Development – DIC – SIDO – SIDCO – NSIC – SIPCOT – TIIC – SIDBI – Incentives and Subsidies – EDP – Need – Objectives Instructions.

TEXT BOOK:

1. Khanka S.S, Entrepreneurial Development, S. Chand & Co, 2007.

REFERENCE BOOKS:

1. Debasish Biswas and Chanchal Dey, Entrepreneurship Development in India, Routledge, 2021.

2. Robert D. Hisrich et-al, Entrepreneurship, 11th edn, McGraw Hill, 2020.
3. Gupta C.B, Srinivasan N.P, Entrepreneurial Development in India, Sulthan Chand & Sons, 2020.
4. Vasant Desai, Dynamics of Entrepreneurship Development, Himalaya Publishing House, 2011.
5. Saravanavel P, Entrepreneurship Development, Ess Pee Kay Publishing, 2009.

Course Outcomes:

On the successful completion of the course, student will be able to

CO1	Get the interest in entrepreneurial activity	**K2**
CO2	Understand the meaning and role of entrepreneur	**K1**
CO3	Equip themselves with entrepreneurial skills for self-employment	**K4**
CO4	Understand the importance of women entrepreneur in economic development	**K3**
CO5	Develop knowledge about the financial institutions which help the entrepreneur	**K6**

Mapping:

Course Outcomes	**Programme Outcomes**							**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	M	N	W	N	S	S	N	W	N	S
CO2	M	M	S	W	S	N	W	S	M	N	W	S
CO3	S	S	S	N	S	N	W	S	N	M	M	S
CO4	M	S	S	N	S	N	W	M	N	M	S	S
CO5	M	M	M	N	S	N	M	M	N	M	W	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation N – No correlation

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MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL-624101

M.A. ECONOMICS (CHOICE BASED CREDIT SYSTEM)
(Full-time)

SYLLABUS, REGULATION AND SCHEME OF EVALUATION

(From 2021-2022 onwards)

MOTHER TERESA WOMENS UNIVERSITY
KODAIKANAL---624 102
DEPARTMENT OF ECONOMICS
CHOICE BASED CREDIT SYSTEM (CBCS)
(2021-2022)
M.A. (ECONOMICS)

1. About the Programme

M.A Economics is a Post Graduate Programme designed with focus on sustainable development of the students. Accordingly, the M.A. Programme includes fundamental theories of economics, recent economic issues, theories of development, Monetary economics, Fiscal Economics, Industrial Economics, Agricultural Economics, Environmental Economics and so on. The Programme prepares its students to be upright and productive citizens. The Programme helps the students to seize the employment opportunities in business, government institutions, and private institutions. This programme is based on Learning objectives and outcome based curriculum frame work consistent with the international standard.

2. Programme Educational Objectives (PEOs)

PEO1	To enhance the knowledge of the students in economic theories.
PEO2	To equip the students with the knowledge of statistical and mathematical tools necessary for economic and social researches.
PEO3	To make the students to be aware of the contemporary economic issues of national and international economies.
PEO4	To prepare the students for competitive examinations through intensive learning and make them face the competitive world with courage and confidence.
PEO5	To enable the students to understand the economic policies and its applications.
PEO6	To enhance the knowledge of the students on environmental issues.
PEO7	To make the students use their theoretical knowledge in practical life.

3. Eligibility

Pass in any UG Degree with 50% of Marks (10+2+3 Pattern)

4. General Guidelines for PG Programme

i. Duration

The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. Medium of Instruction: English

iii. Evaluation

Evaluation of the candidates shall be through Internal Assessment and External Examinations.

- **Evaluation Pattern**

	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz (5) = 25
- External Theory: 75

- **Question Paper Pattern for External Examination for Core and Elective Papers**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions - 2 questions from each Unit	**10**
2	**B**	**5*4=20** (Internal Choice with 2 questions from each Unit (Either/or)	**20**
3	**C**	**3*15=45** Open Choice-Any three questions out of 5 - one Question from each Unit)	**45**
Total Marks			**75**

- **Project Report**

A student should select a topic for the Project Work at the end of third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks, Viva: 75 Marks)

Minimum credits required to pass - 90.

5. Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination, Students with 71% to 74% of attendance must apply for condonation in the prescribed form with the prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Students who with less than 65% of attendance are not eligible to appear for the examination and they shall re-do the semester(s) after completion of the course, with the prior permission of the Controller of the Examination, and The Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and The Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

M.A. (ECONOMICS) CURRICULUM

S. No	Course Code	Course Title	Credits	Hours		CIA	ESE	Total
				P	T			
Semester I								
1	P21ECT11	CORE-I Micro Economics – I	4	5	-	25	75	100
2	P21ECT12	CORE-II Macro Economics – I	4	6	-	25	75	100
3	P21ECT13	CORE-III Indian Economy	4	6	-	25	75	100
4	P21ECT14	CORE-IV Statistical Methods for Economics	4	6	-	25	75	100
5	P21ECT15	CORE-V Agricultural Economics	4	5	-	25	75	100
6	P21ECS11	Supportive Course I Communication Skills for Business	2	2	-	25	75	100
		Total	**22**	**30**				**600**
Semester II								
7	P21ECT21	CORE-VI Micro Economics – II	4	4	-	25	75	100
8	P21ECT22	CORE-VII Macro Economics - II	4	4	-	25	75	100
9	P21ECT23	CORE-VIII Mathematical Methods for Economics	4	4	-	25	75	100
10	P21ECT24	CORE-IX Entrepreneurship Development	4	5	-	25	75	100
11	P21ECT25	CORE-X Environmental Economics	4	5	-	25	75	100
12		NME-I	4	4	-	25	75	100
13	P21CSS22	Supportive Course II (Skill) Computer Skills for Web Designing and Video Editing	2	4	-	25	75	100
		Total	**26**	**30**				**700**
Semester III								
22	P21ECT31	CORE-XI Industrial Economics	4	5	-	25	75	100
23	P21ECT32	CORE-XII International Economics	4	5	-	25	75	100
24	P21ECT33	CORE-XIII Research Methodology	4	4	-	25	75	100
25	P21ECT34	CORE-XIV Monetary Economics	4	6	-	25	75	100
26	P21ECT35	CORE-XV Fiscal Economics	4	4	-	25	75	100
27	P21ECT36	CORE-XVI Development Economics	4	4	-	25	75	100
28	P21WSS33	Supportive Course III Women Empowerment)	2	2	-	25	75	100
		Total	**26**	**30**				**700**
Semester IV								

33	P21ECE411 / P21ECE412 P21ECE413	**ELECTIVE II** (1) Welfare Economics (2)Export Marketing and Procedure (3) MOOC Course$	4	4	-	25	75	100
34	P21ECE421 / P21ECE422 / P21ECE423	**ELECTIVE III** (1)Economics of Human Resource (2)Demography (3) MOOC Course$	4	4	-	25	75	100
35	P21ECR41	Project	22	8	-	25	75	100
		Total	**16**	**30**				**300**
		Grand Total	**90**	**120**				**2300**

Non Major Elective

P21ECN21 Issues in Gender Economics – 4 Credit – Second Semester

Additional Credit Courses (Mandatory)

P21ECV11 – Value Added Program I - Two Credits (First Semester) – **Marketing Strategies**

P21ECI21 – Internship/Industrial Training – Two Credits - (Second Semester)

P21ECO31 – Online Courses - Two Credits - (Third Semester)

P21ECV42 – Value Added Program II - Two Credits (Fourth Semester) – **Data Analysis**

*Those who have CGPA 9 and want to do the project in industry/ institution during fourth semester ,these two papers can be opted in third semester

$Students can take on 4 credit course in MOOC as elective or 2 credit course in MOOC as elective with the approval of Departmental Committee.

Outside class hours

- Health, Yoga and Physical Fitness
- Library Information access and utilisation
- Employability Training

Programme Outcomes (POs)

On the successful completion of the programme, Students will be able to

PO1	get thorough knowledge in fundamental theories of economics.
PO2	understand the current economic problems and find ways to solve them.
PO3	get insights into the mathematical and statistical techniques.
PO4	do economic researches.
PO5	face competitive examinations with courage and confidence.
PO6	become rational consumers and enlightened citizens.
PO7	aware of the contemporary economic issues around the world.
PO8	understand the importance of environmental protection in the context of economic development.

Programme Specific Outcomes (PSOs)
On completion of this Programme,

PSO1	Students will be able to analyse economic problems and find solutions for them.
PSO2	Students will have thorough understanding of national and international economic issues and will acquire skills to face the competitive world.
PSO3	Students will be able to take wise decisions in their personal budgeting.
PSO4	Students will be equipped with entrepreneurial skills, innovation and optimism.
PSO5	Students will be enthusiastic to pursue economic researches,

SEMESTER – I

Course Code	P21ECT11	MICRO ECONOMICS - I	L	T	P	C
CORE I			5	-	-	4

Course Objectives:

1. To make the students to understand the basic concepts of micro economics.
2. To make the students to understand the applications of micro economics.
3. To enhance the knowledge of the students in the subject matter of economics.
4. To help the students in the preparation of competitive examinations.
5. To enable the students to understand the structure of markets.

UNIT I: Basic Concepts

Nature and scope of Micro Economics – Economic models – Uses and Limitations – The concept of Equilibrium – Meaning – Static and Dynamic Equilibrium – Stable Vs Unstable Equilibrium – Neutral Equilibrium – Partial Equilibrium – General Equilibrium – Methods – Deduction and Induction.

UNIT II: Theory of Consumer Behavior and Demand

Consumer preferences – Utility analysis – Cardinal and ordinal utility theories Indifference Curve analysis – Income, substitution and price effects – Revealed preference Theory – Meaning of Demand – Demand Function – Types of Demand – Law of Demand – Changes in Demand – Elasticity of Demand – Importance.

UNIT III: Theory of Production and Cost

The concept of Production – Laws of Production – Laws of Returns to Scale – The Law of Variable Proportions – Internal and external economies – Cobb Douglas production function Iso Quant – Equilibrium of the firm. – Cost curves – Cost output relationship in short run and long run .

UNIT IV: Market Structures

Definition of Market – Classification of Market – Perfect Competition – Features – Price and output determination under Perfect Competition – monopoly – Price Discrimination – Price determination under Discriminating Monopoly – Monopolistic competition – features – the concept of “industry” and “group” equilibrium of the firm – Oligopoly – features – Price determination – Kinked demand curve.

UNIT V: Theories of Pricing

Theories of Pricing – Full cost pricing principle – Mark – up pricing rule – Target pricing – Average cost pricing – Administer pricing – Dual Pricing – Differential pricing – Pricing over

life cycle of product – Multi product pricing – Product line pricing – Public sector pricing – Marginal cost pricing

Text Books:

1. H.L.Ahuja, Modern Micro Economics: Theory and Applications, S.Chand and company Ltd, New Delhi, 2020edition.
2. Dwivedi.N., Micro Economics, Pearson Education, New Delhi, 2012

References:

1. Jhingan.M.L, Micro Economic Theory, Vrinda Publications, New Delhi, 2016
2. Koutsoyannis, A Modern Microeconomics, Macmillan Press, London, 2014.
3. Cyril Kanmony. J., Advanced Micro Economics Himalaya Publishing House, New Delhi, 2013
4. Maria John Kennedy .M. Micro Economics, Himalaya Publishing House, New Delhi, 2013
5. P.L.Mehta, Managerial Economics Analysis Problems and Cases, Sultan Chand & Sons, New Delhi, 2011.
6. Kavery .R and Others, Micro Economic Theory , S,Chand and Company Ltd, New Delhi, 2012
7. Besanto and David.A, Micro Economics, Wiley, New Delhi, 2011

Course Outcomes:

On the successful completion of the course students will be able to

K1	CO1	Understand the basics of Micro Economics
K5	CO2	Analyze the economic relationship between the variables.
K3	CO3	Enhance their skills in the measurement of variables and relationship.
K2	CO4	Improve their attitude towards economic laws.
K4	CO5	Get an interest in the application of economics for business decision, planning and forecasting.

<u>Mapping of COs with POs & PSOs</u>

Course Outcomes	**Programme Outcomes**								**Programme Specific Outcomes**				
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	M	M	M	M	N	M	M	M	M	N	N	S	S
CO2	S	S	M	S	M	S	S	M	S	M	S	S	M
CO3	S	S	M	S	M	S	S	M	S	M	M	S	S
CO4	S	S	M	N	M	S	S	M	N	M	N	M	M
CO5	M	S	M	M	S	M	S	M	M	S	S	S	S

*S-Strong correlation , M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT12	MACRO ECONOMICS	L	T	P	C
CORE II			6	-	-	4

Course Objectives:

1. To provide an elaborate understanding in the subject matter of macro economics.
2. To make the students to aware of the recent developments in the subject of macro economics.
3. To make the students to know about the relevance of macroeconomic concepts to the economy.
4. To help the students in gaining knowledge about practical applicability of concepts of macro economics.
5. To provide understanding in the concepts of national income accounting.

UNIT I: Flow of funds (12 hours)

Flow of Funds in National Economy – National Products and Related Concepts – Sectoral Accounts – Measurements and Problems in National Income Accounting – Social Accounting – Use of Current and Constant Price Indices – Basic Concepts.

UNIT II: Equilibrium model (12 hours)

Basic equilibrium in classical model – basic Keynesian model – equilibrium in the product and money markets – Full employment – Theories of employment – Keynesian theory of employment – Aggregate supply, Aggregate demand and Effective demand.

UNIT III: Consumption function (12 hours)

Consumption function – Absolute income hypothesis – Relative income hypothesis – Permanent income hypothesis – Life cycle hypothesis.

UNIT IV: Investment function (12 hours)

Investment Function – Keynesian approach – Accelerator – Assumptions- importance Multiplier Theory – Assumptions – Leakages – Short Comings.

UNIT V: Keynesian system (12 hours)

Post – Keynesian approach – Neo – Keynesian approach - lags in investment demand – stability and slope of the IS curve and policy consequences.

Text Books:

1.Ahuja.H.L.Macro Economics, S.Chand and Company Ltd, New Delhi, 2020
2.Jhingan.M.L.,Macro Economic Theory, Vrinda Publications, New Delhi,2016

References:

1. Sankaran.S.Macro Economics, Margham Publications, Chennai, 2015.
2. Abel.A.B andBernake.B.S, Macro EconomicsPearson, New Delhi, 2013
3. Gordon Robert. J. Macro Economics, PHI Learnimg,New Delhi, 2012.
4. Vaish, M.C., Macro Economics, Wiley Eastern Limited, New Delhi, 2011
5. Dwivedhi.D.N, Macro Economics: Theory and Policy, McGraw Hill Education, New Delhi, 2010

Course Outcomes

On the successful completion of the course the students will be able to

K1	CO1	Understand the Fundamental knowledge of Macro Economics.
K2	CO2	Learn more about the importance of Macro Concepts.
K3	CO3	Identify the values and importance of basic equilibrium in Classical and Keynesian Model.
K4	CO4	Apply ideas in Consumption function and Investment function concepts.
K5	CO5	Evaluate importance of the subject of Macro Economics.

<u>Mapping of COs with POs & PSOs</u>

Course Outcomes	**Programme Outcomes**								**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO4**	**PSO 5**
CO1	S	M	M	M	M	M	M	M	M	M	M	M	M
CO2	S	W	M	S	W	S	M	W	W	M	S	W	S
CO3	S	S	W	M	M	S	S	S	M	M	M	M	S
CO4	S	S	S	M	M	M	M	W	W	S	M	M	M
CO5	S	W	M	M	M	S	S	W	W	W	M	M	S

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT13	INDIAN ECONOMY	L	T	P	C
CORE III			6	-	-	4

Course Objectives

1. To make the students to understand the problems of Indian economy.
2. To help the students to identify the national income estimations of Indian economy.
3. To help the students to identify the human progress of Indian economy.
4. To help the students to understand the problems and impact of Poverty in Indian economic development .
5. To make the students to understand the objectives and strategy of India's economic planning .

UNIT I: India as a Developing Economy (12 hours)

Basic characteristics of Indian Economy – Major Issues of Developing Economy – India as a Mixed Economy – Profile of Natural Resource in India.

UNIT II: National Income of India (12 hours)

National Income Estimation in India – CSO Revised National Income Series – Trends in National Income: Growth and Structure – Limitations of National Income Estimation in India.

UNIT III: Human Resources and Economic Development (12 hours)

The Theory of Demographic Transition – Size and Growth of Population in India – Sex and Age Composition – Density – Occupational Structure – Workforce Participation in India – Urbanization – Population Growth as retarding Factor to Economic Development.

UNIT IV: Poverty, Inequality and Unemployment in India (12 hours)

Poverty- Concepts – Studies in Poverty – Need for redefining Poverty Line – Poverty under Five Year Plans and Economic Reforms – Poverty Eradication Programmes: Achievements and Failures – Nature and Estimation of Unemployment in India – Causes and Consequences – Various Schemes to reduce Unemployment.

UNIT V: Economic Planning in India (12 hours)

Objectives of Economic Planning – Achievements and Failures of Economic Planning – Liberalization – Privatization – Globalization.

Text Books:

1. Misra and Puri, Indian Economy, Himalaya Publishing House, New Delhi, 2020
2. Deepa Shree, Indian Economy: Performance and Policies, Ane Books, New Delhi,2011

References:

1. Uma Kapila, Indian Economy: Performance and Policies, Academic Foundation, 2019
2. Agarwal.A.N and Agarwal.M.K, Indian Economy, New Age International Publications, 2019
3. Dutt and Gaurov, Dutt&Sundaram Indian Economy. Chand &Co, New Delhi, 2019.
4. Sankaran., Indian Economy, Margham Publication, Chennai, 2014
5. Agarwal H.S., Indian Economy, Laksmi Narain Agarwal Educational Publishers, Agra, 2011

Course Outcomes:

On the successful completion of the course the students will be able to

K1	CO1	Understand the nature of the Indian Economy, its basic characteristics and its natural resources.
K2	CO2	Describe the concepts of National income and estimation of national income and its limitations.
K4	CO3	Analyse the availability of human resources and take decisions to improve.
K3	CO4	Examine poverty and unemployment and the measures to solve unemployment and poverty.
K5	CO5	Evaluate the economic planning and its achievements.

<u>Mapping of COs with POs & PSOs</u>

Course Outcomes	**Programme Outcomes**								**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	M	S	S	S	M	S	W	S	S	M	**S**
CO2	M	S	M	S	S	S	S	M	M	S	W	S	**M**
CO3	S	M	S	M	M	M	S	M	S	N	M	S	**M**
CO4	S	M	M	S	M	S	M	N	S	N	S	M	**S**
CO5	M	S	S	W	M	M	S	W	M	S	S	M	**W**

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT14	STATISTICAL METHODS FOR ECONOMICS	L	T	P	C
CORE IV			6	-	-	4

Course Objectives:

1. To equip the students with the knowledge of statistical tools needed for research and analysis.
2. To impart the knowledge of correlation and regression analysis.
3. To impart the knowledge of parametric and non parametric testing procedures.
4. To equip the students with the knowledge of probability and statistical distributions.
5. To train the students for NET and SET Exams.

UNIT-I : Statistical Investigation and presentation of Data (12 hours)

Data-Types of data variables-primary and secondary data-census and sampling method-sampling and sampling methods-classification of data-Tables-Graphic representation of data-Bar charts-Pie charts-Histogram- Line graph.

UNIT-II : Correlation and Regression (12 hours)

Components of correlation-Karl–Pearson's correlation co-efficient-Spearman's Rank correlation-Regression-Meaning and uses-Regression lines - Regression equations-fitting of simple linear equations.

UNIT-III : Time series and Index Numbers (12 hours)

Moving averages and Time series smoothing-Fitting trend-Fore casting- Index Numbers-Weighted and Un-weighted Index Numbers-Test of consistency-Time Reversal test-Factor reversal test-Base shifting.

UNIT-IV : Parametric-Non -Parametric Test of Hypothesis (12 hours)

Procedure of Testing Hypothesis-Type I and Type II Errors- one tailed-Two tailed-Test of Hypothesis: Parametric: t-test, z-test, f-test, ANOVA Non parametric: chi-square test, the sign test, a rank sum test-Limitations of Non-Parametric Test

UNIT-V : Probability and Theoretical Distributions (12 hours)

Probability Distribution – concept of probabilities- Probability theorems. Theoretical Distribution-Bays' theorem-Bionomical, Poisson and Normal Distribution -Fitting a Normal curve.

Text Books:

1. Manoharan M Palani Paramount Publications, Palani, 2012
2. Gupta S.P Statistical Methods, Sulthan Chand& sons, New Delhi, 2011

References

1. S.C.Gupta, Fundamentals of Statistics, Himalaya Publishing House, New Delhi, 2020.
2. Navdeep Kaur and Sarbjit Kaur, Statistical Methods for Economics, Vishal Publishing Company, Jalandhar, 2019.
3. Pillai R.S and Bagavathi, Statistics theory and Practice, S.Chand& Company Pvt Ltd, New Delhi, 2010.
4. Seema Sharma, Statistics for Business and Economics, Marcham Publications, Chennai, 2010.

Course Outcomes

On the successful completion of the course the students will be able to

K1	CO1	Obtain knowledge on the statistical concepts, methods & techniques to Economics.
K2	CO2	Understand the significance of statistical applications in Economic Analysis.
K4	CO3	Gain knowledge on Analysis and hypothesis.
K3	CO4	Identify the type of statistical situation to which different distributions can be applied.
K5	CO5	Do the project work with confidence.

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	**Programme Outcomes**								**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	M	**S**	**N**	**N**	**N**	**M**	**W**	**M**	**W**	**N**	**W**	**N**
CO2	N	M	**W**	**N**	**S**	**W**	**M**	**S**	**S**	**N**	**W**	**M**	**W**
CO3	M	**S**	**S**	**W**	**W**	**S**	**N**	**W**	**N**	**S**	**W**	**N**	**S**
CO4	W	**W**	**S**	**N**	**N**	**M**	**W**	**W**	**N**	**W**	**M**	**N**	**N**
CO5	N	**W**	**S**	**N**	**W**	**N**	**W**	**M**	**N**	**W**	**S**	**N**	**W**

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT15	AGRICULTURAL ECONOMICS	L	T	P	C
CORE V			5	-	-	4

Course Objectives:

1. To enable the students to understand the importance of agricultural sector in India.
2. To enable the students to understand the problems of Indian agriculture.
3. To help the students to know about the prospects of Indian agriculture.
4. To help the students to know about the recent developments in Indian agricultural sector.
5. To help the students to understand the pricing policy and marketing efficiency of agricultural sector.

UNIT I: Agriculture and Economic Development (12 hours)

Nature and Scope of Agricultural economics: Traditional agriculture and its modernization – Role of agriculture in economic development – Interdependence between agriculture and industry. Models of interaction between agriculture and the rest of the economy – Agricultural development – Green Revolution – Mechanization.

UNIT II: Land Reforms and Land Policy (12 hours)

Principles of land utilization : Land distribution – Structure and trends – Land values and rent – Land tenures and farming systems – Peasant, capitalist, collective and state farming Tenancy and crop sharing – Forms, incidence and effects – land reforms measures and performance.

UNIT III: Agricultural Production and Productivity (12 hours)

Resource use and efficiency: Production function analysis in agriculture – factor combination and resource substitution – Size of farm and laws of returns – Farm budgeting and Farm Planning – Corporate agriculture and contract farming.

UNIT IV: Agricultural Prices (12 hours)

Agricultural markets and marketing efficiency : Marketing functions and costs – Market structure and imperfections – Regulated markets – Marketed and marketable surplus – Behavior of agricultural prices – Cobweb model; Price and income stability; State policy with respect to agricultural marketing – Warehousing – Prices – Taxation, crop insurance and subsidies – Terms of trade between agricultural and non-agricultural prices – Need for state intervention – Objectives of Agricultural Price Policy – Instruments and evaluation.

UNIT V: Agricultural Finance (12 hours)

Role of capital and rural credit – Organized and unorganized capital market – Rural savings and capital formation – characteristics and sources of rural credit – Institutional and Non – Institutional – Reorganization or Rural credit – Co-operatives, Commercial Banks, Regional Rural Banks – Role of NABARD.

Text Book:

1. Agricultural Economics, S.Subba Reddy etal ,Himalaya Publishing House, New Delhi, 2019.

References:

1. Johinder Sing and R.K.Lekhi, Agricultural Economy of India, Kalyani Publications Ludhiana, 2020
2. Satbir Singh Nain and Vinay Memala, Introduction to Agricultural Economics,, Himalaya Publishing House, New Delhi, 2020.
3. Amarjit Singh etal, Fundamentals of Agricultural Economics, Himalaya Publishing House, New Delhi, 2019.
4. Uma Kapila, Indian Economy: Performance and Policies, Academic Foundation, 2019.
5. Nandania.A.V., Introduction to Indian Agriculture Economics, Cyber Tech Publications, New Delhi, 2014.

Course Outcomes

On the successful completion of the course the students will be able to

K1	CO1	Understand the role of Agriculture in economic development.
K2	CO2	Identify the sources and importance of rural credit.
K3	CO3	Examine the marketing of agricultural products and behaviour of agricultural prices.
K5	CO4	Evaluate the pricing policy of the agricultural sector
K6	CO5	Assess the land reforms measures and performance.

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PS4	PSO5
CO1	S	S	W	M	W	S	M	W	W	M	W	M	N
CO2	S	S	M	M	W	M	S	M	W	W	M	M	M
CO3	S	M	M	W	M	S	S	M	M	W	M	M	W
CO4	S	S	M	M	M	S	M	W	M	M	W	M	M
CO5	S	M	W	M	M	S	M	W	W	M	W	M	M

S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECS11	COMMUNICATION SKILLS FOR BUSINESS	L	T	P	C
SUPPORTIVE COURSE I			2	-	-	2

Course Objectives

1. To improve the listening skill of the students
2. To improve the writing skill of the students
3. To impart the knowledge of business communication
4. To impart the skill of personality development
5. To train the students in stress management

UNIT I: Introduction to Communication (6 hours)

Communication-meaning of communication- Objectives-types of communication-importance of effective communication- barriers -Business letter-sales letters-Dealing with non-payment problems-complaints-circular letters

UNIT II: Business Correspondence (6 hours)

Enquiries-Replies- Complaints-Preparing a Curriculum Vitae or a Resume-Application letter-Offer letter-Acceptance letter-Testimonial

UNIT III: Reports (6 hours)

Reports-structure- Formal Report- Informal Report-Check list for compiling reports- Preparing Minutes of meeting-Compiling a press release

UNIT IV: Communication Skills (6 hours)

Basic skills and techniques for talking to people in business situation-Telephonic conversation

UNIT V: Personality Development (6 hours)

Body language- Personality Development-Stress management-Role of technology in communication

Text Book:

1. Puspalatha and Sanjay Kumar, Communication Skills, Oxford University Press, New Delhi,2017

References

1. V.Saraswathi & Maya. K. Mudbhatkal: English for Competitive Examinations, Emerald Publishers, Chennai, 2000.
2. Chitra.C., Business Communication, Charulatha Publications, 2019.
3. Kumkum Bhardwaj, Fundamentals of Business Communication, Wiley, 2019.

Course Outcomes

On the successful completion of the course the students will be able to

K1	CO1	Understand the concept and structure of communication
K2	CO2	Develop writing skills
K6	CO3	Create and write business communication
K4	CO4	Apply personality development skills
K5	CO5	Trained to manage stress

Mapping of COs and POs and PSOs

Course Outcomes	Programme Outcomes					Programme Specific Outcomes							
	PO1	**PO2**	**PO 3**	**PO 4**	**PO5**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**	**PSO 8**
CO1	**S**	**S**	**M**	**M**	**S**	**M**	**S**	**S**	**N**	**W**	**W**	**M**	**M**
CO2	**S**	**S**	**M**	**M**	**S**	**N**	**S**	**S**	**M**	**M**	**N**	**S**	**M**
CO3	**S**	**M**	**M**	**W**	**M**	**W**	**S**	**W**	**N**	**M**	**N**	**S**	**M**
CO4	**S**	**W**	**M**	**M**	**S**	**S**	**M**	**M**	**S**	**W**	**W**	**W**	**M**
CO5	**S**	**M**	**M**	**N**	**M**	**M**	**S**	**S**	**W**	**S**	**N**	**S**	**M**

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

SEMESTER – II

Course Code	P21ECT21	MICRO ECONOMICS	L	T	P	C
CORE VI			4	-	-	4

Course Objectives

1. To enhance the knowledge of the students in the subject matter of economics .
2. To help the students in the preparation of competitive examinations.
3. To enable the students to understand the basic laws of economics.
4. To enable the students to understand the relevance of micro economic concepts to the economy.
5. To help the students to understand the theories of value

UNIT I: Distribution (12 hours)

Neo – Classical approach – Marginal Productivity Theory; Product Exhaustion Theorem; Elasticity of Technical Substitution – Theory of distribution in imperfect product and factor markets.

UNIT II : Factor Pricing : Theory of Rent and Wages (12 hours)

Classical theory – Ricardian theory of rent – Modern theory of rent – Demand and supply theory of rent – Quasi Rent – Subsistence theory of wages – Wage fund theory – Marginal productivity theory – Modern theory of wages.

UNIT III: Theory of Interest and Profit (12 hours)

Classical theory of interest – Fisher's theory of interest – Lonable funds theory – Liquidity preference theory – Modern theory of interest – Risk theory – Uncertainty bearing theory – Dynamic theory – Schumpeter's innovation theory – Marginal productivity theory of profit.

UNIT IV: Economics of Risk (12 hours)

Individual behavior towards risk – Expected utility and certainty equivalence approaches risk and risk aversion – cost and risk, risk pooling and risk spreading – mean – variance analysis and portfolio selection.

UNIT V: Theories of Value (12 hours)

Adam Smith – The measure of value – Determinants of value – The market price and the natural price – David Ricardo Labour theory value – The Ricardo effect – Karl Marx – Marxian Theory of value.

Text Books

1. Ahuja H.L. Micro Economic Theory, S.Chand and Company Ltd, Mumbai,2014
2. David Desanko and Ronald Braeutigam, Micro Economics,WilleyPublications, New Delhi, 2017

References

1. B,Bose and Marimuthu, An Introduction to Micro Economics, Himalaya Publishing House, New Delhi, 2020.
2. Jhingan.M.L., Micro Economic Theory, Himalaya Publishing House, New Delhi,2018.
3. Abha Mittal, Micro Economics, S.Chand & Company, New Delhi,2018.
4. Martin.J.Osbome and Ariel Rubinstien, Models in Microeconomic Theory, Open Book Publishers, 2017
5. Koutsoyannis, A Modern Macro Economics, Macmillan Press, London,2014.

Course Outcomes:

On the successful completion of the course, the students will be able to

K1	CO1	Understand the various forms of markets and competitions.
K2	CO2	Examine the business decision process
K3	CO3	Identify market equilibrium
K5	CO4	Evaluate the logic of factor pricing
K4	CO5	Apply the economic ideas in practical life

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO8**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	M	W	M	M	S	M	M	W	M	W	M	M
CO2	M	M	S	M	M	M	S	M	S	M	M	N	M
CO3	S	S	M	M	M	S	S	S	M	M	M	S	S
CO4	M	M	W	W	W	M	M	M	W	W	M	S	M
CO5	S	S	S	M	M	S	M	S	S	M	S	S	M

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT22	MACRO ECONOMICS	L	T	P	C
CORE VII			4	-	-	4

Course Objectives

1. To provide an elaborate understanding in the subject matter of macro economics.
2. To make the students to aware of the recent developments in the subject of macro economics.
3. To make the students to know about the relevance of macroeconomic concepts to the economy.
4. To help the students in gaining knowledge about recent developments in theories of macro economics.
5. To help the students to understand the concepts of inflation and deflation

UNIT I: Neo-Classical and Keynesian Synthesis (12 hours)

Neo-Classical and Keynesian views on interest; the IS – LM model; Extension with government sector; Relative effectiveness of monetary and fiscal policies.

UNIT II: Post-Keynesian Demand for Money (12 hours)

Post-Keynesian approaches to demand for money – Patinkin and the Real Balance Effect, Approaches of Baumol; and Tobin: Friedman and Modern quantity theory; Crisis in Keynesian economics and the Revival of monetarism.

Unit III: Macro Economics in an Open Economy (12 hours)

Mundell – Fleming model – Asset markets, expectations and exchange rates – Monetary approach to Balance of Payments.

UNIT IV: Theory of Inflation (12 hours)

Inflation – Types – Deflation – Approaches to inflation – Classical and Keynesian approaches to inflation – Policies to control inflation.

UNIT V: Trade Cycle (12 hours)

Trade cycle – Features – Phases – Theories of Trade cycle: Kaldor – Hicks – Schumpeter.

Text Books:

1. Jhingan.M.L, Macro Economic Theory, Vrinda Publications, New Delhi,2016
2. Ghosh.C. and Gosh. A, Macro Economics, PHI. New Delhi, 2011

References:

1. Abha Mittal, Macro Economics, S,Chand and Company Ltd Mumbai, 2014 edition..
2. Seth.M.L, Macro Economics, S,Chand and Company Ltd Mumbai, 2014 edition.
3. Ahuja.H.L, Macroeconomic Theory, S.Chand and Company Ltd, Mumbai, 2013
4. Froyen.R.T., Macro Economics :Theories and Policies, Pearson, 2013

.**Course Outcomes**

On the successful completion of the course, the students will be able to

K1	CO1	Understand the fundamentals of macro economics
K2	CO2	Identify the importance of macro concepts
K3	CO3	Examine the values and importance of Classical and Keynesian synthesis
K4	CO4	Apply the ideas and approaches of Patinkin, Baumol, Tobin and Friedman
K5	CO5	Evaluate the importance of macro economics

Mapping of COs and POs and PSOs

Course Outcomes	Programme Outcomes								Programme specific outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	M	M	S	S	M	M	M	M	W	W	M	M	M
CO3	M	W	M	S	S	M	S	S	M	M	S	M	S
CO4	W	S	W	W	M	M	W	W	W	M	M	M	W
CO5	W	S	S	S	W	M	M	M	S	S	W	M	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT23	MATHEMATICAL METHODS FOR ECONOMICS	L	T	P	C
CORE VIII			4	-	-	4

Course Objectives:

1. To enable the students to understand the fundamentals of mathematical methods.
2. To impart various mathematical methods.
3. To improve the mathematical knowledge of the students.
4. To help the students in applying mathematical formula in practical life.
5. To equip the students to know the application of mathematical techniques.

UNIT I: Introduction (12 hours)

Definition and importance of Mathematical Methods - Linear equations - Quadratic equations – Logarithmic function.

UNIT II: Calculus and Differentiation (12 hours)

Differential Calculus Meaning Partial Differentiation – Total Differentiation - Total , Average and Marginal Cost – Average and Marginal Revenues – Marginal Utility - Maxima and Minima – Profit and Sales Maximization.

UNIT III: Set Theory (12 hours)

Set Theory Meaning - Definition - Notations of Set – Types of Sets – Forms of Sets - Specification of Sets – Law of Set Operation – Ordered Pairs - Cartesian Product - Application in Economics.

UNIT IV: Matrices (12 hours)

Matrices Meaning - Definition - Notations of Matrix - Types of Matrix - Algebra of Matrices – Transpose of a Matrix - Determinants - Rank of a Matrix - Adjoint – Inverse – Solving a System of Liner Equations – Testing Consistency Liner Equation.

UNIT V: Linear Programming (12 hours)

Linear Programming Meaning - Basic Concepts - Mathematical Formulation of LPP – Graphical Method – Simplex Method.

Text Books

1. Dr. D.Bose, An Introduction to Mathematical Economics, Himalaya Publishing House, Mumbai, 2014
2. S.C.Gupta and V.K.Kapoor, Fundamentals of Mathematics and Statistics, S.Chand and Company Ltd, New Delhi, 2020. .

References

1. Balwant Kandoi, Mathematics for Business and Economics with Applications, , Himalaya Publishing House, Mumbai, 2017
2. Joshi.R.C and Nancy, Mathematical Methods in Economics, Vishal Publishing Co, Jalandhar, 2019
3. Monga.G.S, Mathematics and Statistics for Economic, S.Chand and Company Ltd, New Delhi, 2014.
4. Madnani.G.M.K, and Mehta. B.C. Mathematics for Economists, S.Chand and Company Ltd. New Delhi, 2011.
5. Vedamanickam, Mathematical Methods, G.V. Book Publication, Madurai, 2011.

Course Outcomes

On the successful completion of the course, students will be able to

K2	CO1	Use mathematical knowledge for their future studies
K3	CO2	Capable to workout Maximum Profit and Utility, Minimum Cost and Price; if there are two commodities
K1	CO3	Understand the concepts of SET Theory
K4	CO4	Calculate marginal functions, Maximum profit and Minimum cost for a firm and maximum utility for consumer.
K5	CO5	Examine Total and Average Functions, Consumer's and Producer's Surplus.

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	**Programme Outcomes**								**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	S	M	S	S	S	S	S	S	M	S	M
CO2	S	M	S	S	M	S	M	S	M	S	S	S	S
CO3	M	M	S	S	W	M	S	S	S	M	S	W	S
CO4	S	S	S	M	M	S	W	M	S	M	M	M	M
CO5	S	S	S	S	W	M	S	S	W	M	W	M	S

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT24	ENTREPRENEURSHIP DEVELOPMENT	L	T	P	C
CORE IX			5	-	-	4

Course Objectives

1. To help the students in developing entrepreneurial skills.
2. To promote the knowledge of the students in project management and marketing techniques.
3. To enhance the knowledge of the students on getting finance for setting new enterprises.
4. To make the students to understand the problems faced by the women entrepreneurs and the solutions to the problems.
5. To make the students to understand the role of entrepreneurs in economic development.

UNIT I: Introduction (12 hours)

Entrepreneurship – Definition, importance and characteristics of Entrepreneurship – Functions, types, and motives of Entrepreneurship – Growth of Entrepreneurs in India.

UNIT II: Business idea and project preparation (12 hours)

Search for a business idea – sources – processing and selection – selection of types of organization – project classification and identification – project objectives – internal and external constraints – format for a report.

UNIT III: Women Entrepreneurs (12 hours)

Functions and role of women Entrepreneurs and rural Entrepreneurs – their problems – selection of industry by women Entrepreneurs – types of industries / business for women Entrepreneurs and rural Entrepreneurs.

UNIT IV: Training and Finance (12 hours)

Training and Finance : objectives of training – phase of EDP – special agencies for training – institutional finance with special emphasis of commercial banks, IDBI, IFCI, ICICI, IRBI, SFC, SIDFI, SIPCOT, Khadi and Village Industries Commission – Micro Finance.

UNIT V: Subsidies and Grants (12 hours)

Role of Central and State Government in promoting Entrepreneurship – Introduction of various incentives, subsidies and grants – Fiscal and Tax concessions available – Role of Entrepreneurships in export promotions and import substitutions.

Text Books

1. E.Gordan and K.Natarajan, Entrepreneurship Development, Himalaya Publishing House, New Delhi, 2020
2. K.K.Khanka, Entrepreneurial Development, S.Chand and Company Ltd, New Delhi, 2020

References

1. Vasant Desai, Entrepreneurship Development, Himalaya Publishing House, New Delhi, 2016.
2. Adelman,Philip.J, Entrepreneurial Finance, Pearson Education, Noida, 2011
3. Dipesh.D,Ulke,, Entrepreneurship Development, Himalaya Publishing House, New Delhi, 2012
4. Dhillon and Manvinder, Economic Empowerment of Women, Holiday Book House, Panchkula, 2010
5. Gupta,C.P and Srinivasan. N.P, S.Chand and Company Ltd, New Delhi, 2018.

Course Outcomes

On the successful completion of the course, students will be able to

K1	CO1	Acquire the knowledge regarding, Characteristics of an entrepreneurship.
K3	CO2	Develop an interest in entrepreneurial activity.
K2	CO3	Attain entrepreneurial skills for self employment.
K5	CO4	Assess the training and financial facility available for entrepreneurship.
K6	CO5	Create the business correspondence and communication.

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	**Programme Outcomes**								**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**W**	**W**	**N**	**N**	**N**	**W**	**M**	**S**	**W**	**N**	**W**	**M**	**M**
CO2	**M**	**S**	**W**	**N**	**N**	**S**	**S**	**S**	**W**	**M**	**N**	**N**	**W**
CO3	**M**	**M**	**N**	**N**	**N**	**S**	**M**	**M**	**M**	**N**	**N**	**N**	**W**
CO4	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
CO5	**M**	**W**	**N**	**N**	**N**	**M**	**W**	**S**	**N**	**W**	**N**	**N**	**M**

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT25	ENVIRONMENTAL ECONOMICS	L	T	P	C
CORE X			5	-	-	4

Course Objectives

1. To improve knowledge of the students in Environmental Economics.
2. To equip the students would gain knowledge and skills in environmental resources.
3. To make the students aware of importance in environmental pollution.
4. To prepare the students are would be able to evaluation of environmental benefit.
5. To enable the student to understand the environmental regulation and policies.

UNIT I: Introduction to Environmental Economics (12 Hours)

Environmental Economics Definition – Nature Scope and Importance- Relationship between Environmental Economics – The basic Concepts of Environmental Economics – Basic theory of environmental economics –Efficiency in private economy – Imperfect market problems – Kaldar – Hicks – compensation principle – Tragedy of commons.

UNIT II: Environmental Resources and Problems (12 Hours)

Environmental Resources - Definition, Type, Characteristics and Functions – Causes and Consequences Natural Resource - Renewable and Non- Renewable Resource – Environmental Problems in India.

UNIT III: Environmental Pollution (12 Hours)

Air, Water, Noise, Soil, Land Pollution – Industrial Pollution – Causes and Effect – Waste disposal and recycling of water –Global Warming and climate change, Ozone layer - - acid Rain – Bio- Diversity loss causes and Impact – Environmental Pollution in India – Policies of Pollution control and Conservation – Protection of environment – Legal system.

UNIT IV: Cost – Benefit Analysis (12 Hours)

Optimum Pollution - efficient level of environmental quality – evaluation of environmental benefit – direct and indirect methods - Population, Economic growth and environmental quality – Urbanization and environmental Problems – Second Stage of Demographic Transaction Effect of over- population problems and its impact.

UNIT V: Environmental and Policies (12 Hours)

Environmental Regulation Instruments – CAC-Legal – Global Environmental Movement – Regulation and Prohibition taxes , Subsidies and effect charges, Government Protection of Environmental Services – Environmental Education – Awareness – Movement in India.

Text Books

1. N.Mani, Environmental Economics, Himalaya Publishing House, New Delhi, 2018
2. Sethi Purnima, Environmental Economics, Alfa Publications, New Delhi, 2011

References

1. Charles D.Kolstad, Intermediate Environmental Economics, Oxford University Press, New Delhi, 2019.
2. M.J.Raijada, Environmental Economics, Himalaya Publishing House, New Delhi, 2018
3. Jhingan.M.L., Environmental Economics, Virinda Publications, New Delhi, 2015
4. VermaG.P, Environmental Economics, Advance Learner Press, New Delhi, 2013.

Course Outcomes

On the successful completion of the course, the students will be able to

K1	CO1	Understand the theories of environmental economics.
K2	CO2	Examine the environmental problems and offer solution.
K4	CO3	Apply regulation and prohibition measures to protect the environmental pollution
K3	CO4	Identify India's environmental policies
K5	CO5	Recognize their role in environmental protection

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	W	W	S	M	S	N	N	S	N	N	S	M
CO2	S	M	M	N	M	S	M	N	S	W	W	W	S
CO3	S	W	M	S	S	S	S	W	W	S	S	S	M
CO4	S	W	M	M	S	W	M	S	W	N	S	M	W
CO5	S	M	S	S	S	M	S	S	N	S	S	S	S

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECN21	ISSUES IN GENDER ECONOMICS	L	T	P	C
NON MAJOR ELECTIVE–I			4	-	-	4

Course Objectives

1. To know the objectives types, determinants of women Empowerment.
2. To learn the various national and international agencies for women empowerment.
3. To uplift women in socially, economically and politically as empowered.
4. To make aware of women rights and enhance their life
5. To know the women entrepreneurship development in India

UNIT I: Fundamentals of Women's Studies (12 Hours)

Meaning and Definition of the concept of Women's studies - Need and Scope - Women's studies as an academic discipline - Women's Studies – theories and Achievements- International Women's Year 1975 - International Women's Decade 1975 -1985; Towards Equal Status 1976 – Current trends-Importance of women's education – Efforts of various Committees –Life Skill Education to build capacity - Education as a tool of Women Empowerment - Obstacles to Women Education – Social, Economic, Cultural and other factors, limitations of Formal system of education-Role of educational institutions, Parents and Community.

UNIT II: Issues of Women (12 Hours)

Girl Children and Women in Society: Social Networking- Influencing factors of Social Networking-Types of Social Networking- impact and consequences of networking- Remedial measures and strategies for solution- NCW: Initiatives to overcome Women's issues - Ministry of Home Affairs and Networking with State Women Commissions: Cyber Crime Prevention against Women and Children (CCPWC)-challenges - efforts & effective measures to prevent crime against women and children - create awareness for social issues. Motherhood - Single Parent - Widows – Multiple Roles of Women - Role conflict, Role change - Social Responsibility and Gender Empowerment.

UNIT III: Achievement and Rights of Women (12 Hours)

Gender Equality: Achievement of Women - Educational, Political, Economic, Social - Panchayat Raj - Political role and participation - National and International Levels; Women's Rights - Property Rights - Redressal mechanism at different levels - Rights of Women with Disability: Case Studies on Women Achievers in the field of politics, education, arts science, law etc.

UNIT IV: Empowerment of Women (12 Hours)

Empowerment of Women: Alternative approaches - Women in Development (WID) - Women and Development (WAD) - Women's Development- Definition, Meaning and Scope, Gender and Development (GAD), Human Development Index (HDI) vs Gender Development Index (GDI). Types of Empowerment: Social, Educational, Political, Economical, Legal to Holistic levels-Role of Govt. and NGOs - Help line numbers in promoting women's empowerment - National and International Funding Agencies in promoting research on women.

UNIT V: Women Entrepreneurship (12 Hours)

Women Entrepreneurship:– Types of Entrepreneurs Opportunities and Risk – Push and Pull Factors –financial Assistance and credit facilities-Micro finance- Entrepreneurship Skill and Competencies - Women Entrepreneurship Development in India: TRYSEM – NABARD – NMEW - Support to STEP – TREAD – Rural Entrepreneurship Development Programme – Gramia Bank –Mahila bank and supportive measures- Industrial Development Bank of India (IDBI) – Small Industries Development Bank of India-SHG and Entrepreneurship opportunities.

References

1. Rani Sandhya, "Development of Women – Issues and Challenges", Discover Publishing House Pvt Ltd, New Delhi, 2012.
2. Anil Kumar Jha, "Gender Inequality and Women Empowerment", Axis Books, New Delhi, 2012.
3. Nandal Santosh , "Women and Development", A Mittal Publications, New Delhi, 2012
4. Rao Pulla, "Political Empowerment of Women in India – Challenges and Strategies", ABD Publishers, New Delhi, 2012.
5. Jenny Edwards, Andrea Cornwall, et al., "Feminisms, Empowerment and Development: Changing Women's Lives", Kindle Edition, 2014.
6. Elson Diane, et al. "Gender Equality and Inclusive Growth: Economic Policies to Achieve Sustainable Development", UN Women, 2019
7. Priyanka Sharma Gurnani, "Women Entrepreneurship – Emerging Dimension of Entrepreneurship in India" Educreation Publishing House, New Delhi, 2016.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	Gain knowledge about the concept, need and scope of women's studies.
K4	CO2	Acquaint and analyze issues of women in various contexts.
K3	CO3	Examine the changing role of women in society and issues related to it.
K5	CO4	Evaluate the importance of women's education
K2	CO5	Comprehend empowerment of women and their achievement

Mapping of COs and POs and PSOs

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	S	S	W	N	**M**	**S**	**S**	**M**	**N**	**S**	**S**	**W**
CO2	N	S	S	S	M	**S**	**S**	**S**	**S**	**S**	**M**	**M**	**N**
CO3	W	S	M	S	N	**M**	**S**	**S**	**S**	**S**	**M**	**S**	**W**
CO4	N	M	M	S	N	**S**	**S**	**S**	**S**	**M**	**M**	**M**	**M**
CO5	N	M	S	S	N	**S**	**M**	**M**	**S**	**S**	**S**	**S**	**W**

*S-Strongcorrelation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

SEMESTER – III

Course Code	P21ECT31	INDUSTRIAL ECONOMICS	L	T	P	C
CORE XI			5	-	-	4

Course Objectives

1. To help the students to know about the prospects of industrial sector of India.
2. To help the students to know about the recent development in industrial sector of India.
3. To enable the students to understand the importance of industrial sector in India.
4. To enable the students to understand the problems of Industrial sector.
5. To motivate the students to start business firms.

UNIT I: Introduction to Industrial Economics (12 Hours)

Industrial economics : Meaning, Nature and Scope – Industrial efficiency – the determinants of economic efficiency – measurement of efficiency levels – Types of organizational Form and alternative motives of the Firm – Business motives – Efficiency and the size of the firm.

UNIT II: Industrial Location (12 Hours)

Industrial location - The Geographical contribution - The Economic theories of location - Weber's theory of location - Split location - Sargant Florence theory - Losch theory - Industrial location: trends in India.

UNIT III: Industrial Productivity (12 Hours)

Industrial productivity - Measurement - Scope and significance - Tools of productivity - Factors influencing industrial productivity - Labour productivity - Determinants of labour productivity - Productivity movement in India.

UNIT IV: Industrial Policies (12 Hours)

Industrial policies - 1948 to till date -Concentration of Economic Power - Measurement of concentration - Consequences - MRTP - FERA - FEMA - LPG policies - Industrial combination - Types - Growth - Forms - Combination in India.

Unit V: Balanced Regional Development (12 Hours)

Balanced regional development - Indicators of regional imbalance – Distribution of industries – causes of economic backwardness – criteria for industrial - backwardness - Identification of Industrial backward areas - Policy measures to remove regional disparities.

Text Books

1. Singh, S.P, Industrial Economics and Management, AITBS Publication, India, 2010
2. Jotwani.K, Industrial Economics, Nirali Prakasan Publications, India, 2016

References

1. Birthwal, Industrial Economics, New Age International Publications,2018
2. Devine.P.J, Lee.N, Jones. R.Mand Tyson.W.J, An Introduction to Industrial Economics, Routiedge edition, New York, 2018.
3. Cherunilam F, Industrial Economics: Indian perspective, Himalaya Publishing House, New Delhi, 2017.
4. Ranjana Seth Industrial Economics, Ane Books Private Ltd, New Delhi, 2010.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	Understand the meaning of industry and measurement of industrial efficiency.
K3	CO2	Examine the factors affecting the location of an industry.
K4	CO3	Measure the industrial productivity.
K5	CO4	Evaluate the industrial policies.
K6	CO5	Assess the policy measures to remove regional disparities.

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	W	M	M	S	S	M	M	W	M	M	M
CO2	M	M	M	W	M	S	S	M	M	W	M	M	N
CO3	S	M	M	M	M	S	S	W	M	W	M	M	M
CO4	S	M	W	M	M	S	M	W	M	W	M	M	M
CO5	S	M	W	M	S	S	S	W	M	M	W	M	M

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT32	INTERNATIONAL ECONOMICS	L	T	P	C
CORE XII			5	-	-	4

Course Objectives

1. To enable the students to understand the theories governing international trade.
2. To enable the students to understand the significance of international economics.
3. To analyse the balance of payment and trade of the nation.
4. To enable the students to understand the consequences of exchange control and international trade.
5. To enable the students to understand the functions of international financial institutions.

UNIT I: Introduction to International Economics (12 Hours)

International Economics: Meaning, Nature and Scope - Importance of the study of International Economics: Inter - Regional and International Trade; Theories of Absolute Advantage, Comparative Advantage and Opportunity Cost; Hecksher - Ohlin Theory of Trade - Main Features, Assumptions and Limitations.

Unit II: Importance of trade (12 Hours)

Gains from Trade - Their Measurement and Distribution; Trade as an Engine of Economic Growth - Doctrine of Reciprocal Demand - Its Importance and Limitations - Factors determining the gain from trade.

UNIT III: Tariffs and Quota (12 Hours)

Types of Tariffs and Quota; Free Trade and Protection Tariffs; Concept of Optimum Tariff.

UNIT IV: Balance of Trade and Balance of Payments (12 Hours)

Concepts and Components of Balance of Trade and Balance of Payments; Equilibrium and Disequilibrium in Balance of Payments; Consequences of Disequilibrium in Balance of Payments; Various Measures to correct deficit in Balance of Payments; Relative merits, demerits and limitations of Devaluation; Concept and Implications of Foreign Trade Multiplier.

UNIT V: Foreign exchange and MNC'S (12 Hours)

Foreign exchange - Meaning - Foreign market functions - Objectives, Methods and Forms - Instruments of Export Promotion and Recent Export and Import Policies of India; Role of Multinational Corporations of India. Role of FDI & FII - Recent Reforms in International Trade with Regard to India.

Text Books

1. Mannur H G, International Economics, Vikas Publishing House, Ludhiana, 2021
2. Jhingan.M.L., International Economics, Virinda Publications, New Delhi, 2016

References

1. D.M.Mithani, International Economics, Himalaya Publishing House, New Delhi, 2020.
2. HL Bhatia, International Economics, S.Chand and Company Ltd, New Delhi, 2019.
3. Radha.V, International Trade, Prasanna Publications Chennai, 2012.
4. Francis Cherunilam, International Economics, S.Chand and Company Ltd, New Delhi, 2010.

Course Outcomes

On successful completion of the course, the students will be able to

K1	CO1	Understand the theories of international trade
K2	CO2	List out the factors determining the international trade
K4	CO3	Compare and contrast Balance of Payment and Balance of Trade
K5	CO4	Evaluate the functioning of Exchange Control and Exchange Rate Payments.
K6	CO5	Analyse the functions of International Financial Institutions

Mapping of COs and POs and PSOs

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	W	S	S	S	S	M	S	S	S
CO2	S	M	S	M	S	S	S	S	S	S	M	S	S
CO3	S	W	S	S	S	S	M	M	M	M	M	M	M
CO4	S	M	S	S	M	S	S	M	W	S	S	S	S
CO5	M	S	M	M	S	S	W	S	M	S	S	M	M

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT33	RESEARCH METHODOLOGY	L	T	P	C
CORE XIII			4	-	-	4

Course Objectives

1. To enable the students to understand the basic frame work of research process.
2. To enable the students to understand the research tools in social sciences.
3. To develop an understanding of various research design
4. To enable the students to understand the sampling design
5. To enable the students to understand the procedure in report writing and todo the research efficiently.

UNIT I: Research-meaning and scope (12 Hours)

Research – Meaning – Scope and Significance – Types of Research – Research process – Characteristics of good research – Scientific method – Problems in research – Identifying research problems.

UNIT II: Review of Literature and data collection (12 Hours)

Review of Literature – Purpose of Review of Literature – Tools of data collection – Primary & Secondary sources of data collection – Methods – Interview – Preparation, Questionnaire – Group discussion.

UNIT III: Hypothesis and Scaling Techniques (12 Hours)

Hypothesis – Meaning – Sources – Types formulation of Research design – Types, Case study – Features of good design – Measurement meaning – Scaling techniques – Meaning types of scales – Scale construction techniques – Pretest and pilot study establishing reliability and validity.

UNIT IV: Sampling (12 Hours)

Sampling design – Meaning – Concepts – Steps in sampling – Criteria for good sample design – Types of sample designs – Probability and Non Probability samples.

Unit V: Interpretation and report writing (12 Hours)

Interpretation – Meaning – Techniques of interpretation – Report writing – Steps in Report writing – Layout of Report – Types of Report – Norms for using Tables, Charts, Diagrams – Appendix, Norms for using Index and Bibliography.

Text Book

1. Ranjit Kumar, Research Methodology, Sage Publications, New Delhi, 2014

References

1. C.R.Kothari, Research Methodology, Methods and Techniques, Willey eastern Ltd., New Delhi, 2019
2. R.Meenakshi et.al, Research Methodology, S,Chand and Company Ltd, New Delhi, 2018.
3. W.J.Goode and P.K.Hatt, Methods in Social Research, Mc Graw Hill, International Edition, 2017.
4. A.N.Sadhu Research Methodology and Social Sciences – Himalaya Publishing House, 2015.

Course Outcomes

On the successful completion of the course, the students will be able to

K3	CO1	Apply scientific methods in research
K1	CO2	Understand the research gap
K3	CO3	Employ the methodological designs
K2	CO4	Identify the basics of probability and the uses of probability distribution
K6	CO5	Create Reports with proper interpretation

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	W	W	S	M	S	N	N	S	N	N	S	M
CO2	S	M	M	N	M	S	M	N	S	W	W	W	S
CO3	S	W	M	S	S	S	S	W	W	S	S	S	M
CO4	S	W	M	M	S	W	M	S	W	N	S	M	W
CO5	S	M	S	S	S	M	S	S	N	S	S	S	S

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation

Course Code	P21ECT34	MONETARY ECONOMICS	L	T	P	C
CORE XIV			6	-	-	4

Course Objectives

1. To enrich the knowledge of students on monetary theories.
2. To provide knowledge on money market and banking sector.
3. To enhance the knowledge of the students in recent developments in monetary economics.
4. To make the students to understand the concept of monetary economics.
5. To impart knowledge on banking system of India.

UNIT I: Monetary theories (12 hours)

Concept – Role of money in economy – Fisher's quantity theory – Cambridge Cash Balance Approach – Keynesian theory – Modern Quantity theory; Friedman's Approach – Don Patinkin's theory – Tobin's Portfolio analysis – Inventory theory of money (Baumol).

UNIT II: Theory of Money Supply (12 hours)

High powered money – Money multiplier process – Determinates of money multiplier – Factors affecting money supply – Credit creating by commercial banks – NBFI.

UNIT III: Central banking system (12 hours)

Role of Central Bank – Development and promotional functions – Credit control methods – RBI: Recent RBI Policies and Guidelines.

UNIT IV: Money and Capital Markets (12 hours)

Characteristics of developed and underdeveloped money market – Indian money market capital market; Primary and Secondary market – Stock exchange: role and its functions, capital issue control and its aim – SEBI and its role functions.

UNIT V: Monetary Policy (12 hours)

Role of monetary policy in economic development – goals, targets and indicators of monetary policy – lags in monetary policy – Inflation – Philips curve – Narasimhan Committee report.

Text Book

1. M.L.Jhingan, Monetary Economics, Vrinda Publications, New Delhi, 2011

References

1. Suraj Gupta, Monetary Economics ,S.Chand and Company Ltd, New Delhi, 2019
2. S,Sankaran, Monetary Economics, Marcham Publications ,Chennai, 2018
3. R,K,Paul.: Monetary Economics, Kalyani Publications New Delhi, 2017
4. Muraleedharan.D., Modern Banking: Theory and Practice, PHI Learning Publications, New Delhi, 2014
5. Nadar.E.N., Money and Banking, PHI Learning Publications, New Delhi, 2013
6. Carl.E.Walsh, Monetary Theory and Practice, PHI Learning Publications, New Delhi, 2011

Course Outcomes

On the successful completion of the course, the students will be able to

K3	CO1	Apply the knowledge on the monetary theories
K1	CO2	Understand the concepts of money supply
K4	CO3	Assess the role and policies of bank
K3	CO4	Employ the concepts of money and capital markets
K5	CO5	Critically evaluate the monetary policy

Mapping of COs and POs and PSOs

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	M	S	S	S	S	N	W	S	S	M	M
CO2	S	W	S	S	M	M	M	S	S	W	S	M	S
CO3	S	M	M	S	S	S	M	W	S	S	N	S	M
CO4	S	M	S	W	M	S	S	M	S	M	M	M	M
CO5	M	S	S	M	M	M	M	W	M	M	M	N	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation

Course Code	P21ECT35	FISCAL ECONOMICS	L	T	P	C
CORE XV			4	-	-	4

Course Objectives

1. To help the students to understand the scope of fiscal economics.
2. To help the students to understand the importance of financial administration and fiscal policies.
3. To help the students to understand the theories of fiscal economics.
4. To help the students to aware of the existing financial scenario.
5. To enable the students to understand the recent changes in fiscal policies of the government.

UNIT I: Introduction to Public Finance (12 Hours)

Public Finance : Significance, Scope, and Function – Public Finance Versus Private Finance – Theory of Public Good – Market Failure – Externalities – Provision for Public Goods – general Model of Efficient Allocation for Public Good.

UNIT II: Taxation (12 Hours)

Sources of Public Revenue : Theory of Taxation – Taxable Capacity – Ability to Pay And Benefit Principle in Taxation – Indian Direct and Indirect Taxes – Incidence of Tax – Tax Reforms – MODVAT.

UNIT III: Public Expenditure and Budget (12 Hours)

Public Expenditure: Theories of Public Expenditure – Structure and Growth of Indian Public Expenditure – Expenditure Revenue Mobilization for the Budget – Performance Budget – Limitation of Budget – Analysis of Recent budget (State & Central).

UNIT IV: Public Debt (12 Hours)

Public Debt: Growth and Composition of Public Debt – Internal and External Debt – Central and State Deficit – Redemption of Public Debt.

UNIT V: Federal Finance (12 Hours)

Indian Fiscal Policy: Principle of Federal Finance – Evaluation of Federal Finance – 12th and 13th Finance Commission – Local Finance.

Text Books

1. D.M.Mithani, Modern Public Finance: Theory and Policy, Himalaya Publishing House, New Delhi, 2014
2. Sreenivasan.K. and Dayananda K.C., Money and Public Finance, Himalaya Publishing House, New Delhi, 2018

References

1. Huch Dalton, Principles of Public Finance, Allied Publishers, Vikas Publishing House, 2019
2. S.K,Singh, Public Finance in Theory and Practice, S.Chand and Company Ltd, New Delhi, 2019
3. Lekhil R.K.,Johinder, Public Finance, Popular,2018
4. Bose.D, Ganesan.S and Marimuthu A, An Introduction to Public Finance, S.Chand and Company Ltd, New Delhi, 2012
5. H.L.Bhatia, Public Finance, Vikas, Noida, 2012

Course Outcomes

On the successful completion of the course, the students will be able to

K1	CO1	Understand the basic concepts of fiscal economics
K2	CO2	Classify the various types of goods
K3	CO3	Discuss different theories of fiscal economics
K4	CO4	Analyse the causes and effects of public debt and public financing
K5	CO5	Critically evaluate the budgetary procedure and the role of finance commission

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	N	S	S	M	W	N	M	N	S	S	W	M
CO2	M	S	N	S	S	N	S	N	N	N	S	S	M
CO3	M	M	M	M	M	M	S	M	S	M	N	N	M
CO4	M	S	M	S	S	M	M	M	S	N	S	M	M
CO5	S	S	M	M	M	N	S	N	N	S	M	M	N

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECT36	DEVELOPMENT ECONOMICS	L	T	P	C
CORE XVI			4	-	-	4

Course Objectives

1. To provide a strong knowledge base on the features of Indian economy
2. To help the students to understand the theories of economic development.
3. To help the students to understand the various growth models.
4. To help the students to understand the recent development in Indian economy.
5. To help the students to understand the importance of capital formation for economic development.

UNIT I: Economic Development and Growth (12 Hours)

Economic Development – Concept and Approaches – Characteristics of under developed economy – Obstacles to economic development – Factors influencing Economic Development and growth – Characteristics of modern economic growth and strategies of development.

UNIT II: Theories of Economic Development (12 Hours)

Theories of Economic Development : Adam smith – Richard – Malthus – J.S. Mill – Karl Marx – Schumpeter – Keynes – Rostow – Nurkse.

UNIT III: Growth Theories (12 Hours)

Lewis – Fei Ranis – Leibenstein – Nelson – Rosenstein – Rodan's Doctrine of Balanced Growth – Concept of Unbalanced growth – Dualistic Theory – Myrdal's Theory.

UNIT IV: Growth Models (12 Hours)

Harod – Domar – Kaldor – Joan Robinson – Meades – Solow – Models of Technical change – Steady – State growth – Fel'dman model – Mahalanobis Model – Endogenous Growth Model.

UNIT V: Capital Formation (12 Hours)

Capital formation - Domestic Measures – human capital formation – Role of State – International Measures: Foreign Capital and MNCs.

Text Books

1. Jhingan M.L, The Economics of Development and Planning, Virinda Publications, New Delhi, 2014

References

1. K,L,Datta, Growth and Development Planning in India, Oxford University Press, 2021
2. Michael P. Todoro and Stephen. C.Smith, Economic Development, Pearson, UK, Longman, London, 13th edn, 2020.
3. Gerard Roland, Development Economics, Routledge Publishers, New York,2014.
4. Bhabesh Sen. Ed, Economic Development and Poverty in India, New Century Publications, New Delhi, 2012.
5. Agion and Philippe, Economics of Growth, PHI Learners, new Delhi, 2010.

Course Outcomes

On the successful completion of the course, the students will be able to

K1	CO1	Understand the nature of developing economy
K2	CO2	Describe the theories of economic development
K5	CO3	Measure the growth and development of the economy
K4	CO4	Analyse various models of economic growth
K5	CO5	Critically appraise the capital formation, human capital and foreign capital

Mapping of COs and POs and PSOs

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	M	S	S	N	M	S	S	S
CO2	S	S	S	W	S	S	S	S	S	S	M	M	M
CO3	S	N	S	M	S	M	S	S	N	M	W	M	M
CO4	S	S	S	S	S	M	S	S	N	W	M	S	S
CO5	S	s	M	N	W	M	S	S	S	S	N	M	S

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation

SEMESTER-IV

Course Code	P21ECE411	WELFARE ECONOMICS	L	T	P	C
ELECTIVE-II			4	-	-	4

Course Objectives

1. To provide knowledge on the basic concepts of welfare economics.
2. To provide knowledge on importance of welfare in modern economy.
3. To provide knowledge on theories of welfare economics.
4. To enhance the knowledge of the students in the subject matter of welfare economics.
5. To enable the students to understand the behaviour of consumers.

UNIT I: Introduction to Welfare Economics (12 Hours)

Definition and Meaning of Welfare Economics – Difference between Welfare Economics and Positive Economics – Concept of Social Welfare in Welfare Economics – Old Welfare Economics – Pigouvian Welfare Condition – Analysis of Externalities – Pigou's ideal output.

UNIT II: The Walrasian general equilibrium (12 Hours)

Introduction – The Walrasian general Equilibrium Model – 2x2x2 Graphical General Equilibrium Model.

UNIT III: The Pareto's Optimum (12 Hours)

The Pareto's Optimum, Compensation criteria – Kaldor, Hicks criterion, Scitovsky Criterion, Little Criterion – Social Welfare Function – Arrows Impossibility Theorem, Maximization of Social Welfare – Production possibility Curve (PPC) – PPC to grand possibility curve (GPC) – Rawls theory of Social Justice.

UNIT IV: Pareto's exchange (12 Hours)

Optimum conditions of Pareto's exchange – Factors substitution and degree of specialization – Optimum conditions of product utilization and product substitution – Pareto's Optimality – Trade Off between Efficiency and Equity – Theory of Second Best.

UNIT V: Economics of Risk and Uncertainty (12 Hours)

Economics of Risk and Uncertainty – Individual Consumer Behaviour Risk, Gambling and Insurance – Choice between Insurance and gambling Asset port folio selection.

Text Book

1. Edgar K.Browning, Mark A. Zupan, Micro Economics : Theory and Applications, 13th Edition, Wiley Publications, 2020

References

1. DN.Dwivedi, Micro Economics Theory and Applications: Third Edition Vikas Publication Pvt. Ltd., 2016.
2. Jhingan M.L., Advanced Economic Theory, .Himalaya Publishing House, New Delhi, 2014
3. Koutsoyiannis, A, Modern Economics, Macmillan press, London,2014.
4. Maddala G.S and Miller, Ellen, Micro Economics: Theory and Applications, Tata McGraw Hill, New Delhi, 2004.

Course Outcomes

On the successful completion of the course the students will be able to

K2	CO1	Enhance their knowledge on welfare economics
K1	CO2	Understand the concepts of social welfare.
K3	CO3	Estimate the responsibility of all the firms in the society.
K4	CO4	Analyse risks and uncertainty in the economy.
K6	CO5	Create awareness on the social cost and benefits in the modern economy

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	Programme Outcomes								Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	W	W	N	N	N	W	M	N	W	W	M	S
CO2	W	S	S	M	N	S	S	S	S	S	S	M	S
CO3	W	S	S	M	W	M	S	S	S	M	M	S	S
CO4	M	S	S	W	N	M	S	S	M	S	S	S	S
CO5	N	S	S	W	N	S	M	W	W	S	W	S	S

*S-Strongcorrelation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECE412	EXPORT MARKETING AND PROCEDURE	L	T	P	C
ELECTIVE-II			4	-	-	4

Course Objectives

1. To improve the knowledge of the Students in Export Marketing and procedure.
2. To equip the Students to gain knowledge and skills in Export Policy and Marketing Decision.
3. To make the students to be aware of the importance of export pricing and costing.
4. To prepare the students to be aware of the export finance and post shipment finance.
5. To enable the student to understand the export marketing communication.

UNIT I: Export Marketing -Introduction (12 Hours)

Export Marketing - Definition – features – importance of marketing – Distinction between market and marketing – Approaches of Export Marketing – Export Decisions – Various types of marketing Decisions – Export Documents and Procedure – Commercial Invoice , Shipping Bill , Certificate of Origin – Pre-shipment procedure of export marketing.

UNIT II: Export Policy and Decision (12 Hours)

Export policy and decision – definition – Need and Importance – Factors affecting export policy – International market – Branding decision in international market – Branding problem in export marketing – Segmentation, strategies of International market segmentation – Basis of market segmentation – Segmentation of consumer market.

UNIT III: Export Pricing and Costing (12 Hours)

Export Pricing and costing – Factors influencing pricing decisions – Process of price determination of a product - kinds of pricing and policies – International price , export costing - various elements of costs –Production -selling and special costs.

UNIT IV: Export Finance (12 Hours)

Export Finance- Need and purpose- time and source – pre- shipment finance- packing credit – period of packing credit – packing credit to sub – suppliers – foreign currency – post shipment finance – Trade finance – export finance in India – Marketing mix and system – element of marketing system.

UNIT V: Export Communication (12 Hours)

Export Communication – communication process – factors influencing international marketing communication – Export marketing channels of communication - channel of distribution – selection of distribution channel.

Text Book

1. Natarajan .L., International Marketing , Margham Publications, Chennai, 2014

References

1. Balaji.C.D., International Trade, Margham Publications, Chennai, 2018
2. Kapoor D, Marketing Management and Sales Management, Sultan and company Ltd. New Delh, 2017
3. Kathiresan S, and Radha V, Marketing Management, Bhavani Publications Chennai, 2011
4. Sankaran.S., International Trade, Margham Publications, Chennai, 2011

Course Outcomes

On the successful completion of the course the students will be able to

K1	CO1	Understand the theories of Export marketing
K2	CO2	Describe the export marketing procedure and policy decision
K4	CO3	Assess the Regulation and Prohibition measures of Export pricing and costing.
K5	CO4	Evaluate India's Export finance
K6	CO5	Create export marketing communication

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO 5**	**PO 6**	**PO 7**	**PO8**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	M	M	M	M	N	M	M	M	M	S	M	S	S
CO2	S	S	M	S	M	S	S	M	S	M	S	S	M
CO3	S	S	M	S	M	S	S	M	S	M	M	S	S
CO4	S	S	M	N	M	S	S	M	N	M	N	M	M
CO5	M	S	M	M	S	M	S	M	M	S	S	S	S

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation

Course Code	P21ECE421	ECONOMICS OF HUMAN RESOURCE	L	T	P	C
ELECTIVE-III			4	-	-	4

Course Objectives

1. To familiarize the concepts of human resources
2. To gain sound knowledge on issues in Education
3. To enable the students to know about the importance of investment in health
4. To gain knowledge on Wage theories
5. To enable the student to understand the human resource requirements.

UNIT I: Human Resource and Economic Development (12 Hours)

Importance of Human Resource- Human Resource and Economic Development- Investment in Human Capital- Unemployment- Types, Causes and remedies.

UNIT II: Investment on Education (12 Hours)

Importance of Education- Education and Economic Development- Women's Education- Issues in Education.

UNIT III: Investment on Health (12 Hours)

Importance of human Resource in Health- Investment in Health-Healthcare Expenditure in India-Healthcare Issues and Challenges- Health Insurance for poor.

UNIT IV: Labour Market (12 Hours)

Theories of Labour Market- Wage theories-Trade Unions- Women and Child Labour- Labour Market Discrimination-Wage discrimination- Social Security in India.

UNIT V: Human Resource Planning (12 Hours)

Importance of Human Resource Planning-Forecasting Human resource requirements-Orientation and Training-Training process.

Text Book

1. Jaysankar,J, Human Resource Management, Margham Publications, Chennai, 2011

References

1. Steve Bradley & Colin Green, The Economics of Education, Academic Press, 2020.
2. Jhingan M L, The Economics of Development and Planning, Vrinda Pub, 2019.
3. Ruddar Dutt & K.P.M. Sundaram, Indian Economy, S.Chand & Co, New Delhi, 35th edn, 2018.
4. Michael Lovenheim & Sarah Turner, Economics of Education, Worth Publishers, 2017.
5. Jon Ingham, Strategic Human Capital Management, Butterworth-Heinemann, 2006.

Course Outcomes

On the successful completion of the course, the students will be able to

K1	CO1	Understand the importance of Human Resource Development
K2	CO2	Identify the importance of investment on Education and Health
K4	CO3	Assess the impact of health care on human resources
K5	CO4	Evaluate the theories of Labour Market and the issues in Social Security Measures.
K6	CO5	Create awareness on training of employees

Mapping of COs and POs and PSOs

Course Outcomes	**Programme Outcomes**								**Programme Specific Outcomes**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	**S**	**S**	**M**	**M**	**S**	**M**	**S**	**S**	**N**	**W**	**W**	**M**	**M**
CO2	**S**	**S**	**M**	**M**	**S**	**N**	**S**	**S**	**M**	**M**	**N**	**S**	**M**
CO3	**S**	**M**	**M**	**W**	**M**	**W**	**S**	**W**	**S**	**M**	**N**	**S**	**M**
CO4	**S**	**W**	**M**	**M**	**S**	**S**	**M**	**M**	**S**	**W**	**W**	**S**	**M**
CO5	**S**	**M**	**M**	**N**	**M**	**M**	**S**	**S**	**W**	**S**	**N**	**S**	**M**

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECE422	DEMOGRAPHY	L	T	P	C
ELECTIVE-III			4	-	-	4

Course Objectives

1. To make the students to understand about the demography.
2. To know about the reasons for migration.
3. To understand the population policy in India
4. To equip the students with the knowledge regarding the relationship between demography and economic development
5. To understand the population trends in India.

UNIT I: Population and Development (12 Hours)

Population and Development- Meaning and scope of demography; components of population growth and their interdependence; Measures of population change; Structure, distribution and sources of population data; Theories of population – Malthus, Optimum theory of population; theory of demographic transition –Population and development.

UNIT II: Population Trends (12 Hours)

Population trends in the twentieth century; Population explosion –Determinants of age and sex structure; Demographic effects of sex and age structure, economic and social implications; Age pyramids and projections.

UNIT III: Fertility, Nuptiality and Mortality (12 Hours)

Fertility, Nuptiality and Mortality-Importance of study of fertility – Factors affecting fertility – Socio-economic factors. Nuptiality – Concept and analysis of marital status, single mean age at marriage. Mortality – Death rates, crude and age-specific; Mortality at birth and infant mortality rate.

UNIT IV: Migration and Urbanization (12 Hours)

Migration and Urbanization-Concept and types – Temporary, internal and international; International migration –Its effect on population growth and pattern; Factors affecting migration; Urbanization – Growth and distribution of rural-urban population in developed and developing countries. Urbanization in India.

UNIT V: Population Policy **(12 Hours)**

Population Policy in India-Evolution of population policy in India – The shift in policy from population control to family welfare, to women empowerment; Family planning strategies and their outcomes.

Text Book

1. M.L. Jhingan, B.K. Bhatt and J.N. Desai, Economic Planning and Development, 3rd Edition, Vrinda Publication (P) Ltd. New Delhi, Reprint 2019.

References

1. Rajendra K Sharma, Demography and Population Problems, Atlantic Publishers, 2020.
2. Krishnamurthy Srinivasan, Population Concerns in India: Shifting Trends, Policies and Programs, Sage Pub, 2017.
3. Bedprakas SyamRoy, India's Journey Towards Sustainable Population, Springer, 2017.
4. Mahendra K Premi, India's Changing Population Profile, Kindle edn, 2011.
5. Choubey, P. K., Population Policy in India, Kanishka Publications, New Delhi, 2000.

Course Outcomes

On the successful completion of the course, the students will be able to

K2	CO1	Describe the growth of population in India
K3	CO2	Examine the theories of population
K1	CO3	Understand the concepts of Fertility, Nuptiality and Mortality
K5	CO4	Analyse the reasons for migration
K4	CO5	Develop a proactive attitude towards the population policy

<u>Mapping of COs and POs and PSOs</u>

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO 5**
CO1	M	M	M	M	N	M	M	M	M	N	N	S	M
CO2	S	S	M	S	M	S	S	M	S	M	S	S	M
CO3	S	S	M	S	M	S	S	M	S	M	M	S	S
CO4	S	S	M	N	M	S	S	M	N	M	N	M	M
CO5	M	S	M	M	S	M	S	M	M	S	S	S	M

*S-Strong correlation ; M-Moderate correlation; W- Weak correlation, N – No correlation

Course Code	P21ECV11	MARKETING STRATEGIES	L	T	P	C
VALUE ADDED PROGRAMME I			2	-	-	2

Course Objectives

1. To improve the knowledge of the students on the basic concepts of the market.
2. To enhance the decision making power of students in the marketing under various environmental conditions.
3. To make the students to understand the Marketing environment.
4. To enhance the knowledge of the students on Pricing strategies.
5. To enable the students to understand the various forms of marketing services.

UNIT I: Nature and Scope of Marketing (6 Hours)

Introduction : concepts, nature, scope and importance of marketing- Marketing concept and its evolution- market mix – Strategic marketing planning – an over view.

UNIT II: Product Decisions and Product mix (6 Hours)

Concepts of a product – classification of products – Major product decisions –Product line and product mix - Branding , Packaging and labeling – Product life cycle – Strategic implications – Pricing decisions : Factors affecting price determination – Pricing strategies.

UNIT III: Marketing environment (6 Hours)

Marketing environment – micro and macro components and their impact on marketing decisions – Market segmentation and positioning – Buyer behavior - consumer decision making process.

UNIT IV: Social, ethical and legal aspects of marketing (6 Hours)

Social, ethical and legal aspects of marketing – Marketing services – international marketing – Green marketing , Cyber marketing – Relationship marketing and other developments of marketing.

UNIT V: Marketing Research (6 Hours)

Meaning and scope of marketing research – Marketing research process – Marketing organization and control – organizing and controlling marketing operations-marketing strategies

References

1. Francis Cherunilam, International Marketing , , Himalaya Publishing House, New Delhi, 2021
2. Sherlekar.S.A, Marketing, Himalaya Publishing House, New Delhi, 2020
3. Karunakaran.K. Marketing Management, Himalaya Publishing House, New Delhi, 2017.
4. Kathiresan S and Radha.V, Marketing Management, Prasanna Publications, Chennai, 2011
5. Saxena, Rajan, Marketing Management, Tata McGraw Hill, New Delhi, 4th edn, 2009.
6. Kapoor. D.C, Marketing Management and Sales Management, Sultan Chand and Company Ltd, New Delhi, 2006.

Course Outcomes

On the successful completion of the course, the students will be able to

K1	CO1	Understand the conceptual framework of marketing and its applications.
K2	CO2	Take decision in marketing under various environmental constraints.
K3	CO3	Examine market analysis and select suitable strategies
K5	CO4	Analyse the issues and development in marketing
K6	CO5	Prepare themselves to conduct marketing research

Mapping of COs and POs and PSOs

Course Outcomes	Programme Outcomes								Programme Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	S	M	M	S	N	W	S
CO2	S	M	S	N	M	S	M	M	M	W	M	M	M
CO3	S	S	M	M	S	M	S	W	S	S	M	S	N
CO4	S	M	M	S	S	S	S	M	M	S	N	W	S
CO5	S	W	W	M	M	N	M	W	S	N	M	M	M

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

Course Code	P21ECV42	DATA ANALYSIS	L	T	P	C
VALUE ADDED PROGRAMME II			2	-	-	2

Course Objectives

1. To impart knowledge on available statistical software
2. To impart knowledge in steps in data storage
3. To provide knowledge on visualization and representation
4. To help the students to adopt appropriate tools in research
5. To help the students to use SPSS package in their research

UNIT I: Statistical software **(6 Hours)**

Using data-available statistical software-steps in data storage

Data input and output-process of data analysis

UNIT II: Organisation and planning **(6 Hours)**

Organization and planning

Techniques for anlysing quantitative data

UNIT III: Computerised Data Analysis **(6 Hours)**

SPSS package-applications

Free software for data analysis

UNIT IV: Visualization and Representation **(6 Hours)**

Visualization and representation

Alternative forms of presenting summarizing and presenting data

UNIT V: Estimation techniques **(6 Hours)**

Simple estimation techniques

Tests for statistical inference

Text Book

1. Jennifer Sargunar, Introduction to Information Technology, Dorling Kindersley (India) Pvt. Ltd, 2011

References

1. Tattar.P, Ramaiah.S, Manjunath.B .A, Course in Statistics, Wiley, 2018
2. Levine.D, Stephen D, Szabat.K, Statistics for Managers using Microsoft Excel, Pearson, 2017

Course Outcomes

On the successful completion of the course, the students will be able to

K1	CO1	Understand the steps in data storage
K2	CO2	List the available statistical software
K4	CO3	Evaluate the impact of visualization and representation
K3	CO4	Apply appropriate tools in research
K6	CO5	Analyse data using various computerised software

Mapping of COs and POs and PSOs

Course Outcomes	Programme Outcomes								Programme specific outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	M	S	M	M	S	N	W	W
CO2	S	M	S	N	M	M	M	M	M	W	M	M	M
CO3	S	S	M	M	S	M	S	W	S	M	M	S	N
CO4	S	M	M	S	S	S	M	M	M	S	N	W	S
CO5	S	W	W	M	M	N	M	W	S	N	M	M	W

*S-Strong correlation; M-Moderate correlation; W- Weak correlation, N – No correlation.

Department of Mathematics

MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL

DEPARTMENT OF MATHEMATICS

B.Sc. MATHEMATICS

SYLLABUS TO BE IMPLEMENTED FROM THE ACADEMIC YEAR

2021-2022

(CHOICE BASED CREDIT SYSTEM)

Mother Teresa Women's University, Kodaikanal
Department of Mathematics
Choice Based Credit System (CBCS)
(2021-2022 onwards)
B.Sc Mathematics

1. About the Programme

B.Sc. (Bachelor of Science) Mathematics is a three year programme to encourage students in subject area by creates interest and sprit in mathematics to help them potential, to become excellent mathematician and develop knowledge in logical and analytical thinking.

2. Programme Educational Objectives (PEOs)

The B.Sc. Mathematics program describe accomplishments that graduates are expected to attain within five to seven years after graduation

PEO1	Acquire knowledge in functional areas of Mathematics and apply in all the fields of learning.
PEO2	Recognize the need for lifelong learning and demonstrate the ability to explore some mathematical content independently.
PEO3	The graduates will become successful professionals through logical and analytical thinking abilities.
PEO4	Employ mathematical ideas encompassing logical reasoning, analytical, numerical ability, theoretical skills to model real-world problems and solve them.
PEO5	Develop critical thinking, creative thinking, self confidence for eventual success in career.
PEO6	Analyze , interpret solutions and to enhance their Entrepreneurial skills, Managerial skill and leadership
PEO7	To prepare the students to communicate mathematical ideas effectively and develop their ability to collaborate both intellectually and creatively in diverse contexts.
PEO8	Rewarding careers in Education, Industry, Banks, and pursue higher studies.
PEO9	The graduates will work and communicate effectively in inter-disciplinary environment, either independently or in a team, and demonstrate leadership qualities.

3. Eligibility : + 2 pass with General Mathematics

4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.
ii. **Medium of Instruction:** English
iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	10	25	10	25
External	30	75	30	75

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	A	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	B	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	C	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

B.SC. MATHEMATICS CURRICULUM

S. No.	Course Code	Title of Course	Credits	Hours		Maximum Marks		
				T	P	CIA	ESE	Total
Semester I								
1.	U21LTA11	Part-I Tamil I	3	6	-	25	75	100
2.	U21LEN11	Part-II English I	3	6	-	25	75	100
3.	U21MTT11	Core – I Calculus	4	5	-	25	75	100
4.	U21MTT12	Core – II Classical Algebra	4	6	-	25	75	100
5.	U21PHA11	Allied I Ancillary Physics	4	5	-	25	75	100
6.	U21EVS11	Environmental Studies	2	2	-	25	75	100
7.	U21PEPS11	Professional English –I	4	6	-	25	75	100
		Total	**24**	**36**				**700**
Semester II								
8.	U21LTA22	Part-I Tamil II	3	6	-	25	75	100
9.	U21LEN22	Part- II English II	3	6	-	25	75	100
10.	U21MTT21	Core-III Analytical Geometry 3D	4	5	-	25	75	100
11.	U21MTT22	Core- IV Differential Equations & Laplace Transforms	4	5	-	25	75	100
12.	U21PHA22	Allied –II Physics Practical	4	-	5	25	75	100
13.	U21VAE21	Value Education	3	3	-	25	75	100
14.	U21PEPS22	Professional English – II	4	6	-	25	75	100
		Total	**25**	**36**				**700**
Semester III								
15.	U21LTA33	Part I Tamil-III	3	6	-	25	75	100
16.	U21LEN33	Part II English- III	3	6	-	25	75	100
17.	U21MTT31	Core - V Vector Calculus, Fourier Series & Fourier Transforms	4	5	-	25	75	100
18.	U21MTA33	Allied III Ancillary Mathematical Statistics –I	4	5	-	25	75	100
19.	U21MTE311 / U21MTE312 / U21MTE313	Elective I Numerical Methods/ Stochastic Process/ Principles of Experimental Design	3	4	-	25	75	100
20.	U21MSS31	SBE I-Managerial skills	2	2	-	25	75	100

21.	U21MTN31	Non Major Elective –I	2	2	-	25	75	100
22.	U21PEPS33	Professional English III	4	6	-	25	75	100
Total			**25**	**36**				**800**
Semester IV								
23.	U21LTA44	Part I Tamil IV	3	6	-	25	75	100
24.	U21LEN44	Part II English IV	3	6	-	25	75	100
25.	U21MTT41	Core-VI Statics	4	4	-	25	75	100
26.	U21MTT42	Core-VII Sequence & Series	4	4	-	25	75	100
27.	U21MTA44	Allied- IV Ancillary Mathematical Statistics – II	4	4	-	25	75	100
28.	U21MTE421/ U21MTE422/ U21MTE423	Elective- II Programming in C & C++/ Automata Theory/ Knowledge for Industry	3	3	-	25	75	100
29.	U21CSS42	SBE II-Computer Skills for Office Management	2	2	-	25	75	100
30.	U21MTN42	Non Major Elective –II	2	2	-	25	75	100
31.	U21PEPS44	Professional English IV	4	6	-	25	75	100
		Total	**29**	**37**				**800**
Semester V								
32.	U21MTT51	Core-VIII Dynamics	4	5	-	25	75	100
33.	U21MTT52	Core-IX Abstract Algebra	4	5	-	25	75	100
34.	U21MTT53	Core-X Real Analysis	4	5	-	25	75	100
35.	U21MTT54	Core- XI Operations Research –I	4	5	-	25	75	100
36.	U21MTT55	Core- XII Theory Of Numbers	4	5	-	25	75	100
37.	U21MTE531/ U21MTE532/ U21MTE533	Elective III Fuzzy Sets and Fuzzy Numbers / Mathematical Modeling / Data Structures and Algorithms	3	3	-	25	75	100
38.	U21MTS53	SBE:III Mathematical Aptitude	2	2	-	25	75	100
		Total	**25**	**30**				**800**
Semester VI								
39.	U21MTT61	Core- XIII -Linear Algebra	4	5	-	25	75	100
40.	U21MTT62	Core- XIV Complex	4	5	-	25	75	100

		Analysis						
41.	U21MTT63	Core- XV Operation Research – II	4	5	-	25	75	100
42.	U21MTT64	Core- XVI Graph Theory	4	5	-	25	75	100
43.	U21MTT65	Core -XVII Discrete Mathematics	4	5		25	75	100
44.	U21MTE641/ U21MTE642	Elective-IV Astronomy / Mathematical Cryptography	3	3	-	25	75	100
45.	U21MTS64	SBE- IV- Operations Research Lab	2	2	-	25	75	100
46.	U21EAS61	Extension Activities(NSS/NCC/RRC/ YRC/ PYE)	3	-	-	25	75	100
		Total	**28**	**30**		**200**	**600**	**800**
		Total Credits	**156**	**205**		**Total Marks**		**4600**

Non Major Elective

The candidates, who have joined the UG Programme, can also undergo Non Major Elective offered by other Departments

Non Major Elective- For Other Department

Semester –III

NME	Course code	Course Name
I	U21MTN31	Resource Management Techniques

Semester –IV

NME	Course code	Course Name
II	U21MTN42	Numerical Methods

Additional Credit Courses (Two Credit courses)

U21MA031: Online Course – III Semester-2 Credits
U21MAI41: Internship – IV Semester-2 Credits

Value added course – V Semester: 2 Credits

S.No	Course code	Course Name
1	U21MAV51	Numerical Methods Lab Using C++

B.Sc. Physics / Chemistry: Ancillary Mathematics I & II

Semester I
Course code: U21MAA11 Ancillary Mathematics I 5 Hours/ 4 credits

Semester - II
Course code: U21MAA22 Ancillary Mathematics II 5 Hours /4 Credits

Programme Outcomes:

PO.No.	Upon completion of this course the students will be able to
PO 1	think critically, evaluate analytically and apply the acquired knowledge of their discipline in related scenario.
PO 2	formulate hypothesis, design experiments, use appropriate tools and interpret the results.
PO 3	demonstrate the precise understanding of the principles and theories of their discipline through experiments.
PO 4	enhance the communicative skills and gain confidence to disseminate knowledge through oral/verbal communications effectively at various situations.
PO 5	identify the different roles in an organizational structure of the work place and carry out multiple roles in social responsibilities.

Programme Specific Outcomes:

PSO. No	upon completion of this course the students will be able to	PO MAPPED
PSO-1	perceive the relevance of the subject in various fields such as science, technology, business and industries.	PO-3
PSO-2	interpret the graphical and numerical data and apply the analytical, theoretical and computational skills to solve problems.	PO-1 PO-2 PO-3
PSO-3	acquaint with the knowledge on the effects of changing conditions in real life systems to construct mathematical models and excel in various decision making tasks	PO-2 PO-3
PSO-4	understand mathematical ideas and foundations of mathematics to develop proficiency in Mathematics	PO-4
PSO-5	engage in activities directly benefiting the broader community and acquire job oriented knowledge	PO-3 PO-5

SEMESTER – I

COURSE CODE	U21MTT11	CALCULUS	L	T	P	C
CORE -I			5	-	-	4

Objectives:

- To learn the different concepts of differential and integral calculus.
- To learn will acquire basic knowledge of integration
- To learn will become proficient in multiple integrals and its applications
- The learner will gain concepts of change of variables

Unit-I: Successive differentiation:
Introduction- the nth derivative-standard results- examples-Trigonometrically transformation – formation of equation involving derivatives-Expansion of function - Leibnitz Theorem and its application Maxima and Minima of Function of two variables.

Unit-II: Curvature:
Introduction of Curvature-circle- Radius of Curvature and Center of Curvature in Cartesian formula for the radius of Curvature-coordinates of the center of curvature - evolute and involute – radius of curvature when the curve is given in polar coordinates- Form and Polar Form p - r equation; Pedal Equation of a Curve – Chord of a Curvature.

Unit-III: Double Integral:
Definition of the Double Integral –Evaluation of double integral – solved problem- exercise - Double integral in polar Co- ordinates- solved problem - exercise.

Unit-IV: Triple Integral:
Definition – Examples- Applications of multiple integrals – finding the area between two coordinates- coordinate of the center of gravity-moment of inertia of an area- properties - Change of variables in the case two variables - Change of variables in the case three variables.

Unit-V: Beta and Gamma Functions:
Definitions of Beta and Gamma Functions – Convergence of $\Gamma(n)$ – Recurrence formula of Gamma functions – Properties of Beta functions – Relation between Beta and Gamma functions – Solved problems - Applications of Gamma functions to multiple Integrals.

Text Book:

1. **S.Narayanan and T.K.Manickachagam Pillai,** "Calculus-Volume I & II", Viswanathan Printers and Publishers - 2011.
   Unit I – Calculus – Volume I: Chapter 3 and Chapter 8-Sec 4,
   Unit II - Calculus – Volume I: Chapter 10.2.1 to 3.1
   Unit III - Calculus – Volume I: Chapter 5- Sec. 1 to 3.1
   Unit IV – Calculus - Volume II: Chapter 5- Sec. 4 to 5.4 and Chapter 6

Unit V - Calculus - Volume II: Chapter 7 – Sec. 2.1 to 6

Reference books:

1. **P.Kandasamy and K.Thilagavathi,**"Mathematics for Branch I: Vol I and Vol II"- S.Chand and Company Ltd., - New Delhi - 2004.
2. **Arumugam Issac –** "Calculus" – New Gamma Publishing House – Jan 2011.

Course Outcome:

On the successful course completion, students will be able to:		Cognitive Level
CO1	identify areas in Mathematics and study of functions expansion	K1
CO2	understand the concepts of Radius of Curvature, Cartesian Form, p - r equations	K2
CO3	apply the concept of change of variables in double and triple integrals.	K3
CO4	apply double, triple integral to find the area and volume respectively.	K3
CO5	apply the Beta and gamma function to solve the multiple integrals.	K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT12	CLASSICAL ALGEBRA	L	T	P	C
CORE -II			6	-	-	4

Objectives:

- To impart skills in the various applications of algebraic methods.
- The learner will become proficient in expansion and summation of function.
- Understanding relation between roots and coefficients of equations, sign changes, reciprocals.
- To understand terms of series, summation and its changes

Unit-I: Binomial theorem:

Introduction of Binomial theorem – Greatest term in the expansion of $(1 + x)^n$ - sum of the coefficients - Multinomial theorem - Binomial theorem for rational index – Particular cases –Summation of binomial series - Approximate values- solved problems.

Unit-II: Exponential Limits:

Introduction of Exponential limit – Exponential theorem – Summation – Logarithmic series – Modification of Logarithmic Series – Euler's constant – Series summed by Logarithmic series – Application of exponential and logarithmic series to limits and approximation - Logarithms of Complex Numbers.

Unit-III: Summation:

Summation of series – Definition and Examples - Application of partial fraction- Summation by difference series – Recurring series – To find r^{th} order of a Recurrence series when 2r terms are given - Generating function.

Unit-IV: Theory of Equations:

Remainder Theorem – Relation between roots and coefficients of equations Symmetric Function of Roots – Newton's Theorem on the sum of the powers of the roots. Transformations of Equations: Roots with signs changes - Reciprocal roots.

Unit-V: Reciprocal Equation:

Introduction-Standard form of reciprocal equation – Examples – To increase/ decrease the roots of the equation by given quantity – Removal of terms – Transformation – Discard's rule of signs - Solutions of Numerical Equations: Solutions of Numerical Equations – Newton's methods of divisors – Horner's method.

Text book:

1. **T.K.Manickachagam Pillai and others**, "Algebra Volume I", - S. Viswanathan Printers & Publisher Pvt, Ltd., - 2010.
   Unit – I - Algebra Volume I – Chapter 3
   Unit – II - Algebra Volume I – Chapter 4

Unit – III - Algebra Volume I – Chapter 5
Unit – IV - Algebra Volume I – Chapter 6 – Section 1 to 15.2
Unit – V - Algebra Volume I – Chapter 6 – Section 15.3 to 30

Reference book:

1. **P. Kandasamy and K.Thilagavathy**, "Mathematics, Volume I", S.Chand and Company Ltd., New Delhi – 2004.

Course Outcome:

On the successful course completion, students will be able to:		Cognitive Level
CO1	knowledge in Binomial, Exponential, Logarithmic series and summation of series	K1
CO2	knowledge in methods to find an approximate roots of the equations	K2
CO3	apply the all tests to find the convergence or divergence of an infinite series.	K3
CO4	find the number of positive and negative roots of polynomial equation	K3
CO5	analyze the relation between roots and coefficients of the polynomial equations	K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S	S	S	S	M	S
CO2	S	M	M	S	S	S	S	S	M	M
CO3	S	M	S	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21PHA11	ANCILLARY PHYSICS	L	T	P	C
ALLIED I			5	-	-	4

Objective:

- To impart preliminary knowledge on basic concepts of physics to chemistry and mathematic students to make them understand the fundamentals of core physics.

Unit- I: Mechanics:
Centre of Gravity – Centre of Gravity of a solid hemisphere – Hollow hemisphere – Centre of Gravity of a solid cone – Centre of Gravity of a solid tetrahedron. States of Equilibrium: Equilibrium of a rigid body – Stable, unstable and neutral equilibrium – Example. Stability of Floating bodies – Meta center – Determination of Metacentric height of a ship.

Unit II: Properties of Matter:
Stress – Strain – Young's modulus – Behavior of wire under progressive tension –Bending of beams – Expression for the bending moment – Measurement of Young's modulus by bending of a beam – Non uniform bending and Uniform bending. Viscosity: Streamline flow and Turbulent flow – critical velocity - Poiseuille's formula – Determination of coefficient of viscosity of a liquid (Variable pressure head). Surface Tension: Drop weight method of determining the surface tension of a Liquid – Experiment to determine the interfacial tension.

Unit-III: Electronics:
Intrinsic and extrinsic semiconductor – PN Junction diode – Biasing of PN junction – V-I characteristics of junction diode – Rectifiers – Half wave – Full wave and bridge rectifiers – Zener diode – Characteristics of Zener diode – Voltage regulator – Transistor – Characteristics of transistor – CB, CE mode – Transistors as an amplifier. **Digital:** Decimal – Binary – Octal and Hexa Decimal number systems and their Mutual Conversions – 1's and 2's complement of a Binary number and Binary arithmetic (Addition, Subtraction, Multiplication and Division) – Binary Subtraction by 1's and 2's complement method – Basic logic gates – AND, OR, NOT, NAND, NOR and EXOR gates – NAND and NOR as universal building gates – Boolean Algebra – Laws of Boolean Algebra – De Morgan's Theorems – Their verifications using truth tables.

Unit -IV: Optics :
Geometrical Optics: Spherical aberration of a thin lens – Methods of reducing spherical aberration – Coma – Aplanatic surface – Astigmatism – Curvature of the field – Distortion. Interference: Introduction – Air wedge – Newton's rings – Colors of thin films. Diffraction: Plane diffraction Grating – Theory of plane transmission Grating

Unit-V: Modern Physics

Atomic Physics Atom Models: Sommerfield's and Vector atom Models – Pauli's exclusion Principle – Various quantum numbers and quantization of orbits. X-rays: Continuous and Characteristic X-rays – Mosley's Law and importance – Bragg's law – Miller indices.

Nuclear Physics Introduction – Nucleus – Classification of Nuclei – Nuclear Size – Charge – Mass and Spin -Nuclear Radiations and their properties, Laws of Radioactivity-Decay Constant-Half life and mean life- age of the earth- carbon Dating.

Text Books:

1. R. Murugeshan, Properties of Matter, S. Chand & Co. Pvt. Ltd., Revised edition, 2012.
2. Narayanamoorthy and N. Nagarathinam, Mechanics – Part II, The National Publishing Company, Chennai, 2005.
3. N. Subramaniyam, Brijlal and M.N.Avathanulu, Optics, S. Chand &Co. Pvt.Ltd.—25 th revised edition, New Delhi, 2012.
4. V. Vijayendran, S.Viswanathan, Digital Fundamentals, Printers & Publishers Private Ltd, Chennai, 2004.
5. Mehta V.K., Principles of Electronics, S.Chand and company Ltd, 2014.
6. Albert Paul Malvino, Digital Principles and Applications, McGraw-Hill International Editions, New York, 2002.
7. Puri V.K., Digital Electronics Circuits and Systems, TATA McGraw Hill Publications, New Delhi, 2011.
8. R. Murugeshan, Kiruthiga Sivaprasath, Modern Physics, S. Chand & Co, New Delhi, First edition, 1984.
9. R. S. Sedha, A Text Book of Digital Electronics, S. Chand & Co, New Delhi, First edition,2004

Books for Reference:

1. D.S Mathur. Revised by: Dr. P.S. Hemne, Mechanics –S. Chand and Co. New Delhi. First edition 1981, Reprint 2015.
2. Brij Lal and Subramanyam, Properties of Matter –Eurasia publishing house (Pvt.) LTD. New Delhi. Sixth Edition 1991
3. B. L. Theraja, Basic Electronics (Solid State), S. Chand and Co. New Delhi 2006
4. R. Murugesan,Optics and Spectroscopy- S. Chand Publishing, 1997.
5. J. B. Rajam, Atomic Physics., S. Chand & Company Limited, New Delhi, First edition, 1990.
6. B. N. Srivastava, Basic Nuclear Physic, Pragati Prakashan, Meerut, 2005.

Course Outcomes (CO):

CO	Learning outcome	Remarks
CO1	Analyze center of gravity	K4
CO2	Learn about modulus, viscosity and surface tension of materials	K2
CO3	Study the characteristics of diode and transistor	K1
CO4	Understand about aberration and different properties of lenses	K2
CO5	Gain knowledge about atomic model and basic nuclear properties	K2

K1- Remember K2- Understand K3- Apply K4- Analyze K5-Evaluate

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	M	S	S	S
CO3	S	M	S	M	M	S	S	S	S	S
CO4	S	M	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

SEMESTER – II

COURSE CODE	U21MTT21	ANALYTICAL GEOMETRY 3D	L	T	P	C
CORE III			5	-	-	4

Objectives:

- This is used to model geometric objects - *points*, (straight) *lines*, and *circles* being the most basic of these.
- To acquire knowledge of planes and its properties as a 3 dimensional objects.
- To understand the concepts skew lines and spheres.
- Solving problems related to geometry of three dimensions.

Unit-I: Rectangular Cartesian Coordinates:
Direction cosines of the line – Coordinates-Distance between points–Angle between the lines – Projections – Direction cosines-Relation between the direction cosines of a straight lines-Direction ratios- The. Projection of the line on any other line with direction cosines-Conditions for perpendicularity and parallelism.

Unit-II: The Plane:
The General equation of the first degree in x,y,z, represents a plane-The equation of the plane making intercepts a,b,c on the axes OX,OY,OZ respectively-The equation of the plane passing through the three given points – Angle between planes – Equation of plane through the intersection of two given planes –Length of the perpendicular.

Unit-III: Straight line:
A straight line in the intersection of two planes – Symmetric form of the equations of a line-Equation of a straight line passing through two given points – Equation of Plane and straight line- The condition for the line perpendicular to the plane – Shortest distance between two given lines.-Coplanar lines.

Unit-IV: Sphere:
Definition-The equation of a sphere when the centre and radius are given– Length of the tangent – Plane section of a sphere – Equation of circle on sphere- Equation of a sphere passing through a given circle – Intersection of two spheres in a circle– Equation of the tangent plane to the sphere and examples.

Unit-V: Cone:
Equation of a Cone with its vertex at the origin - equation of a quadratic cone with given vertex and given guiding curve - necessary condition for general equation of second degree to represent a cone - circular cone - equation of circular cone with given vertex - axis and semi vertical angle – Cylinder – Equation – Enveloping cylinder.

Text book:

1. **T.K.Manickavachagom Pillay and T.Natarajan**,"A Text Book of Analytical Geometry – part II - Three dimensions", Viswanathan Printers and Publishers, 2011.

   Unit I - Chapter 1
   Unit II - Chapter 2
   Unit III - Chapter 3
   Unit IV - Chapter 4
   Unit V - Chapter 5 – Sec. 1 to 8

Reference books:

1. **H.K.Dasse, H.C.Saxena and M.D.Raisinghania,** "Simplified Course in Solid Geometry (3D)", S.Chand and Company, 2009
2. **P.Duraipandian**, "Analytical Geometry – 3 Dimensional", Emerald publishers – 1998

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	familiarize the concept of direction cosines and projections	K1
CO2	identify different forms of equations of plane.	K1
CO3	analyze the symmetric form of equations of a line and the angle between a line and a plane.	K3
CO4	acquire the knowledge of coplanar lines, skew lines and its properties.	K3,K4
CO5	apply concept of a sphere and circle to determine their equations.	K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	M	S	S	S
CO3	S	M	S	M	M	S	S	S	S	S
CO4	S	M	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT22	DIFFERENTIAL EQUATIONS AND LAPLACE TRANSFORMS	L	T	P	C
CORE IV			5	-	-	4

Objectives:

- To introduce the basic concepts of differential equations and Laplace Transforms.
- Understand the basic concepts of first order differential equation and it applications.
- Determine solutions to second order linear homogeneous, non-homogeneous differential equations with constant coefficients.
- Find solutions by applying Laplace transform methods.
- Understand the elementary theory of partial differential equations, and solve it using various techniques.

Unit-I: Differential Equations of The First Order And First Degree:
Introduction-Variable separable Homogeneous, non – homogeneous, Linear equation, Bernoulli's equations, Exact differential equations. Equation of the first order and higher degree: Equations Solvable for dy/dx – equations solvable for y – equations solvable for x – Clairaut's form.

Unit-II: Linear Equations With Constant Co – Efficient:
Definition – complementary function of a Linear equation with constant Co – efficient – particular Integral – General method of finding P.I – special methods for finding P.I of the functions of the type e^{ax} , cos ax or sin ax , e^{ax} V where V is any function of x , x^m – Linear equations with Variable Co – efficient, Equations reducible to the linear equations.

Unit-III: Simultaneous Differential Equations:
Introduction of Simultaneous equations of the first order and first degree – Simultaneous linear differential equations: Linear equations of the second order : Complete solution given a known integral – Reduction to the normal form – Change of Independent Variables – Variation of Parameters – Methods of operations factors.

Unit-IV: Partial Differential Equations:
Formation of Partial Differential Equation of the first order-Classification of integrals-Singular Integral- General Integral- Derivation of partial differential equation– Lagrange method of solving linear PDE – Solution of PDE of type F(p, q)=0, F(z, p, q)=0, F(x, p) = G(y, q), Clairaut's form and Charpit's method.

Unit-V: Laplace Transforms:
Definition of Laplace Transforms – Piecewise Continuity- Sufficient condition for the existence of the Laplace transform-methods-Examples - Laplace transform of periodic functions – Properties- examples– Some general theorems- Examples – The inverse Transform's-Properties.- Examples

Text Book:

1. **S. Narayanan and T.K. Manickavachagam pillai**, "Differential equations and its applications", S. Viswanathan Printers and Publishers Pvt. Ltd., Madras 2014.

   Unit I - Chapter 2 and 4.
   Unit II - Chapter 5 – Sec. 1 to 6.
   Unit III- Chapter 6 and 8.
   Unit IV –Chapter 12 Sec. 1 to 5.
   Unit V- Chapter 9 – Sec. 1to 7.

Reference Books:

1. **Arumugam and Isaac,**" Differential equations and applications", New gamma publishing house – 1999.
2. **P.Kandasamy and K. Thilagavathi,** "Mathematics for Branch I: Volume III" ,S. Chand and Company Ltd., New Delhi - 2004.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	solve linear equations with variable coefficients.	K2
CO2	understand the fundamental properties of the Laplace transforms	K1&K2
CO3	apply the Laplace inverse transforms to solve simultaneous equations	K3
CO4	solve partial differential equations using Lagrange's method and Charpit's method	K3&K4
CO5	create real life problems into ordinary differential equations.	K4 &K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO4	PO3	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	M	S	M	M	S	S
CO2	S	M	S	S	S	S	M	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	M	S	S	S
CO5	S	S	S	S	S	S	S	S	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21PHA22	PHYSICS PRACTICAL	L	T	P	C
ALLIED II			-	-	5	4

Objective:

It is aimed at exposing the non-physics under graduate students to the technique of handling simple measuring instruments and also make them measure certain mechanical, electrical and optical properties of matter

Any Twelve experiments

1. Estimation of Error
2. Compound Pendulum – g and unknown mass determination
3. Young's Modulus – Uniform bending – pin and microscope method
4. Young'sModulus–Cantilever–Pin&Microscope
5. Young's Modulus – Uniform bending – Optic lever method
6. Young's Modulus – Non-Uniform bending – pin and microscope method
7. Viscosity –Stoke's Method
8. Viscosity – Poiseuille's method
9. Sonometer – frequency of a lining fork
10. Calibration of Voltmeter – potentiometer
11. Comparison of capacitances – B.G
12. Dispersive power of prism – Spectrometer
13. Logic Gates – AND, OR, NOT using discrete components
14. Logic Gates – NAND, NOR – using IC's
15. Diode Characteristics
16. Zener diode Characteristics
17. Newton's rings of a liquid
18. Spectrometer – Prism-i-d curve to find μ
19. NANDasUniversalgate: IC
20. NORasUniversalgate:IC
21. SurfaceTension– CapillaryRise
22. Newton's Law of cooling

Text Books

1. C.C Ouseph, G.Rangarajan- A Text Book of Practical Physics, - S. Viswanathan Publisher-Part I (1990).
2. C.C Ouseph, Rangarajan, R. Balakrishnan, A Text Book of Practical Physics, S.Viswanathan Publisher-Part II (1996).
3. S. L Gupta and V.Kumar - Practical Physics, Pragati Prakashan – 25th, Edition (2002).
4. A. P. Malvino, Electronics, Cybergear, 2010.
5. John Morris, Analog Electronics, Import, 1999.
6. S.K. Bhattacharya, Electrical Machines (TTTI Chandigarh) - TMH 1998.

Course Outcomes (CO):

CO	Learning outcome	Remarks
CO1	Able to Estimate Errors	K3
CO2	Analyze dimensional change of bar	K4
CO3	Determine viscosity of liquid	K4
CO4	Study the characteristics of diode and ICs	K3
CO5	Determine surface tension of liquis	K4

K1- Remember K2- Understand K3- Apply K4- Analyze K5-Evaluate

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	M	S	S	S
CO3	S	M	S	M	M	S	S	S	S	S
CO4	S	M	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

SEMESTER - III

COURSE CODE	U21MTT31	VECTOR CALCULUS, FOURIER SERIES AND FOURIER TRANSFORM	L	T	P	C
CORE - V			5	-	-	4

Objectives:

- To enhance basic skills in the areas of vector calculus , Fourier series and Fourier transforms
- Vectors and its product
- Multiple vector integration
- To study about Fourier series and their applications.

Unit-I: Differentiation of Vector:

Introduction - Vector Algebra- Differentiation of Vector – Vector operator del - Grad, Div and Curl – geometrical interpretation –Directional derivative - Solenoid, Irrotational vector – formulas involving del operator – Angle between the surfaces.

Unit-II: Double and Triple Integral:

Introduction- Vector Integration – Line Integrals Surface Integrals and volume integrals- (Theorems of Green, Gauss and Stokes) Gauss divergence, Green's and Stoke's theorems – Verification of theses theorems.

Unit-III: Fourier Series:

Definition- Dirchlet's conditions- Fourier series of periodicity 2π – Problems in Fourier series of periodicity 2π - Fourier series of periodicity 2l-Problems in Fourier series of periodicity 2l - Odd and even functions –Root mean square value of a function - Parseval's theorem.

Unit-IV: Half range series:

Introduction about Half range series definition - Half range series formula –Cosin series- Sin series – Problems using Cosin series - Problems using Sin series- Parseval's theorem - Harmonic analysis- Complex form of Fourier series introduction- Definition and . Problems using Complex form of Fourier series.

Unit-V: Fourier Transform:

Introduction of Fourier Transform – Definition of Fourier Transform – Fourier Transform Properties – Fourier integral theorem – convolution theorem – problems solving using Fourier Transform.

Text Books:

1. **Arumugam and Issac**, "Analytical Geomentry 3D and Vector Calculus", Sci. Tech Publishers – 2011.
   Unit I –Chapter 5.

Unit II – Chapter 6 – Sec 6.1, 6.2.

2. **P. Kandasamy and K.Thilagavathy**, "Mathematics, Vol IV", S.Chand and Company Ltd.,- 2004.
   Unit III – Chapter I
   Unit IV – Chapter I
   Unit V - Chapter IV

Reference Book:

1. **T.K.Manickavasagam pillay and Narayanan , "**Vector Algebra and Analysis" Viswanathan printers and publishers Pvt Ltd
2. **Murray R. Spiegel**, "Outline of Theory and Problems of Vector Analysis and an Introduction to Tensor Analysis" , Schaum's, 1959.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	demonstrate the operator of vector	K1
CO2	apply double and triple integration	K2
CO3	demonstrate the Fourier Transforms	K3
CO4	analysis half range series	K3
CO5	integral equations of Fourier Transforms	K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	M	M	S	S
CO2	S	S	S	S	M	S	S	M	M	S
CO3	M	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	M	M	S	S	M

COURSE CODE	U21MTA33	ANCILLARY MATHEMATICAL STATISTICS-I	L	T	P	C
CORE - V			5	-	-	4

Objectives:

- To impart skills in various applications of statistical methods.
- Analyze the given data by using statistical methods.
- Understand the basic concepts of probability and related results.
- Use different probabilistic methods to solve problems arise in different situations.

Unit-I: Measures Of Dispersion:

Dispersion – range, quartile deviation – mean deviation – standard deviation – root mean square deviation – Relation between standard deviation and root mean square deviation – effect of change of origin and scale on moments – Karl pearson's beta and gamma co-coefficient – measures of Skewness – Kurtosis.

Unit-II: Theory Of Probability:

Introduction-Short history- Definition of various terms Mathematical or classical or 'priori' probability-Statistical or Empirical Probability-Problems – Law of addition of probabilities for two events – statement of general law of addition of probabilities – Bayes Theorem.

Unit-III: Random Variables:

Distribution Function-Properties of distribution function-Discrete Random Variable- Probability Mass function-Continuous Random Variables: Probability density function – various measures of central tendency, dispersion, Skewness and Kurtosis for continuous probability distribution and Problems.

Unit-IV: Mathematical Expectation:

Addition and Multiplication Theorem – covariance – Expectation and variance of a linear combination of random variables – Expectation of continuous random variable – Moment generating function and its properties – uniqueness Theorem on Characteristic function-Chebyshev's inequality – weak law and bernoulie's law of large numbers.

Unit-V: Theoretical Discrete Distribution:

Bernoulli Distribution and its moments – Binomial Distribution – moments, mean deviation about mean, mode, M.G.F and Characteristic function – recurrence relation for the moments – additive property of independent Poission variants – recurrence formula for the probability of the Binomial Distribution and Poission Distribution.

Text Book:

1. **S.C Gupta and V.K. Kapoor** , "Elements of Mathematical Statistics",Sultan Chand Publishers, New Delhi. 2009.

   Unit I - Chapter 3

   Unit II - Chapter 4

Unit III- Chapter 5
Unit IV- Chapter 6
Unit V – Chapter 7

Reference Book:

1. **P.R.Vittal**, "Mathematical Statistics", Margham Publications -2002- Reprint 2012.
2. **S.C.Gupta and V.K.Kapoor**,"Funtamentals of Mathematical Statistics", 10th edition,Sulton Chand Publications, 2002.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	calculate mean, median and mode.	K1
CO2	be familiar with elementary statistical methods of analysis of data and interpret them.	K1,K2
CO3	understand the concept of correlation and regression.	K3
CO4	relate Binomial, Poisson and Normal distributions.	K3
CO5	develop problem solving skill on applying statistical methods to real problems.	K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	M	M	S	M	M
CO3	S	S	S	M	M	M	M	S	S	S
CO4	M	M	S	M	M	M	S	M	M	M
CO5	M	S	S	S	M	M	M	S	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE311	CHOICE I	L	T	P	C
ELECTIVE I		NUMERICAL METHODS	4	-	-	3

Objectives:

- To develop efficient algorithms for solving problems in Science, Engineering and Technology.
- The leaner will analyze the different aspects of numerical solution of algebraic and transcendental equations.
- Students will be able to identify the basic concept of numerical differentiation and integration, principle of least squares.
- The learner will become knowledgeable in solving solution to simultaneous linear equations.

Unit-I: Introduction:

Solution of Algebraic and Transcendental Equations: Bisection Method definition – Algorithm for Bisection Method - problem solving using Bisection Method -Iteration Method introduction – Condition for Convergence – Order of Convergence of an iterative process.

Unit-II: Solution of Algebraic and Transcendental Equations:

Regular Falsi Method – Geometrical interpolation - Newton's Raphson Method – Geometrical meaning of Newton's method – Criterion for the convergence in Newton Raphson method – Order of convergence of Newton's method.

Unit -III: Solutions of Simultaneous Linear Algebraic Equations:

Simultaneous Linear Algebraic Equations- Solutions of Simultaneous Linear Algebraic Equations introduction - Direct method – Introduction - Gauss Elimination Method for Simultaneous Linear Algebraic Equations – Gauss Jordan Elimination Method Simultaneous Linear Algebraic Equations – Method of triangularization – Iterative methods.

Unit -IV: Solutions of Simultaneous Equations cont.:

Gauss Jacobi method for Solutions of Simultaneous Linear Algebraic Equations Introduction- Algorithm for Gauss Jacobi method for Solutions of Simultaneous Linear Algebraic Equations – Gauss Seidel Method of iteration for Solutions of Simultaneous Linear Algebraic Equations Introduction- . Algorithm and problems in both methods .

Unit -V: Finite Differences:

Introduction about First and Higher Order Differences – Express any value of y in term of y_n and the backward difference of y_n – Difference of a factorial polynomial - Forward and Backward Differences. problems in Forward and Backward Differences.

Text Book:

1. **P.Kandasamy, K.Thilagavathi and K. Gunavathi**, "Numerical Methods", S.Chand and Company Ltd , New Delhi 2013.

   Unit I – Chapter 3 -3.1 to 3.2
   Unit II – Chapter 3 -3.3 to 3.4
   Unit III – Chapter 4 -4.1- 4.2
   Unit IV – Chapter 4 - 4.8 - 4.9
   Unit V – Chapter 5 – 5.1 – 5.2

Reference Books:

1. **Arumuga, Issac, Somasundaram**,"Numerical Analysis", New Gamma Publishing House, Palayam Kottai 2003
2. **G. Balaji**, "Numerical Methods", G.Balaji Publishers, Chennai 2007.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand the equations using different methods under differ conditions and numerical solutions of system algebraic equation	K1
CO2	apply various interpolation methods and finite different concepts	K3
CO3	analyse differentiation and integration whenever and where ever routine methods are not applicable	K4
CO4	evaluate the ordinary differential equations using different methods through the theory of finite differences.	K5
CO5	evaluate the partial differential equations using different methods through the theory of finite differences.	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	S	M	M	S	M	S
CO2	S	S	S	M	S	S	M	M	M	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	M	S
CO5	S	M	S	S	M	S	M	S	S	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE312	CHOICE II	L	T	P	C
ELECTIVE I		STOCHASTIC PROCESS	4	-	-	3

Objectives:

- To give a depth knowledge about Markov chain and Process.
- To understanding the stochastic models for much real life probabilistic situations and expected results.
- To learn the well known models like birth – death and queueing to reorient the knowledge of stochastic analysis.
- The learner understands in depth knowledge about ergording, renewal theory and its application in discrete and continuous process.

Unit-I: Basic Definitions:

Stochastic Processes: An Introduction-Specification of Stochastic process - Markov Chains: Definition and Examples- Higher Transition Probabilities - Generalization of Independent Beronoulli Trials : Sequence of Chain – Dependent Trails

Unit-II: Morkov Chains:

Definition and examples-:Transition matrix(or Matrix of Transition Probabilities) – order of a Markov Chains – Markov chain in graphs – Higher Transition Probabilities - Classification of States and Chains: Communication relationships – Class properties- Classification of Chains – Classification of States – Determination of Higher Transition Probabilities - Stability of A Markov System – Graph Theoretic Approach.

Unit-III: Markov Process with Discrete State Space:

Poisson Process and its extension: Introduction- Postulates for Poisson Process and its Extension: Poisson Process: Introduction- Poisson Process and Related Distributions – Interval Time- Properties of Poisson process- Generalisation of Poisson process: Poisson process in Higher Dimensions- Poisson Cluster Process – Pure Birth Process: Yule-Furry Process- Birth-Immigration Process- Time dependent Poisson process- Random Variation of the Parameter λ- Renewal process.

Unit-IV: Classification of States:

Introduction about Classification of States -Brownian Motion – Wiener Process – Differential Equations for a Wiener Process -Kolmogorov Equation – First Passage Time Distribution for wiener Process. Problem solving using wiener Process.

Unit-V: Birth and Death Distribution Process:

Introduction about Birth and Death Distribution Process- Renewal Process - Renewal Processes in Continuous Time with problems – Renewal Equation - Stopping Time: Wald's Equation - Renewal Theorems with Applications.

Text Book:

1. **J.Medhi**, "Stochastic process", Second edition- New Age International Publishers.
   Unit I: Chapter 1: 1.5;
   Unit II: Chapter 2: 2.1 to 2.7
   Unit III: Chapter 3: 3.1 to 3.3
   Unit IV: Chapter 4: 4.1 to 4.5
   Unit V: Chapter 6: 6.1 to 6.5

Reference Books:

1. Samuel Karlin and Howard M. Taylor, "A First Course in stochastic process", second edition, academic Press. 1975
2. Samuel Karlin and Howard M. Taylor, "A Second course in stochastic process", Academic Press, 1981
3. Narayan Bhat, U, "Elements of Applied Stochastic Processes", Second Edition John Wiley & Sons, New York
4. Feller, "An Introduction to Probability theory and its applications", Volume 1. Third edition, John Wiley & Sons, New York

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	remember random variables with Probabilistic condition	K1
CO2	understand Markov chains , Markov process and alternate approach	K2
CO3	apply the concepts in Birth and Death Distribution Process	K3
CO4	identify the type of the Differential Equations for A Wiener Process -Kolmogorov Equation	K3
CO5	prove the sampling distribution theory	K3, K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	S	M	M	M
CO2	M	S	M	M	M	M	S	S	S	M
CO3	S	S	S	S	S	M	M	M	S	S
CO4	M	S	S	S	S	S	S	S	M	S
CO5	M	S	S	S	S	S	S	S	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE313	CHOICE III	L	T	P	C
ELECTIVE I		PRINCIPLES OF EXPERIMENTAL DESIGN	4	-	-	3

Objectives:

- To learn analysis skill with models
- To know comparing ideas
- To find errors

Unit-I: Basic Principles For Designing Statistical Experiments:
Randomization, Replication and local control techniques - Determination of experimental units and notion of experimental error - Analysis of variance with one–way and two–way classifications - Models and Methods of analysis.

Unit-II: Completely Randomized Design (CRD) and Randomized Block Design (RBD):
Models and estimates of parameters and their standard error - Analysis of data arising from such designs, Analysis when one or two observations are missing.

Unit-III: Latin Square Design (LSD):
Latin Square Design introduction -Model – Estimation of parameters – Method of analysis – Missing Plot technique in Latin Square Design

Unit-IV: Multiple Comparison Tests:
Multiple Comparison Tests introduction -Least Significant Difference- Student-Newman–Keuls test-Duncan's Multiple Range test- Tukey's test

Unit-V: Factorial Experiments:
Factorial Experiments 2^2, 2^3 and 3^2 designs; estimation of main effects and interactions and their standard errors and error estimations..

Text Books:

1. **Das, M.N. and Giri.N.C.** ",Design and Analysis of Experiments", Wiley eastern, 1986
2. **Montgomery, C.D "**,Design of Experiments", 8/e, John Wiley and Sons, 2012

Reference Books:

1. **Goon.A.M, Gupta and Dasgupta.B**. , "An Outline of statistical theory, vol. II ", 6/e World Press Calcutta. 2001
2. **Gupta .S.C. and Kapoor.V.K.,** "Fundamentals of Applied Statistics ", Sultan Chand. 2000.
3. **Parimal Mukhopadhyay**, "Applied Statistics ", 2/e, Books and Allied (P) Ltd, Kolkata,2

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	acquire skills in statistical analysis.	K1
CO2	calculate values through designs.	K2
CO3	apply the concepts through models.	K3
CO4	comparing results in Latin square design.	K3, K4
CO5	calculating standard errors.	K3, K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	M	M	M	S	M	M
CO2	M	M	S	M	M	S	M	M	S	M
CO3	M	S	S	S	M	M	M	S	S	S
CO4	M	M	M	M	M	M	M	M	M	S
CO5	M	M	M	M	M	M	M	M	S	M

*S-Strong; M-Medium; L-Low

SEMESTER – IV

COURSE CODE	U21MTT41	STATICS	L	T	P	C
CORE VI			4	-	-	4

Objectives:

- To learn the application of geometric properties in equilibrium and motion of particles.
- To learn know to apply geometrical concepts in parallel forces, moments and couples
- Proficient in static equilibrium's three forces acting on a rigid body and friction.
- The learner to understand real time application.

Unit–I: Forces Acting At A Point:

Resultant and Components- Parallelogram of Forces- Analytical expression for the Resultant of two forces acting at a point – Triangle of Forces – Perpendicular Triangle of Forces – Converse of the Triangle of Forces- The Polygon of Forces – Lami's Theorem – An extended form of the parallelogram law of Forces- Resolution of a Force – Components of a Force along two given directions –Theorem on Resolved parts.

Unit–II: Resultant Of Any Number Of Coplanar Forces Acting At A Point:

Analytical Method - Conditions of Equilibrium of any Number of forces Acting upon a Particle – Geometrical or Graphical Conditions - Analytical Conditions. Parallel Forces and Moments: To find the Resultant of Two like parallel forces acting on a rigid body- To find the Resultant of Two unlike and unequal parallel forces acting on a rigid body – Resultant of a Number of Parallel Forces Acting on a rigid Body – conditions of Equilibrium of Three Coplanar Parallel Forces – Centre of two Parallel Forces – Moment of a Force – Physical Significance of the Moment of a Force – Geometrical Representation of a Moment – Sign of a Moment.

Unit–III: Unit of Moment:

Varigon's theorem of moments – Generalised Theorem of Moments (Principle of Moments)- Moment of a Force a about an axis. Couples: Definition – Equilibrium of two couples – Equivalence of two Couples- Couples in Parallel Planes – Resultant of Coplanar Couples - Resultant of a Couple and a Force.

Unit–IV: Equilibrium Of Three Forces Acting On A Rigid Body:

Rigid Body subjected to any Three Forces – Three Coplanar Forces – Conditions of Equilibrium- Procedure to be followed in solving any Statical Problem – Two Trigonometrical Theorems – Coplanar Forces: Introduction - Reduction of any number of Coplanar forces – analytical Proof of theorem – Conditions for a system of forces to Reduce to a single force or to a Couple.

Unit–V: Friction:

Introduction – Experimental Results – Statical, Dynamical and Limiting Friction – Law of Friction – Friction-a Passive force – coefficients of Friction – Angle of Friction – Cone of Friction – Numerical Analysis – Equilibrium of a particular on a rough inclined plane -

Equilibrium of a body on a rough inclined plane under a force parallel to the plane - Equilibrium of a body on a rough inclined plane under any force.

Text Book:

1. **M.K.Venkatraman**, "Statics", 12th edition, Agasthiar Publications, Trichy, 2010.
   Unit I - Chapter 2 – Sec. 1 to 13.
   Unit II - Chapter 2 – Sec 15, 16 and Chapter 3 – Sec 1 to 10.
   Unit III- Chapter 3 – Sec. 11 to 14 and Chapter 4.
   Unit IV – Chapter 5 and Chapter 6 – Sec. 1 to 5.
   Unit V – Chapter 7.

Reference Books:

1. **A.V.Dharmapadam**, "Statics", S Viswanathan Printers and Publishing Pvt.,Ltd. 1993
2. **P.Duraipandian and Lakshmi Duraipandian**, "Mechanics", S.Chand and Company Ltd,New Delhi - 1985.
3. **Dr.P.P.Gupta**, "Statics", Kedal Nath Ram Nath, Meerut,1983-1984.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand the action of forces on rigid bodies.	K1
CO2	analyze the concept of parallel forces and moments.	K2
CO3	compute equation of central orbit.	K3
CO4	understand the concept of friction.	K2
CO5	compute equation of equilibrium of strings.	K3

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO4	PO3	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	S	S	M	M	S	S
CO2	S	M	S	S	M	M	M	M	M	S
CO3	S	M	S	S	M	M	S	S	S	S
CO4	S	M	S	S	S	S	M	S	S	S
CO5	S	S	S	S	S	M	S	S	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT42	SEQUENCE AND SERIES	L	T	P	C
CORE VII			4	-	-	4

Objectives:

- To enhance basic skills in the areas of sequences and series.
- Types of sets, inequalities and sequences
- Behavior of sequences and its subsequences
- Infinite series and various tests for finding rearrangements its convergence

Unit–I: Sequences:

Definition of Sequences – Bounded sequences – Monotonic sequences – Convergent sequences – Divergent and Oscillating sequences – Solved problems – The Algebra of limits- Behaviour of monotonic sequences- solved problem.

Unit–II: Limit points:

Limit points definition -Some theorems on Limits – Cauchy's first limit theorem- subsequences – Limit points – Cauchy sequences – Cauchy's general principle of convergence- the upper and Lower limits of a sequence – solved problems.

Unit–III: Series of Positive Terms:

Infinite series- Definition – Cauchy's general Principle of convergence – comparison test – Kummer's Test – D' Alembert's ratio test- Solved problems in D' Alembert's ratio test – Raabe's Test – Solved problems in Raabe's Test- De Morgan and Bertrand's test , Gauss's test- solved problems.

Unit–IV: Root test and condensation test:

Cauchy's root test – Cauchy's Condensation test – Cauchy's Integral test – Series of arbitrary terms: Alternating series – Leibnitz's test – Absolute Convergence – Test for Convergence of Series of Arbitrary terms – Dirichlet's test – Abel's test – solved problems.

Unit–V: Rearrangement of Series:

Rearrangement(Derangement) of Series Definition – Riemann's theorem –Insertion of brackets – multiplication of series : Definition – Abel's theorem – Merten's theorem – Power series.

Text Book:

1. **Arumugam and Issac,** "Sequences and series", New Gamma publishing House, December 2015 and reprint 2017.

   Unit I – Chapter 3 – 3.1 to 3.7.
   Unit II – Chapter 3 – 3.8 to 3.12.
   Unit III – Chapter 4 – 4.1 to 4.3.
   Unit IV –Chapter 4 – 4.4 and 4.5, Chapter 5 – 5.1 to 5.3.
   Unit V – Chapter 5 – 5.4 to 5.6.

Reference Book:

1. **S.C.Malik ,Savita Arora., ”**Mathematical Analysis**”,** New Age International Private Limited.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand the fundamental principles of Analysis	K2
CO2	identify convergence and divergence of series	K2
CO3	apply various tests to find the limit of a series	K3
CO4	distinguish between absolute convergence and ordinary convergence of a Series.	K4
CO5	compute the radius of convergence of the power series.	K4, K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	M	S	S	M
CO2	S	S	S	M	M	M	M	S	S	M
CO3	S	S	M	S	M	M	M	S	M	M
CO4	M	M	M	M	M	S	M	S	S	M
CO5	S	S	M	M	M	M	S	M	M	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTA44	ANCILLARY MATHEMATICAL STATISTICS - II	L	T	P	C
ALLIED IV			4	-	-	4

Objectives:

- To impart skills in various applications of statistical methods.
- Analyze the given data by using statistical methods.
- Construct and evaluate hypothesis tests.
- Apply sampling techniques to real life situations.

Unit–I: Distributions:

Theoretical Continuous Distributions – Rectangular Distribution – Normal Distribution as Limiting form of Binomial Distribution – Chief Characteristic of Normal Distribution and Normal Probability curve – Mode, Median, M.G.F, Moments, Mean Deviation from the Mean of Normal Distribution – A linear combinations of Independent Normal variants – Points of Inflexion of Normal Curve – Area property- Fitting of Normal distribution.

Unit–II: Curve fitting:

Fitting of a straight Line, Second degree Parabola Polynomial of kth degree change of Origin – fitting of power curve $y=ax^b$ fitting of Exponential curves $y=ab^x$, $y=ae^{bx}$ - Theory of attributes – Notations – Dichotomy Classes and Class frequencies – order – relation between class frequencies – class symbols as operators – Condition, for consistency of data – Independence of Attributes and its criterion – association of Attributes – Yule's – Co-efficient of association.

Unit–III: Correlation and regression:

Bivariate Distribution – Correlation – Scatter diagram- Karl Pearson Co-efficient for correlation and Limits – calculation of Correlation Co-efficient for a bivariate frequency Distribution- Rank Correlation- Repeated Ranks – Regression – Line of Regression – Regression Co-efficient and Its Properties – Angles between two lines of regression.

Unit–IV: Sampling and Large sample test:

Introduction- Types of sampling – parameters and Statistics – Test of Significance – Null – Hypotheses – test of Significance for single mean, Difference of Means – Difference of standard Deviation, Exact Sampling Distribution – Chi-square variant – Derivation- M.G.F.Mode, Skewness of Chi square Distribution – additive property of Chi-square variants – Application Chi-square Distribution – Chi-square test for population Variance and Goodness of Fit – Independence of Attributes.

Unit–V: Distribution:

Exact Sampling distribution – t,f and z distribution, definitions and Applications to t,f and z distribution – test for single mean, differences of mean, Observed Correlation Co-efficient – f test for quality of population on variance .

Text Book:

1. **S.C.Gupta&V.K.Kapoor** ,"Elements of Mathematical Staistics", course of Madras: Madurai University, Sultan Chand Publishers, New Delhi 2009.

   Unit I - Chapter 8 -8.1 to 8.2.11,8.2.14.
   Unit II -Chapter 9- 9.1 to 9.3 and chapter 11
   Unit III -Chapter 10
   Unit IV - Chapter 12
   Unit V -Chapter 13 and 14

Reference Books:

1. **Arumugam and Thangpandi "**Probability and Statistics", New Gamma Publishing House, 2006.
2. **P.R. Vittal**, "Mathematical Statistics", Margham Publications, 2012.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand Theoretical Continuous Distributions	K2
CO2	estimate the parameters of population on the basis of given information, Correlation and regression.	K3
CO3	make decision using t- test and F- test, z - test.	K4
CO4	analyze the association between two or more groups and populations.	K4
CO5	evaluate sample distributions	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	M	S	M	M
CO2	M	M	M	M	S	M	M	S	S	M
CO3	M	S	S	S	M	M	M	M	M	M
CO4	S	S	S	M	M	M	S	M	M	M
CO5	S	S	S	M	M	M	S	S	M	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE421	CHOICE I	L	T	P	C
ELECTIVE -II		PROGRAMMING IN C & C++	3	-	-	3

Objectives:

- To develop programming skills in C and its object oriented concepts.
- The learner will become proficient in object oriented programming concept and proficient in C tokens
- Proficient in C operators , class declaration and definition and its objects
- Proficient in conditional statements and loop concept

Unit–I: Overview of C:

Importance of C - Sample C Programs - Basic structure of C program- Programming style - Executing a C Programe .Constants, Variables and Data types : – Character set – C tokens – Keywords and Identifiers – Constants – Variables – Data types – Declaration of Variables – Assigning Values to Variables – Defining Symbolic Constants.

Unit–II: Operators and Expression:

Arithmetic of Operators – Relational Operators – Logical Operators – Assignment Operators- Increment and decrement Operators – Conditional Operator – Bitwise Operators- Special Operators – Arithmetic Expressions – Evaluation of Expressions – Precedence of Arithmetic Operators – Some Computational Problems – Type Conversions in Expressions – Operator Precedence and Associativity – Mathematical Functions.

Unit–III: Principles of Object- Oriented Programming:

Software crisis – Software evolution – A look at procedure-oriented programming – Object oriented programming paradigm – Basic concept of Object -oriented programming – Benefits of OOP – Object Oriented Languages – Applications of OOP.

Unit–IV: Tokens, Expressions and Control Structures:

Introduction – Tokens – Keywords – Identifiers and constants – Basic data types – User Defined data types – Derived data types – Symbolic constants – Type compatibility – Declaration of variables – Dynamic initialization of variables – Reference variables – Operators in C++ - Scope resolution operator – Member Dereferencing operators - Memory management operators – Manipulators – Type cast operator – Expressions and their Types – Special assignment expressions – Implicit conversions – Operator overloading – Operator precedence – Control structures.

Unit–V: Functions in C++:

Introduction – The main function – Function prototyping – Call by reference – Return by reference- Inline functions – Default arguments – Constant arguments – Function overloading – Friend and Virtual Functions – Math Library functions. Managing Console I/O operations Introduction – C++ streams – C++ stream classes – Unformatted I/O operations – Formatted Console I/O operations – Managing Output with Manipulators

Text Books:

1. **E.Balagurusamy**, "Programming in ANSI C‖" , 4th Edition , Tata McGraw- Hill Publishing Company Ltd., New Delhi, Ninth Reprint 2009.
   Unit I – Chapter 1&2
   Unit II – Chapter 3
2. **E.Balaguruswamy,** "Object – Oriented Programming with C++ ", Tata McGraw Hill Education Private Limited, New Delhi, Tenth Reprint 2010.
   Unit I – Chapter 1 & 2
   Unit II – Chapter 3
   Unit III –Chapter 4 & 10

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand the concepts and Programming	K2
CO2	discuss the representation and appropriate use of primitive data types	K1
CO3	describe the object-oriented programming approach in connection with **C**++	K2
CO4	apply the concepts of object-oriented programming	K3
CO5	evaluate the process of data file manipulations using **C**++	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	S	S	M	M	M	M	S
CO2	S	S	S	S	S	M	M	S	M	S
CO3	S	M	M	M	S	S	M	S	S	S
CO4	S	S	S	S	S	S	M	S	S	M
CO5	S	S	S	S	S	M	S	S	S	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE422	CHOICE II	L	T	P	C
ELECTIVE -II		AUTOMATA THEORY	3	-	-	3

Objectives:

- To make the students to understand the nuances of Automata and Grammar.
- To explain various types of automata and grammar.
- Introduce the fundamental concepts of formal languages, grammars and automata theory.
- Identify different formal language classes and their relationships
- To make them to understand the applications of these techniques in computer science.

Unit–I: Finite Automata-An Informal picture of Finite Automata:
The Ground Rules – The Protocol- Enabling the Automata to Ignore Actions – The Entire System as an Automation – Using the Product to Validate the Protocol- Deterministic Finite Automata: Definition of a Deterministic Finite Automation – How a DFA Process strings- Extending the Transition Function to Strings – The Language of a DFA- Exercise

Unit–II: Nondeterministic Finite Automata:
An Informal View of Nondeterministic Finite Automato – Definition of Nondeterministic Finite Automata – The Extended Transition Function- The Language of an NFA- Equivalence of Deterministic and Nondeterministic Finite Automata- A Bad Case for the subset Construction – An Application: Text Search: Finding Strings in Text – Nondeterministic Finite Automata for Text Search – A DFA to Recognize a Set of Keywords – Exercise.

Unit–III: Finite Automata with Epsilon-Transitions:
Use of $\in$ - Transitions – The Formal Notation for an $\in$- NFA- Epsilon–Closures –Extended Transitions and Languages for $\in$-NFA's – eliminating $\in$-Transitions – exercises.

Unit–IV: Regular Expressions and Languages:
Regular Expressions: The operators of Regular Expressions- Building Regular Expressions – Precedence of Regular –Expression operators – Exercises – Finite Automata and Regular Expressions: From DFA's to Regular Expressions – Converting DFA's to Regular Expressions by eliminating states – Converting Regular Expressions to Automata – Exercise.

Unit–V: Algebraic Laws for Regular Expressions:
Associativity and Commutativity – Identities and Annihilators – Distributive Laws – The Idempotent Law – Laws Involving Closures – Discovering laws for Regular Expressions. Properties of Regular Languages: Closure Properties of Regular Languages: Closure of Regular Languages under Boolean Operations –Homomorphisms – Inverse Homomorphisms –Decision properties of Regular Languages: Converting Among Representations – Testing Emptiness of Regular Languages – Equivalence and Minimization of automata:Testing Equivalence of States.

Text Book:

1. **John E. Hopcroft and Rajeev Motwani and Jeffrey D. Ullman**, "Introduction to Automata theory, Languages and Computations", 3rd edition, Pearson Addison Wesley,NewYork,2006 Chennai, 2000.
   Unit I: Chapter 2: Sections 2.1-2.2
   Unit II Chapter 2 Section 2.3.-2.4
   Unit III: Chapter 2, Section 2.5,
   Unit IV: Chapter 3, Sections 3.1-3.2,
   Unit V: Chapter 3, Sections 3.4 and Chapter 4: 4.2-4.4

References Books:

1. **Harry R. Lewis and Christos H. Papadimitriou**, " Elements of the Theory of Computation" Second Edition, Prentice Hall, 1997.
2. **A.V. Aho, Monica S. Lam, R. Sethi, J.D. Ullman**, "Compilers: Principles, Techniques and Tools ", Second Edition, Addison-Wesley, 2007.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand basic concepts in Lattices , formal language and automata theory	K2
CO2	demonstrate abstract models of computing, including deterministic (DFA), non-deterministic (NFA), Push Down Automata(PDA)	K3
CO3	apply theoretical knowledge relate practical problems to languages and automata	K4
CO4	analyze the logic and methods behind grammars and recognizers for different formal languages	K5
CO5	formalize the structure of a given formal language using regular expressions and context free grammars and implementation of a lexical analyzer.	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M	M	M	M	S	S
CO2	S	M	S	S	S	S	M	M	M	S
CO3	M	M	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE423	CHOICE III	L	T	P	C
ELECTIVE -II		KNOWLEDGE FOR INDUSTRY	3	-	-	3

Objectives:

- ❖ To knowledge for Industry, need for digital transformation and the following Industry tools:

1. Artificial Intelligence 2. Big Data and Data Analytics 3. Internet of Things

Unit–I: Industry 4.0:

Need – Reason for Adopting Industry 4.0 - Definition – Goals and Design Principles - Technologies of Industry 4.0 – Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality.

Unit–II: Artificial Intelligence:

Artificial Intelligence (AI) – What & Why? - History of AI - Foundations of AI -The AI - environment - Societal Influences of AI - Application Domains and Tools - Associated Technologies of AI - Future Prospects of AI - Challenges of AI.

Unit–III: Big Data And IOT:

Evolution - Data Evolution - Data : Terminologies - Big Data Definitions - Essential of Big Data in Industry 4.0 - Big Data Merits and Advantages - Big Data Components : Big Data Characteristics - Big Data Processing Frameworks - Big Data Applications - Big Data Tools - Big Data Domain Stack : Big Data in Data Science - Big Data in IoT - Big Data in Machine Learning - Big Data in Databases - Big Data Use cases Big Data in Social Causes - Big Data for Industry - Big Data Roles and Skills -Big Data Roles - Learning Platforms; Internet of Things (IoT) : Introduction to IoT - Architecture of IoT - Technologies for IoT - Developing IoT Applications - Applications of IoT - Security in IoT

Unit–IV: Applications And Tools Of Industry 4.0:

Applications of IoT – Manufacturing – Healthcare – Education – Aerospace and Defense – Agriculture – Transportation and Logistics – Impact of Industry 4.0 on Society: Impact on Business, Government, People: Tools for Artificial Intelligence, Big Data and Data Analytics, Virtual Reality, Augmented Reality, IoT, Robotics

Unit–V: Jobs 2030+:

Industry 4.0 – Education 4.0 – Curriculum 4.0 – Faculty 4.0 – Skills required for Future - Tools for Education – Artificial Intelligence Jobs in 2030 – Jobs 2030 - Framework for aligning Education with Industry 4.0

Text Book:

1. **P.Kaliraj& T. Devi**, “Higher Education for Industry 4.0 and Transformation to Education 5.0”, 2020

Reference Book:

https://nptel.ac.in/courses/106/105/106105195/

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	know the reason for adopting Industry knowledge 4.0 and Artificial Intelligence	K1
CO2	understand the need for digital transformation	K2
CO3	apply the industry 4.0 tools	K3
CO4	analyze the applications of Big Data	K4
CO5	examine the applications and security of IoT Applications	K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	S	S	S	S	M	S	S
CO2	S	M	M	S	S	S	M	M	M	S
CO3	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	M	S	M	S	S	S	S	S	S

*S-Strong; M-Medium; L-Low

SEMESTER - V

COURSE CODE	U21MTT51	DYNAMICS	L	T	P	C
CORE - VIII			5	-	-	4

Objectives:

- Proficient in Newton's laws of motion and projectiles
- Proficient in collision of elastic bodies
- Proficient in motion under action of central forces
- To defines the path of orbiting body around central body relative to, without specifying position as a function of time.

Unit-I: Newton Laws of Motion and Applications:
Introduction- Momentum- Newton's law of motion-Explanation and illustration of the first law-Explanation of the second law of motion-Composition of Forces- Parallelogram law of forces-Absolute Units of forces-Weight- gravitational units of force

Unit-II: Projectiles:
Definition- Two fundamental Principles-Path of the projectile is a parabola- Characteristics of the motion of a projectile– Equation of path range etc. –Range of a particle projected on an inclined plan etc. – Motion on the surfaces of a smooth inclined planes- Enveloping Parabola.

Unit-III: Impulsive Forces-Impulses:
Impulsive force-Impact of two bodies-Loss of kinetic energy in impact-Motion of shot and guns-Impact of water on a surface- worked examples – Impact in a fixed plane – Direct and Oblique impact – Solved Problems.

Unit-IV: Simple harmonic motion:
Introduction-Simple harmonic motion in a straight line- Definition-General solution of the Simple harmonic motion—Geometrical representation of a Simple Harmonic Motion – Equation of motion – composition of two simple harmonic motions – simple pendulum.

Unit-V: P-R Equation:
Introduction - Velocity and acceleration in polar coordinates – Equation of motion in Polar coordinates – Motion under a central force – Differential equation of central Orbits – Perpendicular from the pole on the tangent formulae in polar coordinates – Pedal equation of central orbit – Pedal equation of some well-known curves – Velocities in central orbit – Two fold problems in central orbits – Apses and apsidal distances – Law of the inverse square – Law of the inverse cube.

Text Book:

1. **M.K.Venkatraman**, "Dynamics", 9th edn, Agasthiar Publications, Trichy,1997.
   Unit I – Chapter 4 – Sec. 4.1 to 4.37
   Unit II – Chapter 6 – Sec. 6.1 to 6.17.
   Unit III – Chapter 8 – Sec. 8.1 to 8.10.
   Unit IV – Chapter 10 – Sec. 10.1 to 10.16.
   Unit V – Chapter 11 – Sec. 11.1 to 11.15.

Reference Books:

1. **A.V.Dharmapadam**, "Dynamics", S.Viswanathan Printers and Publisher Pvt.,Ltd.,Chennai 1993.
2. **K.Viswanntham Naik and M.S.Kasi**, "Dynamics", Emerald Publishers, 1999
3. **Narayanamurthy and N.Nagarathnam** , "Dynamics", National Publishers, New Delhi,1991.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	determine the path and range of a projectile in any direction.	K1
CO2	understand the concept of enveloping parabola.	K2
CO3	knowledge about collision of elastic bodies.	K2
CO4	compute equation of simple harmonic equation.	K3
CO5	understand the motion under the central forces.	K2, K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	M	S	S	M
CO2	M	M	S	M	M	M	M	M	S	M
CO3	S	S	S	S	M	M	M	S	S	M
CO4	S	S	S	M	M	M	M	S	S	M
CO5	M	M	M	M	M	S	M	M	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT52	ABSTRACT ALGEBRA	L	T	P	C
CORE - IX			5	-	-	4

Objectives:

- To provide some knowledge about various algebraic structures.
- Recognize the basic properties of groups and subgroups.
- Understand the types of homomorphism and use them to classify groups.
- Apply the theorems to study the structure of groups.
- Recognize the basic properties of rings, fields and integral domains.
- Using the algebraic methods for solving problems.

Unit-I: Groups:

Definition and Examples – Elementary Properties of a Group – Additive group of integers – Group of residue classes – The Generalised Associative Law - Power and Index law - Quaternion group - Groups of symmetries - Order of an Element – Alternative definitions of a group.

Unit-II: Complexes and Subgroups:

Union and intersection of Subgroups – Properties of Subgroup – Homomorphism – Elementary propertied of Homomorphism – Types of Homomorphism – Some results on isomorphism – Structure of isomorphic groups – Non-isomorphic groups - Cayley's Theorem - Group of Permutation - Cyclic Groups - Automorphism.

Unit-III: Coset's and Lagrange's Theorem:

Properties of Cosets – Index of a subgroup – Consequences of Lagrange's theorem - Normal Subgroups and Quotient Groups – Examples - Quotient Structure – Quotient Group - A Counting Principle - Fundamental theorem of homomorphism.

Unit-IV: Rings:

Definitions and Examples - Elementary properties of rings – division rings and fields – Integral Domains – Zero Divisor - Ordered integral domain – Characteristic of a ring - sub ring and sub field – Properties of sub ring and subfield - prime fields.

Unit-V: Homomorphism of Rings and their types:

Elementary properties of homomorphism – Types of homomorphism - Ideals ring – Quotient structure and Isomorphism theorems - Maximal and Prime Ideals - Field of quotient of an integral domain.

Text Book:

1.T.K.Manickavasagampillai and Narayanan, "Modern Algebra volume I & II" Viswanathan printers and publishers Pvt Ltd., Edition 1982

Unit I- Chapter 6 – 6.1 to 6.2
Units II- Chapter 6 – 6.3 to 6.7
Unit III- Chapter 6 – 6.8 to 6.10
Units IV- Chapter 7 – 7.1 to 7.4

Unit V- Chapter 7 – 7.5 to 7.9

Reference Books:

1. **Arumugam S and Thangapandi Issac**, "Modern Algebra", SCITECH Publications, Chennai, Edition 2003.
2. **A.R.Vasishtha,** "Modern Algebra", Krishna Prakashan Mandir, Meerut, 1994 – 95.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	Knowledge of elementary concepts in Abstract Algebra	K1
CO2	Use appropriate techniques and reasoning to prove the properties of groups	K2
CO3	Understanding the concept of homomorphism and isomorphism in groups	K1,K2
CO4	Extend the results of groups to rings	K3
CO5	Extend the results of rings to fields	K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M	S	M	M	S	M
CO2	S	S	S	S	M	M	M	S	S	M
CO3	M	M	M	M	S	S	S	M	S	S
CO4	S	S	S	M	M	S	S	M	S	S
CO5	M	M	M	M	M	S	M	M	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT53	REAL ANALYSIS	L	T	P	C
CORE - X			5	-	-	4

Objectives:

- Understand the basic concepts of sets
- To provide knowledge about Metric Spaces
- The learner will acquire knowledge of open/closed sets and its properties
- The learner will acquire knowledge of Continuity, Connectedness, and Compactness and apply theorem

Unit-I: Metric Spaces:
Preliminaries- sets and functions - Countable sets- Uncountable sets- Inequalities of Holder and Minkowski- Metric spaces: Definition and Examples-Bounded set in a metric spaces- Open balls in a metric spaces- open sets-subspaces- Interier of a set.

Unit-II: Metric Spaces and Complete metric space:
Closed sets – Definition – Closure of a set- Limit point in set- Dense sets- summary questions - Metric Spaces –definition –examples -Complete metric space: Introduction- Completeness- Baire's Category theorem- summary questions.

Unit-III: Continuity:
Introduction- Continuity-Solved problems -Homeomorphism-Uniform continuity – examples – Uniformly continuous –solved problems - Discontinuous function on R- right limit – left limit – point of discontinuity-discontinuity of the second kind- oscillation.

Unit-IV: Connectedness:
Introduction- Definition and Examples –connected and continuous – solved problems- component - Connected subset of R –solved problems- connectedness and continuity- intermediate value theorem.

Unit-V: Compactness:
Introduction - compact metric spaces – (0,1) with usual metric is not compact- (0, ∞) with usual metric is not compact- discrete metric not compact - compact subsets of R-equivalent characterization for compactness – Compactness and continuity - solved problems.

Text Book:

1. **Arumugam S and Thangapandi Issac ,"** Modern Analysis", New gamma Publishing house , Edition 2013.
   Unit I – Chapter 1& 2 – 1.2 to 2.6 Unit II – Chapter 2 & 3 – 2.7 to 3.2
   Unit III – Chapter 4 – 4.1 to 4.4 Unit IV –Chapter 5
   Unit V – Chapter 6

Reference Books:

1. **Walter Rudin**, "Principles of Mathematical Analysis", McGraw-Hill International. Editions (3rd) – 1976.
2. **V.Karunakaran**, "Real Analysis", Pearson Publications, Edition-2012.
3. **Appostol**, "Mathematical Analysis", Narosa Publishing House-Second Edition-2002.

Course Outcome:

On the successful course completion, students will be able to:		Cognitive Level
CO1	Understand the fundamental properties of real numbers to the formal development of real analysis	K2
CO2	Extended real number system in the complex field developing the theory of real analysis	K3
CO3	Demonstrate an understanding limit and how they are use being sequences and series.	K3
CO4	Analysis various mathematical proofs of basic results in connectedness.	K4
CO5	Evaluate various mathematical proofs of basic results in continuity.	K4,K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	S	S	S	M	S	S
CO2	M	M	M	M	M	S	S	M	S	S
CO3	S	S	S	M	S	S	M	S	S	M
CO4	S	M	M	S	S	S	M	S	S	S
CO5	M	M	S	M	M	S	S	S	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT54	OPERATIONS RESEARCH I	L	T	P	C
CORE - XI			-	5	-	4

Objectives:

- To impart the basic concepts and applications of linear programming.
- The leaner will formulate a linear programming problem and solve them graphically and simplex method
- The leaner will be able to understand the concepts of duality programming
- The leaner will analyze the different aspects of transportation problems and also assignment problems
- Students will be able to identify the basic analysis of various inventory models.
- The leaner will develop, organize, evaluate short, long term processes and solve problems

Unit-I: Linear Programming:

Introduction- Mathematical formulation of linear programming problem-Graphical solution-solved problems- Unbounded solution- Infeasible solution –Canonical form –Standard form - Introduction - Simplex method - Use of Artificial Variables: – Big M Method -problems– Two Phase Simplex method- problems.

Unit-II: Degeneracy in Linear Programming:

Introduction- Degeneracy in Linear Programming – Introduction about Duality - Duality Theorem – Finding solution for Linear Programming problem using Duality and Simplex Method – Dual Simplex Method for Linear Programming problem . Finding solution for Linear Programming problem using Dual Simplex Method.

Unit-III: Transportation Problem:

Introduction of Transportation Problem – Definition of Transportation Problem- Mathematical formulation of the problem - Finding Initial Basic Feasible Solution using North - West Corner Rule - Row Minima method- Column Minima method-Matrix Minima Method - Vogel's Approximation Method - Optimum solution – MODI method .

Unit-IV: Assignment Problem:

Introduction – Definition of Assignment problem -Mathematical formulation of Assignment Problem-Assignment Algorithm-problems solving using assignment algorithm- Minimizations case Routing problem- problems using Routing problem- Application of Assignment problem-Traveling salesman problem .

Unit-V: Inventory Control:

Introduction- Definition – Need for inventory Various Cost in : Inventory Control -Types of Inventories – The inventory decisions -Economic order quantity – Deterministic Inventory Problems: EOQ Problem with no shortages – EOQ Problem with price break – EOQ Problem with two price break – EOQ Problem with n price break.

Text Book:

1. **Kantiswarup, P.K.Gupta, Manmohan** "Operations Research", Sultan chand and sons , Edition 2000.

   Unit I- Chapter 2.3 and 4 - 4.1 to 4.5
   Unit II- Chapter 5 -5.1 to 5.7
   Unit III- Chapter 10
   Unit IV- Chapter 11
   Unit V- Chapter 19 – 19.1 to 19.10, 19.12

Reference Books:

1. **J.K.Sharma**, "Operations Research",Macmillan India Ltd. 1997.
2. **Prem Kumar Gupta, D.S. Hijra**, "Operations Research", S. Chand & Company Ltd,2002.
3. **P.R.Vittal**, "Operations Research", Margham Publications, 2002.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand the application of OR and frame a LP Problem with solution – graphic and through solver add in excel	K1
CO2	analyze and interpret results of transportation and problem using appropriate method	K2
CO3	evaluate simple model of L.P.P.	K3
CO4	solutions of assignment and problem using appropriate method	K3
CO5	evaluate the dynamics of inventory managements principles, concepts of customer demand, distribution and product transformation process	K4, K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	M	M	M	M	S	S
CO2	S	S	S	M	M	M	M	S	M	M
CO3	M	M	S	M	M	M	S	M	M	M
CO4	S	S	S	S	M	M	M	S	S	M
CO5	M	S	S	S	M	M	M	S	M	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT55	THEORY OF NUMBERS	L	T	P	C
CORE - XII			5	-	-	4

Objectives:

- The learner will acquire knowledge of basic concepts of number theory
- The learner will become proficient in various types of functions
- The learner will be know the primitive roots
- Apply the theorems to study the numbers.

Unit-I: Principle of Finite Induction:

Well – Ordering Principle(WOP)- Principle of Finite Induction- The Division Algorithm – Basis Representation Theorem- Binomial Coefficients- Divisibility Theory : Greatest Common Divisor-Least common Multiple- Linear Diophantine Equations- Fundamental Theorem of Arithmetic - Some Question Regarding Primes.

Unit-II: Congruencies:

– Residue System – Test of Divisibility – Linear congruence's - Solving Polynomial congruence's – An Application of Congruence's to Diophantine Equations - Fermat's Little theorem –Euler's Generalization of FLT_1 .

Unit-III: Functions and Theorem:

Wilson's Theorem- Euler's Φ-Function- Arithmetic Functions:-The Function τ and σ – The Möbius Function- Multiplicative Arithmetic Functions- Inversion Formula- Greatest Integer Function.

Unit-IV: Primitive Roots:

Exponents – Primitive roots Modulo a Prime – Determination of Integers having Primitive roots – Indices – Euler's Criterion – Legendre Symbol and its Properties – Gauss Lemma.

Unit-V: Quadratic Reciprocity Law and its applications:

Jacobi Symbol – Perfect Numbers – Mersenne Primes-Fermat Numbers - Phythagorean Triples-Fermat's Last Theorem.

Text Book:

1. **S.B.Malik ,**"Basic Number Theory",Second Revised Edition, Vikas Publishing House PVT LTD, 2009

   Unit I – Chapter: 1&2
   Unit II – Chapter: 3, Chapter: 4 – 4.1, 4.2
   Unit III – Chapter: 4 – 4.3, 4.4 & Chapter: 5
   Unit IV – Chapter: 6, 7- 7.1 to 7.3
   Unit V – Chapter: 7- 7.4 to 7.6, Chapter : 8

Reference Books:

1. **Ivan Niven and Herbert S Zuckerman**, "An Introduction to the theory of Numbers", 3rd Edition, Wiley Eastern Ltd., New Delhi, 2000.
2. **David M.Burton**,"Elementary Number Theory", W.M.C.Brown Publishers, Dubuque, Lawa, 1989.

Course Outcome:

On the successful course completion, students will be able to:		Cognitive Level
CO1	Understand factual knowledge including the mathematical notation and terminology of number theory.	K2
CO2	Construct mathematical proofs of statement and find counter examples to false statements in Number Theory.	K2
CO3	Apply theoretical knowledge to problem of computer security	K3
CO4	Analyze the logic and methods behind the major proofs in number theory	K4
CO5	Determine multiplicative inverses , modulo n and use to solve linear congruences	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M	M	M	M	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	M	M	M	M	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	M	S	S	S	S	M	S	S	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE531	CHOICE -I	L	T	P	C
ELECTIVE III		FUZZY SETS AND FUZZY NUMBERS	3	-	-	3

Objectives:

- Recognize the concept of fuzzy sets and its properties.
- Distinguish fuzzy sets from crisp sets.
- Perform various types on fuzzy sets.
- Understand the fuzzy numbers and fuzzy Lattice relations.

Unit-I: From classical (crisp) sets to Fuzzy sets:

A Grand Paradigm Shift : – Introduction – Crisp sets: An overview – Fuzzy sets: Basic types - Fuzzy sets: Basic concepts Characteristics and significance of the Paradigm Shift.

Unit-II: Fuzzy Sets versus Crisp Sets:

Additional properties of alpha(α)-cuts – Representations of fuzzy sets- Extension Principle for fuzzy sets- Notes and Exercise.

Unit-III: Operations On Fuzzy Sets:

Types of operations – Fuzzy complements- Fuzzy intersections: t – Norms- Fuzzy unions : t – Conorms - Combinations of operations- Aggregation Operations- Notes and Exercises.

Unit-IV: Aggregation operations and Fuzzy Arithmetic:

Aggregation operations - Fuzzy Numbers – Linguistic Variables-Arithmetic Operations on Intervals - Arithmetic Operations on Fuzzy numbers- Lattice of Fuzzy numbers - Fuzzy equations.

Unit-V: Fuzzy Relations:

Crisp versus Fuzzy Relations – Projections and Cylindric Extensions – binary Fuzzy Relations – Binary Relations on a Single Set- Fuzzy Equivalence Relations.

Text Book:

1. **George J. Klir / Bo Yuan,** **"**Fuzzy sets and Fuzzy Logic, Theory and Applications **"**, Prentice Hall of India Pvt. Ltd., New Delhi, 2008.
   Unit – I: Chapter 1: Sections 1.1 – 1.5
   Unit – II: Chapter 2: Sections 2.1 - 2.3
   Unit – III: Chapter 3: Sections 3.1 - 3.6
   Unit – IV: Chapter 3: Sections 3.6 and Chapter 4: Sections 4.1 -4.6
   Unit – V: Chapter 5: Sections 5.1 – 5.5

Reference Books:

1.**George J. Klir & Tina A. Folger** "Fuzzy Sets, Uncertainty & Information" PHI Learning Private Limited, 2012.

2.**D. Driankov, Hellendoorn & M. Reinfrank** "An Introduction to Fuzzy Control" Narosa Publishing House, Reprint 2001.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand concepts between classical sets and fuzzy sets.	K1
CO2	understand the membership functions.	K1
CO3	understand and Apply of basic operations on fuzzy sets.	K1,K3
CO4	analyze the properties and principles of fuzzy sets.	K4
CO5	evaluate arithmetical ability on fuzzy numbers.	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	M	S	S	S	S	M
CO2	M	S	M	S	M	S	S	M	M	M
CO3	M	M	M	S	S	M	M	M	M	M
CO4	S	M	S	M	M	M	S	S	M	M
CO5	S	M	M	M	S	M	S	S	M	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE532	CHOICE -II	L	T	P	C
ELECTIVE III		MATHEMATICAL MODELLING	3	-	-	3

Objectives:

- To study the mathematical models through ode and difference equations
- To train the students to develop mathematical models in real life problems

Unit-I: First Order Differential Equations in Mathematical Modelling:
Through Ordinary Differential Equations Of First Order- Linear Growth and Decay Models – Non-Linear Growth and Decay Models – Compartment Models.

Unit-II: Geometrical Problems:
Mathematical Modelling Through Systems Of Ordinary Differential Equations Of First Order: Dynamic problems – Geometrical problems- Population Dynamics – Epidemics – Compartment Models.

Unit-III: Applications:
Mathematical Modeling through Systems of Ordinary Differential Equations of First Order in Economics – Medicine, Arms Race, Battles and International Trade – Dynamics.

Unit-IV: Mathematical Modeling Through Difference Equations:
Simple Models – Basic Theory of Linear Difference Equations with Constant Coefficients – Economics and Finance – Population Dynamics and Genetics.

Unit-V: Mathematical Modelling:
Mathematical Modelling Through Graphs: Solutions that can be Modeled Through Graphs – Mathematical Modelling in Terms of Directed Graphs, Signed Graphs, Weighted Digraphs and Unoriented Graphs.

Text Book:

1. **J.N. Kapur**, "Mathematical Modelling ", Wiley Eastern Limited, New Delhi, 1988.
   Unit 1: Chap 2, Sec 2.1 – 2.4
   Unit 2: Chap 2, Sec 2.5 – 2.6 Chap3, Sec 3.1 – 3.3
   Unit 3: Chap 3, Sec 3.4 – 3.6
   Unit 4: Chap 5, Sec 5.1 – 5.5
   Unit 5: Chap 7, Sec 7.1 – 7.5

Reference Book:

1. **J.N. Kapur**, "Mathematical Models in biology and Medicine ", EWP, New Delhi, 1985.
2. Michael Alder," An Introduction to Mathematical Modelling, Heaven For Books.com , 2001.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand basic definitions from Mathematical Modelling through Ordinary Differential Equations of First order	K2
CO2	understand Mathematical Modelling through Ordinary Differential Equations of First order problems	K2,K3
CO3	apply Mathematical Modelling through Ordinary Differential Equations of First order to applications	K2,K3
CO4	understand simple models through Difference Equations	K2
CO5	evaluate models through Graphs	K2,K3,K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	M	S	M	S	M
CO2	S	M	S	S	M	S	S	M	M	S
CO3	S	M	S	S	M	S	S	M	M	S
CO4	S	S	M	M	M	S	M	S	M	M
CO5	M	S	S	M	M	M	M	M	M	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE533	CHOICE -III	L	T	P	C
ELECTIVE III		DATA STRUCTURES AND ALGORITHMS	3	-	-	3

Objectives:

- Impart the basic concepts of data structure, array and its operations.
- Introduce the concept of linked list and its operations.
- Understand the concept of Stack & Queue, its representation and operations.
- Understand the concept of Tree & Graph, its representation and operations.
- Study the basic concepts of algorithms and step by step approach in writing algorithms with help of fundamental data structures

Unit-I: Data Structures:

Definition of a Data structure – Data structure operations- primitive and composite Data Types, Arrays-Linear Arrays-Representation of Linear Array in Memory-Traversing Linear Array-Inserting and Deleting in Linear Arrays.

Unit-II: Linked list:

Representation of Linked lists in Memory-Insertion into a linked list-Deletion from a linked list.

Unit-III: Stack in Array:

Array Representation of stack- Array representation of stack-Linked representation of Stack-difference between Array representation and Linked representation of stack

Unit-IV: Trees:

Definition - Binary trees-Representing Binary tree in Memory-Traversing Binary trees. Graph - Graph terminology- Sequential representation of graph: Adjacency matrix, Linked representation-Traversing a graph (Breadth First Search & Depth First Search).

Unit-V: Algorithms:

Definitions-examples, Complexity of Algorithms- Bubble sort – linear Search- worst case- average case- rate of growth: Big O notation- Other Asymptotic Notations for Complexity of Algorithms.

Text Book:

1. **Seymour Lipschutz**, " Data Structures", TataMcGraw-hill Publications, 2006.
   Unit I: Chapter 1: 1.3-1.4 & Chapter 4: 4.1-4.5
   Unit II: Chapter 5: 5.1-5.3, 5.7-5.8
   Unit III: Chapter 6: 6.1-6.4
   Unit IV: Chapter 7: 7.1-7.4 Chapter8: 8.1-8.5
   Unit V: Chapter 1: 1.5 Chapter 2: 2.5 Chapter 4: 4.6-4.7

Reference Books:

1**. L. MathuKrithigaVenkatesh, "** Data Structures and Algorithms ", , Margham Publications.2005
2. **R. Kruse C.L. Tondo and B. Leung**, "Data Structures and Program design in C", PHI. 1997,
3. **Cangsam,Auguenstein, Tenenbaum**, "Data Structures using C & C++",PHI
4.**D.Samantha**, "Classic Data Structures ", PHI,New Delhi, 2005
5.**A.Puntambekar**, "Data Structures And Algorithms ", Technical Publications, Pune,2005

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	identify the data and apply the suitable concepts of data structure in programming.	K2
CO2	demonstrate linked list and its operations for programming.	K2
CO3	explain and utilize the concepts of stack and queue for programming.	K2,K3
CO4	compare the data in the required format using search and sort techniques.	K3
CO5	ability to analyze and check the algorithms.	K3,K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	S	M	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	S
CO3	M	S	S	S	M	S	S	M	M	S
CO4	M	S	S	S	M	S	M	S	M	M
CO5	M	S	S	S	M	M	M	M	M	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTS53	MATHEMATICAL APTITUDE	L	T	P	C
SKILL BASED ELECTIVE III			2	-	-	2

Objectives:

- To impart skills in numerical and quantitative techniques.
- Able to critically evaluate various real life situations by resorting to Analysis of key issues and factors.
- Able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

Unit- I : Numbers system:
HCF – LCM – Problems on numbers. (Chapters 1, 2 & 7)

Unit- II : simplification:
Decimal Fractions and Simplification. (Chapter 3 & 4)

Unit- III : Profit and Loss :
Surds and Indices – Percentage – Profit and Loss. (Chapters 9, 10 & 11)

Unit- IV: Ratio:
Ratio and Proportion – Partnership – Allegation or Mixture. (Chapters 12, 13 & 20)

Unit -V : Average :
Average – Problems on Age. (Chapters 6 &8)

Text Book:

R.S.Aggarwal, "Scope and treatment as in "Quantitative Aptitude" , S.Chand & Company Ltd., Ram Nagar, New Delhi -2007.

Reference Book:

Dr.J.Jayaprakash, "Quantitative Aptitude", 2nd edition, Dr.JP Publication, 2017.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand the basic concepts of Quantitative Ability	K2
CO2	understand the basic concepts of Logical Reasoning Skills.	K2
CO3	acquire satisfactory competency in use of Verbal Reasoning	K2
CO4	solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning and Verbal Ability	K3,K4
CO5	compete in Various competitive exams	K3, K4

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S	S	S	S	M	M
CO2	S	M	S	M	M	M	M	S	S	M
CO3	S	S	S	S	S	S	M	S	S	S
CO4	M	M	S	M	S	S	S	M	S	S
CO5	M	S	S	S	S	M	S	S	S	M

*S-Strong; M-Medium; L-Low

SEMESTER - VI

COURSE CODE	U21MTT61	LINEAR ALGEBRA	L	T	P	C
CORE XIII			5	-	-	4

Objectives:

- To introduce the vector space
- Recognize the basic properties of vector spaces
- Understand the concepts of linear algebra in geometric point of view
- Visualize linear transformations as a matrix form
- Formulate the importance and applications of linear algebra in many branches of Mathematics

Unit-I: Vector Spaces:

Definition and examples – General properties of vector space – Subspace – Direct sum – Definition and theorems - Linear combination –linear span – – Subspace spanned or generated - Definition – Finite dimension - linear dependence and independence.

Unit-II: Basis and Dimension:

Maximally linearly independent definition – Minimal generating function - Quotient space – Isomorphism of vector spaces – Direct sums Direct sums : Internal direct sum and External direct sum – Dual space - Anihilator.

Unit-III: Matrix of a linear transformation:

Rank and nullity of a Linear transformation – Singular and non singular definition – Regular transformation - characteristic equation of a matrix- Matrix Polynomial – Elementary matrix and transformations – Cayley Hamilton Theorem.

Unit-IV: Rank of a matrix:

Row rank, column rank and rank of a matrix – Echelon matrix - Row space and column space – Determinant of a matrix - linear equation –consistency of equation – non homogeneous linear system – Consistency of equation – Invariant under T.

Unit-V: Inner product spaces:

Definition and examples of Similar and Congregant matrices - Inner product spaces- Orthogonality – Norm of v – Orthonormal - Orthogonalization – Gram Schmidt Orthogonalization process - Orthogonal complement.

Text Book:

1. **T.K.Manickavasagampillai and Narayanan,** "Modern Algebra" volume II Viswanathan printers and publishers Pvt Ltd., Edition 1982.
   Unit I- Chapter 8 -8.1 to 8.5

Unit II- Chapter 8 -8.6 to 8.10
Unit III- Chapter 8 -8.14 to 8.18
Unit IV- Chapter 8 -8.20, 8.21
Unit V-Chapter 8 -8.22 to 8.24

Reference Books:

1. **Arumugam S and Thangapandi Issac** ,” Modern Algebra”, SCITECH Publications, Chennai, Edition 2003.
2. **A.R.Vasishtha, “**Modern Algebra**”,** Krishna Prakashan Mandir, Meerut, 1994 – 95

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand Vector Space, Quotient space Direct sum, linear span and linear independence, basis and inner product.	K1,K2
CO2	apply the linear transformations, rank, nullity.	K3
CO3	find the characteristic equation, eigen values and eigen vectors of a matrix.	K3
CO4	prove Cayley- Hamilton theorem, Schwartz inequality, Gramschmidt orthogonalisation process.	K3
CO5	evaluate the system of simultaneous linear equations.	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	M	S	S	S	S	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	S	S	S	M	M	S
CO5	S	S	S	M	S	S	S	M	M	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT62	COMPLEX ANALYSIS	L	T	P	C
CORE XIV			5	-	-	4

Objectives:

- To introduce the concepts of complex numbers and analytic functions.
- The learner will acquire basic concepts of analytic function and its properties
- The learner will acquire basic knowledge about conformal and bilinear transformation
- The learner will gain knowledge of integration of complex valued function
- The learner will become proficient in series of analytic function
- The learner will acquire skills of finding integral values of complex function using residues

Unit-I: Analytic functions:

Cauchy-Riemann equations – Definition of Analytic functions- Sufficient conditions – Harmonic functions – Cauchy- Riemann equations in polar co-ordinates – Theorems and exercise in this method- Milne Thomson's method. - Conformal Mapping- Bilinear Transformation.

Unit-II: Complex integration:

Introduction of Complex integration Cauchy's integral theorem – Cauchy's integral formula – Derivatives of analytic functions – Morera's theorem – Cauchy's inequality – Liouville's theorem – Fundamental theorem of algebra.

Unit-III: Taylor's theorem:

Expansion of functions in power series –Introduction about Taylor's theorem – Taylor's theorem- Taylor's series – Maclarins' series – Laurent's Theorem - Laurent's series.

Unit-IV: Singularity:

Zeros of an analytic function - Singularity definition- singular points – removable singularity - essential singularity – poles - study of the function for the infinite value of Z - Argument Principle – Rouche's theorem - Fundamental theorem of algebra.

Unit-V: Calculus of Residues:

Introduction about Calculus of Residues - Residues - Cauchy's Residue Theorem – Application of Cauchy's Residue Theorem -Argument theorem – Rouche's theorem – Fundamental theorem of algebra - evaluation of definite integrals.

Text Book:

1. **Arumugam S and Thangapandi Issac** ," Complex Analysis", Scitech Publication pvt Ltd, Edition 2014.

   Unit I – Chapter 2 & 3
   Unit II – Chapter 6
   Unit III – Chapter 7 -7.0 to 7.2
   Unit IV – Chapter 7 -7.3, 7.4

Unit V – Chapter 8

Reference Books:

1. **Santhinarayan**, "Theory of functions of Complex Variable ", S.Chand and Company, Meerut, 1995
2. **T.K.M.Pillay, Dr.S.P.Rajagopalan & Dr.R.S. Sattanathan**, "Complex Analusis", S. Viswanathan (Printers & Publisers),Pvt.Ltd. Revised Edition 2007 Reprint 2013
3. **Lars V Ahlfors** "Complex Analysis" , McGraw – Hill Kogakusha, Ltd. 3rd Edition, 1999.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	remember sums, products, quotients, conjugate, modulus, and argument of complex numbers and exponentials and integral powers of complex numbers	K1
CO2	understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.	K2
CO3	find residues and evaluate complex integrals, real integrals using the residue theorem.	K3
CO4	apply Cauchy's residue functions and problem.	K3,K4
CO5	determine whether a given function is analytic.	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	M	M	M
CO2	S	M	S	S	M	S	S	S	M	S
CO3	S	S	S	S	M	S	S	S	M	S
CO4	S	S	S	S	M	S	S	S	M	S
CO5	S	M	M	S	M	M	S	S	M	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT63	OPERATION RESEARCH II	L	T	P	C
CORE XV			5	-	-	4

Objectives:

- To impart mathematical modeling skills through operations research techniques.
- The learner will become proficient in sequence modeling and processes in mathematics and engineering.
- The leaner will acquire the knowledge of Simulation
- The leaner will acquire the knowledge of basics in game theory and replacement problems
- The learner will become to understand the role and application of PERT/CPM for project scheduling.

Unit-I: Sequencing Models and Related Problems:

Sequencing Problems- assumption in Sequencing Problems – processing n jobs through one machine - processing n jobs through two machines - processing n jobs through three machines - processing 2 jobs through m machines - processing n jobs through m machines – solution of complicated Sequencing Problems- problems related to sequencing(routing problem in networks) – minimal path problem(shortest acyclic route models).

Unit-II: Simulation:

Introduction-when to use Simulation- what is Simulation?- advantage of the Simulation technique- limitation of the Simulation- application of Simulation- Monte Carlo Simulation – generation of random numbers – Simulation languages- Examples and applications in simulation method.

Unit-III: Theory of Games:

Introduction- Definition of Game -Two person zero sum game- examples-The maxmini and minimax principle-Example and exercise problems in maxmini and minimax principle- Games without saddle points- Example and exercise problems in Games without saddle points -Mixed strategies-Dominance property-solution of 2×2 rectangle game- Graphical Method.

Unit-IV: Replacement Problem:

Replacement problem introduction - System Reliability – Various Types of replacement - Replacement of Equipment that Deteriorates Gradually- Algorithm – Problems in Replacement of Equipment that Deteriorates Gradually -Replacement of Equipment the Fails Suddenly-. Problems in Replacement of Equipment the Fails Suddenly

Unit-V: Network Scheduling By PERT/CPM:

Introduction network and Network Scheduling -Basic Components- Rules of Construction – Critical Path Analysis –problems in critical path method-Definition for various times in Program me Evaluation and Review Techniques - Definition of Probability Considerations in PERT – Distinction between PERT and CPM.

Text Book:

1. **Kantiswarup, Gupta, P.K.Manmohan**, "Operations Research", Sultan chand and sons Edition 2002 ,Reprint 2017.

   Unit I – Chapter 12
   Unit II – Chapter 22
   Unit III – Chapter 17
   Unit IV – Chapter 18
   Unit V – Chapter 25

Reference Books:

1. **P.K.Gupta and D.Shira,"** Operations Research" (S. Chand and Company Ltd New Delhi-.1992, Reprint 1994.
2. **Taha H.A., "**Operations Research An introduction" Prence Hall of India Private Ltd 1st Edition New Delhi (2008) .

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	remember the nature and feature of Operations Research	K1
CO2	find the replacement period of equipment that fails suddenly/gradually	K2
CO3	find EOQ problems with price breaks	K2,K3
CO4	find inventory decisions costs using deterministic inventory problems with no shortages /with shortages	K3
CO5	understand and evaluate of CPM and PERT Define basic components of Network and find critical path	K1, K3,K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S	S	M	M	M	M
CO2	S	S	M	S	M	S	S	S	S	S
CO3	S	S	S	S	M	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	S	S	M	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT64	GRAPH THEORY	L	T	P	C
CORE XVI			5	-	-	4

Objectives:

- To acquire knowledge of different types of graphs
- To understand different Models of a graph
- To understand how to solve different real life problems
- To understand many techniques to solve a particular problem
- To understand directed graphs.

Unit-I: Graphs:

Definition of Graph – Examples for Graph- various definitions in Graph - Pictorial representation - sub graphs definition –examples- Isomorphism between Graphs – degree of Graph - Walks and connected graphs - cycles in graphs – cut vertices and cut edges definition and examples ..

Unit-II: Eulerian and Hamiltonian Graphs:

Introduction of Eulerian graphs - definition and examples of Eulerian graphs -Fleury's Algorithm for Graph – introduction of Hamiltonian Graphs – Definition and example of Hamiltonian Graphs -Weighted graphs definition and examples ,

Unit-III: Bipartite Graphs:

Introduction and definition of Bipartite graphs-Marriage problem -Trees.- Definition –Example- Incident matrix in Graph algorithm and examples -adjacent matrix in Graph algorithm and examples - path matrix in Graph algorithm and examples and circuit matrix in Graph algorithm and examples

Unit-IV: Planar Graphs:

Defining of Planer graphs – Examples for Planer graphs -Euler's Formula for: Planar Graph – Platonic solids-Dual of a plane graphs- definition and examples of dual of a plane graphs Characterization of planer graphs.

Unit-V: Directed Graphs:

Introduction and definition of directed graphs - Examples of directed graphs- Connectivity in digraphs – examples- Strong orientation of graphs –Eulerian digraphs- examples for Eulerian digraphs - Tournaments.

Text Book:

1. **S.A.Choudum**, "A first Course in Graph Theory", Macmillan india limited,1999.
   Unit I: Chapter 1
   Unit II: Chapter 2
   Unit III: Chapter 3 -3.1 to 3.3 &4-4.1

Unit IV: Chapter 5
Unit V: Chapter 7

Reference Books:

1. **Arumugam S and Thangapandi Issac** ," Graph theory", Sci tech Publication pvt ltd, Edition 2014.
2. **S.A.Choudum**, "A first Course in Graph Theory", Macmillan India limited, 2007.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	remember and understand the theoretical knowledge of graph theory to solve problems.	K1,K2
CO2	understand theories and concepts to test and validate intuition and independent mathematical thinking in problem solving.	K2
CO3	apply networks using the main concepts of graph theory.	K3
CO4	use definitions in graph theory to Analyze examples and to distinguish examples from non-example.	K4
CO5	evaluate graph theory in a coherent and technically accurate manner.	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	M	S	S	M	M	M
CO2	S	S	M	M	M	S	M	S	S	M
CO3	S	M	S	M	M	M	M	M	S	S
CO4	S	M	M	S	M	S	S	M	S	S
CO5	S	S	M	M	M	M	S	M	S	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTT65	DISCRETE MATHEMATICS	L	T	P	C
CORE XVII			5	-	-	4

Objectives:

- To study and, or and not logics by truth tables.
- To study of normal forms.
- Analysis Free and Bound variable formulas.
- Understand Types of Grammar, function of Pushdown automata.

Unit-I: Mathematical Logic Statement and Notation:

Connection – Negation Conjunction – Disjunction – Statement Formulas and Truth Tables – Logical Capabilities of Programming Languages – Conditional and Bi Conditional – Well Formed Formula – Tautologies –Equivalence of Formula – Duality Law Tautological Implication.

Unit-II: Normal Forms:

Normal Forms-decision problem- Examples- Disjunctive Normal Forms – Examples- Conjunctive Normal Forms -examples– Principal Disjunctive Normal Forms priniciple disjunction normal form- sum–of-products canonical form – Principal Conjunctive Norms.

Unit-III: Theory of Inference:

Theory of Inference introduction -Truth Table Technique – Rules of Inference – Definition and examples - Inconsistent Premises – Indirect Method of Proof – Predicate calculus- Free and Bound Variables – Valid Formulas and Equivalences – Inference Theory of Predicate Calculus- examples and exercise problems .

Unit-IV: Grammar:

Definition –Alphabets- string- length of the sting- Concatenation of string- Grammar-Types of Grammar – Definition and examples - Phrase Structure Grammar definition- Examples for Phrase Structure Grammar -Context Sensitive Grammar definition- Examples for Context Sensitive Grammar – Context Free Grammar definition- Examples for Context Free Grammar – Regular Grammar definition- Examples for Regular Grammar – Languages Generated by these Grammars.

Unit-V: Automata:

Definition – Deterministic Automation – Non-Deterministic Automates – Conversion of Non-Deterministic Automates to Deterministic Automation - Algorithm for Conversion of Non-Deterministic Automates to Deterministic Automation- Pushdown automata – Algorithm for Pushdown automata

Text Books:

1. **J.P.Tremblay**, **R. Manohar –** "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw – Hill Edition 1997.
   Unit I- Chapter: 1- 1-1, 1-2:1-2.1 to 1-2.11.
   Unit II-Chapter: 1-3.1 to 1-3.4
   Unit III- Chapter: 1-4.1to 1- 4.3 .1-5 to1-5.4,1-6:1-6.1 -1-6.4
2. **Dr.Rani Siromoney, "**Formal Languages and Automata", The Chiristian Literature Society**,** Revised Edition 1979.
   Unit IV-Chapter2: 2.1 to 2.6
   Unit V-Chapter 5: 5.1 and Chapter 6

Reference Books:

1. **B.S.Vatssa**, "Discrete Mathematics",WISHWA PRAKASHAN,1993.
2. **V.Sundaresan,K.S.Ganapathy Subramanian, K.Ganesan**, "Discrete Mathematics", A.Rd.Publications, 1998.
3. **T.Veerarajan**, "Discrete Mathematics", McGraw Hill Education (India)Pvt.Ltd,NewDelhi, 2014.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understanding of some Logic truth tables	K2
CO2	prove / define basic normal forms	K3
CO3	to analyses the concepts of free and bound variable formulas	K4
CO4	understanding the concepts of Grammars	K4
CO5	basic concepts of Languages and basic definitions of Automata	K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S	S	S	S	M	M
CO2	M	M	S	M	S	M	S	M	M	S
CO3	S	S	S	M	S	S	M	S	M	M
CO4	S	M	M	S	S	M	S	S	M	M
CO5	M	S	S	M	S	M	S	S	M	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE641	CHOICE -I	L	T	P	C
ELECTIVE -IV		ASTRONOMY	3	-	-	3

Objectives:

- The learner understands basic knowledge about natural science.
- The leaner will acquire the knowledge of the celestial objects and origin of those objects and phenomena and their evolution
- The learner will acquire basic knowledge about morning , evening stars , circumpolar stars
- Knowledge of equation of Time, seasons from earth rotation
- Calculation to prepare calendar and conservation of Time.
- It applies mathematics, physics, and chemistry.

Unit-I: Spherical Trigonometry:

Sphere - Great circles and small circles- Axis and poles of circle – distance between two points on a sphere-angle between two circles-secondary's-angular radius or spherical radius – spherical figures –spherical triangles –polar triangle –theorems - Relation between spherical triangles and its polar triangle- Some properties of Spherical triangles- principal of duality-colunar and anti podal triangles –Relation between sides and angles of a spherical triangle- Cosine formulas-cotangent formula-supplemental cosine formula.

Unit-II: Functions of half an angel:

Functions of half a side – Delambre's analogies –Napier's analogies- right angled spherical triangle –Napier's rules- Spherical Coordinates – relation between the Spherical and rectangular coordinates – general proof of the cosine formula – formula in plane trigonometry –Important note.

Unit-III: Sideral time:

West hour angle of a body expressed in time units – theorem- latitude of a place – theorem- to determine – tee R.A. and Declination of a body- to find the hour angle of a body at rising or setting – to find the duration of day time –to trace the changes in the azimuth of a star in the course of a day. (With worked examples)- Morning and evening stars –circumpolar stars – to find the condition that a star is circumpolar. (With worked examples)

Unit-IV: Equation of Time:

Introduction- Dynamical mean sun- equation of time – analytical expression for the equation of time –effect of equation of time on the lengths of morning and evening-to prove that the equation of time vanishes four times a year –seasons –causes of seasons.

Unit-V: Calendar:

Different kinds of year –civil year, Julian calendar – Gregorian calendar – Julian date –Besselian year -Conversion of Time: Relation between sidereal and mean times –to convert mean solar time into sidereal time - to convert sidereal time into mean solar time – to find the sidereal time at a given instant of mean solar time on a given date at Greenwich – to find the mean time

corresponding to a given instant of sidereal time at Greenwich – the difference between local times – to find the sidereal time from local mean time for a given place- to find the mean time from the sidereal time for a given place- given the right ascensions of a star and the mean sun, to find the mean time of transit of the star.

Text Book:

1. **S.Kumaravelu and Susheela Kumaravelu**, "Astronomy for degree classes", Rainbow Printers, Nagarcoil, Reprint 2000.(Copies can be had of S.Kumaravelu, Muruga Bhavanam, Chidambaranager, Nagercoil)

Unit I – Chapter I: Subsection 1- 24
Unit II – Chapter I: Subsection 25 -38
Unit III – Chapter II: Sub sections 70-86
Unit IV - Chapter VII: Subsection 166- 170 and 172-174
Unit V – Chapter VII: Subsection 175- 184 and 186- 189.

Reference Book:

1.**Prophet Muhammad**, "Astronomy: Supplemental Guide", Core Knowledge Foundation, 2013
2.**Jeff Becan, "Astronomy: for Beginners", Illustrted by Sarah Began,**
3. Aldnonymous ,"**General Astronom**", y, en.wikibooks.org, 2015

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understanding about natural science	K2
CO2	knowledge about the celestial objects	K3
CO3	to analyses the equation of time and seasons	K4
CO4	categorize various means in solving Time	K4
CO5	basic concepts of calendar and conservation Time	K6

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S	S	S	S	M	M
CO2	M	M	S	M	S	M	S	M	M	S
CO3	S	S	S	M	S	S	M	S	M	M
CO4	S	M	M	S	S	M	S	S	M	M
CO5	M	S	S	M	S	M	S	S	M	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTE642	CHOICE -II	L	T	P	C
ELECTIVE -IV		MATHEMATICAL CRYPTOGRAPHY	3	-	-	3

Objectives:

- To offer number theoretic preliminaries for widely used public-key cryptosystems.
- To teach public-key cryptographic primitives and their role in communication.

Unit-I: Introduction to Cryptography:

Cryptanalysis of Simple substitution ciphers-Divisibility and Greatest Common Divisors (without proofs) – Modular arithmetic: Modular arithmetic and Shift Ciphers- Prime numbers :Prime numbers, unique factorization and finite fields-Powers and primitive roots in finite fields.

Unit-II: Discrete Logarithms and Diffie–Hellman Key Exchange:

The birth of public key cryptography- Discrete Logarithm Problem-Diffie-Hellman key exchange- Elgamal public key cryptosystem-The Chinese remainder theorem- The Chinese remainder theorem describes the solutions to a system of simultaneous linear congruences.

Unit-III: Integer Factorization and RSA:

Euler's formula and roots modulo pq – The RSA public key cryptosystem-Implementations and security issues- Primality testing-The Distribution of the set of Primes- Pollard's p-1 factorization algorithm - Quadratic residues and Quadratic reciprocity Probabilistic encryption.

Unit-IV: Elliptic Curves and Cryptography:

Elliptic Curves (Theorems without proofs)- Elliptic Curves over finite fields-Elliptic Curve Discrete Logarithm Problem: The double –and-Add Algorithm- Elliptic Curve Cryptography and Lenstra's Elliptic Curve Factorization Algorithm.

Unit-V: Digital Signatures:

Digital Signatures – An Over View and Definitions-RSA Digital Signatures Key Creation-signing exponent and is her verification exponent- RSA Signing- RSA Verification.

Text Book:

1. **Jeffrey Hoffstein, Jill Pipher and Joseph H. Silverman**, "An Introduction to Mathematical Cryptography ", ISBN : 978-1-4419-2674-6, Springer, 2010.
   Chapters: 1.1-1.5, 2.1-2.4, 2.8, 3.1-3.5 (excluding 3.4.1 & 3.4.2), 3.9-3.10, 5.1-5.4,5.6, 7.1-7.2.

Reference Books:

1. **Neal Koblitz, "**A Course in Number Theory and Cryptography ", Springer, 1994.
2. **Jonathan Katz and Yehuda Lindell**, "Introduction to Modern Cryptography ", Second edition, CRC Press, 2015.
3. **Douglas R.Stinson**, " Cryptography Theory and Practice ", CRC Press, Third edition, 2005

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	appreciate the role of mathematics in cryptography.	K1
CO2	understand how secure communications happen over insecure channels.	K2
CO3	appreciate how computational complexities form the basis of public-key cryptography.	K3
CO4	understand the importance of data secrecy, data integrity, and data authentication and the ways to achieve them.	K2,K3
CO5	understand key-agreement, public-key encryption and digital signatures.	K2,K4

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	M	S	S	S	S	M	M
CO2	M	M	S	M	S	M	S	M	M	S
CO3	S	S	S	M	M	S	M	S	M	M
CO4	S	M	M	S	S	M	S	S	M	M
CO5	M	S	S	M	S	M	S	M	M	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTS64	OPERATIONS RESEARCH LAB	L	T	P	C
SKILL BASED ELECTIVE -IV			2	-	-	2

Objectives:

To familiarize students with the basic concepts, models and techniques for effective decision making, model formulation and applications.

Prerequisites: Operations Research – I

Use of Operations Research Software such as LINDO, LINGO, TORA etc., to solve

- Linear programming Problems
- Sensitivity analysis in LPP problems
- Integer Programming Problems
- Transportation Problems
- Assignment problems
- Problems on CPM/PERT
- Non Linear Programming problems
- Queuing problems

Reference Books :

1. **Hamdy A. Taha, "** Operations Research – An Introduction", Eight Edition – Pearson Education – Prentice Hall.
2. LINDO User's Manual – LINDO Systems, Inc.
3. Optimization Modeling with LINGO - 5 th edition – LINDO Systems, Inc.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand the basic concepts and application of operations research in various fields	K1
CO2	know principles of construction of mathematical models of conflicting situations.	K2
CO3	analyze the relationship between a linear program and its dual	K3
CO4	techniques constructively to make effective decisions in business and solve problems in industry	K4
CO5	build and solve all problems by using software.	K4

K1- Remember: K2- Understand : K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	S	S	S	S	M	M
CO2	M	M	S	M	S	M	S	M	M	S
CO3	S	S	S	M	S	S	M	S	M	M
CO4	S	M	M	S	S	M	S	S	M	M
CO5	M	S	S	M	S	M	S	S	M	S

*S-Strong; M-Medium; L-Low

NON MAJOR ELECTIVE- FOR OTHER DEPARTMENT

COURSE CODE	U21MTN31	RESOURCE MANAGEMENT TECHNIQUES	L	T	P	C
SEMESTER - III			2	-	-	2

Objectives:

- To impart the basic concepts and applications of linear programming.
- The leaner will analyze the different aspects of transportation problems, assignment problems and also sequencing problem.
- The leaner will develop, organize, evaluate short, long term processes and solve problems
- The leaner will acquire the knowledge of basics in game theory

Unit–I: Linear Programming Problem:
Definition-Mathematical formation of the Linear Programming Problem— Basic Solution-Degenerate Solution- Basic Feasible Solution of the Linear Programming Problem.

Unit–II: Transportation Problem:
Introduction and Definition-Mathematical form of L.P.P-Table-Find Intial Basic Feasible Solution – North West Corner Rule -Row Minima-Colum Minima- Least Cost Method- Vogel's Approximations Method(VAM) - Un balanced Transportation problem- Only upto Initial Basic Feasible Solution.

Unit–III: Assignment Problem:
Introduction and Definition of Assignment Problem -Mathematical formulation of the problem–Hungarian Algorithm – Simple Problem.

Unit–IV: Sequencing Problem:
Introduction and Definition of Sequencing Problem -Problem of Sequencing- Basic Terms Used in Sequencing- Processing n jobs & Two machine- Processing n jobs Through two Machines.

Unit–V: Game Theory:
Definition- Two-Person Zero-Sum Games- Some basic terms- The Maximin-Minimax Principle-Game without Saddle point- Mixed Strategies - Graphic Solution of 2 × n and m × 2 games.

Text Book:

Kanti Swarup, P.K .Gupta,Man Mohan"Operations Research", Sultanchand and sons , Edition - 2017.

Unit I – Chapter 2 and 4
Unit II – Chapter 10
Unit III – Chapter 11
Unit IV - Chapter 12
Unit V – Chapter 17

Reference Book :

1.**P.R.Vittal and V.Malini,** "Operations Research" Margham Publishers – 2002.
2.**Taha**, "Operation Research", Printice Hall, New Delhi,2011
3. **Kalavathy** , "Operations Research", Vikas Publishing House Pvt .Ltd. 2003
4. **Gupta P.K &Hira D.S** ,"Problems in Operations Research", S.Chand& Co, Delhi , 2006
5.**V.Sundaresan, K.S. Ganapathy Subramanian, &K.Ganesan**, "Resource Management Techniques" (Operations Research), A.R. Publications, Nagapattinum District

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	formulate the real life problems as Linear programming problem.	K1
CO2	use to solve Linear programming problems	K2
CO3	identify degeneracy in transportation problem	K3
CO4	calculate the optimal solution from the feasible solution using MODI method	K3
CO5	obtain the optimal solution for Assignment problems, Sequencing problem , Game Theory .	K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	S	S	S	S	S	M
CO2	S	S	S	S	S	M	M	S	M	S
CO3	S	S	S	M	S	S	M	S	S	S
CO4	M	S	S	S	S	M	S	M	S	S
CO5	M	S	S	S	M	S	M	S	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MTN42	NUMERICAL METHODS	L	T	P	C
SEMESTER - IV			2	-	-	2

Objectives:

- The learner will analyze the different aspects of numerical solution of algebraic and transcendental equations.
- The learner will understand the several methods to solve the simultaneous equations.
- The leaner will derive numerical methods for various mathematical operations and tasks on interpolation.

Unit-I: Solution of Algebraic and Transcendental Equations:
Introduction and advantages of solution of algebraic and Transcendental Equations- Bisection Method – Iteration Method – Condition for Convergence.

Unit-II: Solution of Algebraic and Transcendental Equations:
Deviation and advantage of Solution of Algebraic and Transcendental Equations-Regular Folsi Method -Newton's Raphson Method.

Unit-III: Solutions of Simultaneous Linear Algebraic Equations:
Method of elimination in Simultaneous Linear Algebraic Equations- Gauss Elimination Method for Solutions of Simultaneous Linear Algebraic Equations – Gauss Jordan Method Solutions of Simultaneous Linear Algebraic Equations.

Unit-IV: Solutions of Simultaneous Equations:
Introduction of Jacobi methods of Simultaneous Equations - Algorithm - Gauss Jacobi – Gauss Seidel Method.

Unit-V: Finite Differences:
Introduction of forward and backward Difference of Finite difference: First and Higher Order Differences –Forward and Backward Differences.

Text Book:

1. **P.Kandasamy, K.Thilagavathi and K. Gunavathi**, "Numerical Methods", S.Chand and Company Ltd , New Delhi 2013.

   Unit I – Chapter 3 -3.1 to 3.2
   Unit II – Chapter 3 -3.3 to 3.4
   Unit III – Chapter 4 -4.1- 4.2
   Unit IV – Chapter 4 - 4.8 - 4.9
   Unit V – Chapter 5 – 5.1 – 5.2

Reference Books:

1. **Arumugam , Issac, Somasundaram**,"Numerical Analysis", New Gamma Publishing House, Palayam Kottai 2003.
2. **G. Balaji**, "Numerical Methods", G.Balaji Publishers, Chennai 2007.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand the fundamentals in finding the roots of the equation using bisection method and iteration method.	K2
CO2	approximate solutions of algebraic and transcendental equations.	K3
CO3	analyze and evaluate the accuracy of numerical methods	K4
CO4	evaluate numerical solution to a system of linear equation by Gauss-Seidal method.	K5
CO5	evaluate the problems in interpolation.	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	S	S	M	S	M
CO2	M	S	M	S	S	M	S	M	M	M
CO3	M	S	M	M	M	M	M	S	M	S
CO4	S	M	S	M	S	M	S	M	S	M
CO5	S	S	M	S	M	S	M	S	M	M

*S-Strong; M-Medium; L-Low

VALUE ADDED PROGRAMME

COURSE CODE	U21MAV51	NUMERICAL METHODS LAB USING C++	L	T	P	C
SEMESTER - V			-	-	-	2

Objectives:

- To develop programming skills in C and its object oriented concepts.
- The learner will become proficient in object oriented programming concept and proficient in C tokens
- Proficient in C operators , class declaration and definition and its objects
- Proficient in conditional statements and loop concept

1. Write a Program to find the smallest positive / Largest negative root using simple iteration method
2. Write a Program to find the smallest positive / Negative root using Regula Falsi method.
3. Write a Program to find the Smallest positive / Negative root using Newton-Raphson‘s i method.
4. Write a Program to find the solution of system of equation using Gauss Jacobi method..
5. Write a Program to find the Matrix inversion using Gauss Jordan method
6. Write a Program to interpolate y for given x from the given sets of values of x and y by Newton‘s forward method.
7. Write a Program to find interpolate y for given x from the given sets of values of x and y by Newton‘s backward method.
8. Write a Program to find interpolate y using the Lagrange‘s method
9. Write a Program to derivative at initial point by Newton‘s forward method
10. Write a Program to integration using Trapezoidal & simpson’s method

Text Book:

1. **T.Veerarajan and T.Ramachandran**, “Theory and Problems in Numerical Methods with Programs in C and C++”, Tata McGraw Hill Publishing Company Ltd, 2004.

COURSE CODE	U21MAA11	SEMESTER -I	L	T	P	C
B.Sc. Physics / Chemistry		**ANCILLARY MATHEMATICS I**	**5**	**-**	**-**	**4**

Objectives:

- The learner will become proficient in expansion and summation of function
- The learner will acquire knowledge of solving problems in matrices
- The learner will capable of solving the interpolation problems.
- The learner will gain knowledge of trigonometric functions and related problems
- The learner will become proficient in various types of hyperbolic functions

Unit-I: Partial Fractions:

Introduction of Partial Fractions- Binomial Theorem: The General Term – Expansion of Rational Fractions – Summation of Series. Exponential Theorem: Summation of Series, The Logarithmic Series- Problems.

Unit-II: Theory of Equations:

Introduction of the general Equations- Fundamental Theorem of Algebra – Symmetric Function of Roots – Relation between Roots and Coefficient of Equation – Formation of Equation – Diminish the Roots of the Equation – Reciprocal Equation. Newton - Raphson Method problems.

Unit-III: Matrices:

Fundamental Concepts of Special Types of Matrices –Addition and Subtraction of Matrices – Matrix Multiplication – Associated Matrices. Rank of a Matrix: Elementary Operations or Transformation. Linear Equations: Homogeneous linear Equation – Non-Homogeneous Equation Characteristic Roots and Vectors: Eigen Value and Eigen Vectors – Properties of the Eigen Vectors – Cayley - Hamilton theorem.

Unit-IV: Interpolations:

Introduction about Interpolations: Newton's Forward Method - Newton's Backward Method- Lagrange's Interpolation Formula: Different form of Lagrange's Interpolation Formula- problems.

Unit-V: Trigonometry:

Basic ideas in Trigonometry: Expansions: $\cos^n\theta$, $\sin^n\theta$ – $\cos n\theta$ and $\sin n\theta$ –Expansion of $\sin\theta$,$\cos\theta$ and $\tan\theta$ in powers of θ.Hyperbolic Function: Relation between Hyperbolic Functions and Circular Functions – Periods of Hyperbolic Functions – Inverse Hyperbolic Functions. Logarithm of Complex Quantities

Text Book:

1. **P.Kandasamy, K.Thilagavathy**,"Allied Mathematics Paper I", 1st Semester, S. Chand Publishing . A Division of S. Chand & Company Pvt. Ltd, Edition 2013

Reference Books:

1.**G.C.Sharma and Madhu Jain**, Algebra and Trigonometry, 1st Edition, Galgotia Publications Pvt.Ltd.2003

2.**Dr.S.Arumugam, A.Thangapandi Isaac and A.Somasundaram**, Numerical Methods, 2nd reprint, Scitech Publication India Pvt, Ltd., 2004.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	remember numbers, sequences, series, basic summaries from partial fraction, equations, matrices	K1
CO2	understand trigonometric values and Interpolations	K2
CO3	solve problems by using theorems.	K3
CO4	analyze homogeneous and non-homogeneous linear equations.	K4
CO5	analyze and Evaluate inverse functions.	K4, K5

K1- Remember; K2- Understand; K3-Apply; K4- Analyse; K5- Evaluate; K6- Create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	M	S	S	S	M	M
CO2	M	M	S	M	S	M	S	M	M	S
CO3	S	S	M	M	S	S	M	S	M	M
CO4	S	M	M	S	M	M	S	S	M	M
CO5	M	S	S	M	S	M	S	M	M	S

*S-Strong; M-Medium; L-Low

COURSE CODE	U21MAA22	SEMESTER -II	L	T	P	C
B.Sc. Physics / Chemistry		ANCILLARY MATHEMATICS II	5	-	-	4

Objectives:

- To learn methods of integration and properties and its solving related problems.
- Understand the basic concepts of first order differential equation and it applications.
- Find solutions by applying Laplace transform methods.
- Vectors and its product and its integrations.

Unit-I: Vector Calculus:

Introduction about Vector Calculus – Gradient, Divergence and curl (problems only). Integration of vectors: Integration of vector functions, Line integrals – Surface integrals – Green's theorem in the plane (statement only) – Gauss Divergence theorem (statement only) – Problems – Stoke's theorem (statement only) – Problems

Unit-II: Partial differential equation

Introduction of Partial differential equation from differential equations - Formation of Partial differential equations by eliminating arbitrary constants and arbitrary functions* – Solutions of standard types of first order equations- f (p, q) = 0, f(x, p, q)=0, f(y, p, q)=0, f(z, p, q)=0, $f_1(x, p)= f_2(y, q)$, z = px+qy+f (p, q) , Clairaut's form– Lagrange method of solving linear partial differential equations P p + Q q = R. (problems only)

Unit-III: Total differential equations:

Introduction of total differential equations - Bessel's equations : Bessel's equations – Solutions of Bessel's general differential equations (derivations not included) – General solution of Bessel's equations - Recurrence formulae (derivations not included) – Simple problems using Recurrence relation.

Unit-IV: Laplace Transforms:

Introduction of Laplace Transforms- Definition – Laplace Transform of e^{at}, cos at, sin at, cosh at, sinh at, t^n, n, a positive integer – e^{at} f (t) , t^nf(t) , f (t), f:(t) – Inverse Laplace Transform of standard functions – Solving differential equations of Second order with constant coefficients using Laplace Transform.

Unit-V: Fourier Series:

Introduction of Fourier Series: Definition- Dirchlet's conditions- Fourier series of periodicity 2π and 2l - Odd and even functions –Root mean square value of a function Half range series: Introduction- Half range series –Cosin series- sin series – Parseval's theorem - Harmonic analysis

Text Book:

1. **P.Kandasamy and K.Thilagavathy**. "Mathematics for B. Sc., Br. -I, Volume-II and Volume-III", S. Chand & Company Ltd, First edition, 2004.(UNIT I and III)
2. **S.Narayanan and T.K. Manickavasagam Pillai**," Calculus Vol. III ", S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 2010. (UNIT II and V)
3. **S. Narayanan and T. K. Manickavasagam Pillai**, "Calculus Vol. III " S.Viswanathan (Printers and Publishers, (P)Ltd, Chennai, 1997. (UNIT IV)

References Book

1. **P. Kandasamy and K.Thilagavathy**, "Mathematics, Vol Iv", S.Chand And Company Ltd.,- 2004
2. **Shanti Narayan**, "Differential Calculus", Shyamlal Charitable Trust, New Delhi, 2004.
3. **P.N.Chatterji**,"Vector Calculus ", 1st Edition, Rajhans Prakahan Publishers, Chennai, 1998.

Course Outcome:

On the successful course completion, students will be able to		Cognitive Level
CO1	understand the I and II integrals	K2
CO2	understand properties of integrals, Laplace transform.	K2
CO3	understand first order differential equations.	K2
CO4	analysis Theorems and proves.	K3,K4
CO5	evaluate the importance of shifting properties.	K3, K4

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	S	M	S	S	S	M	M
CO2	M	M	S	M	M	M	S	M	M	S
CO3	S	M	S	M	S	S	M	S	S	M
CO4	S	M	M	S	M	M	S	S	M	M
CO5	M	S	S	M	S	M	S	S	M	S

*S-Strong; M-Medium; L-Low

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MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL

M.PHIL IN MATHEMATICS

SYLLABUS

(WITH EFFECT FROM 2021-2022)

(UNDER CHOICE BASED CREDIT SYSTEM)

DEPARTMENT OF MATHEMATICS

MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL-624 101

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

M.Phil. – SYLLABUS - 2021 -2022 Onwards

Programme Name: M.Phil .Mathematics

Eligibility: M.Sc. Mathematics.

Medium: English

Objective of The Programme:

1. To provide students a firm grip on all the facets of pure and applied mathematics and include the student an ardor for mathematical knowledge
2. To propel the student towards higher academic ambitions in advanced Mathematics
3. To develop in the student logical , heuristic, systematic and critical ways of thinking to assist in problem solving in their chosen career.
4. To provide the student some inputs in teaching methodology and psychology of teaching

Programme Outcomes(POs)

On completion of the Programme, the learner will be able :

PO1: to acquire advanced conceptual knowledge and comprehensive understanding of the fundamental principles in respective discipline

PO2: to apply knowledge and critically evaluate the concepts and scientific developments to take up any challenge

PO3: to visualize and work on laboratory multidisciplinary tasks related to current research in the fields of mathematical , Physical and Life sciences

PO4: to acquire research based knowledge and design methods to investigate complex problems in research/industrial field and achieve employability/self employment

PO5: to communicate effectively ideas verbally in English, leading to Entrepreneurship ventures such as consultancy and training

PO6: to Employ innovative and environment friendly methods, novel idea to solve complex and challenging societal and environmental issues

Programme Specific Outcome (PSOs)

On completion of the M.Phil Mathematics the student will be able

PSO1: to develop research level thinking in the field of pure and applied mathematics.
PSO2: to develop abstract mathematical thinking

PSO3: to assimilate mathematics independently and solve advanced mathematical problems.
PSO4: to write research articles in mathematics and to publish it in reputed journals.

PSO5 : to develop and enhance teaching skills in mathematics.

Subject Code	**Subject**	**Credit**	**Hours**	**Formative**	**Summative**	**Total**
Semester I						
M21MTT11	Research Methodology	4	10	40	60	100
M21MTT12	Advanced Algebra and Analysis	4	10	40	60	100
M21PST13	Teaching Learning skill/Professional Skills-I	4	10	40	60	100
Semester II						
M21MTT21	Special paper Related to Project	4	10	40	60	100
M21MTD21	Dissertation	14	20	120	80	200
TOTAL CREDITS		**30**		**TOTAL MARKS**		**600**

The M.Phil course consists of four theory papers. Paper 3 is common for all the programmes. Special Paper 4 is pertaining to the area of specialization chosen by the candidate under a guide. It is purely internal (framing syllabus, question setting and evaluation).

Each candidate will submit a dissertation on a topic in the relevant discipline after carrying out the project work under the supervision of a guide. The project may be theoretical or experimental. The duration of the project will be for six months or more as per the discretion of the Department.

The dissertation will be evaluated by an external examiner and viva voce will be conducted by a committee consisting of the guide and the department faculty.

The examination will be for 100 marks in each of the theory papers. The question paper will cover the entire syllabus. The duration of the examination is 3 hours.

List of Specialization Paper /Area Paper

1. Fuzzy Graphs And Fuzzy Hyper Graphs
2. Fuzzy Theory And Applications
3. Topology and Image Processing
4. Non Linear Differential Equations
5. Inventory Control Models
6. Directed Study*

One from the list of special paper may be selected by the students depending on the area of their research.

*Any other paper as per the choice of any faculty member in the Department of Mathematics shall be added in this list. The syllabus will be framed by the Department and shall be implemented after getting approval from the Board of Studies.

Semester -I

Course Code	Course Name	Category	T	P	Credit
M21MTT11	**Research Methodology**	**Core- I**	**10**	**-**	**4**

Objectives:

- The systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge is Methodology.
- To import knowledge about Fundamental Group and Separation Theorem in the Plane
- To import knowledge 2nd order PDE by linear system with applications.
- The learner will be gain combined knowledge in research methodology, advanced topology and problem solving by PDE.

Course Outcomes:

Upon successful completion of this course, students will be able to

CO 1: Construct the fundamental group of a topological space.

CO 2 : Understands the connection between covering spaces and fundamental group

CO 3 : Work with cell complexes and the basic notions of homotopy theory

CO 4 : Solve the calculations with differential forms and characterize the exterior Derivative.

CO 5: Know Stroke's theorem and understand how this generalizes classical theorems in Calculus.

CO Number	CO Statement	Knowledge Level
CO1	Research Report: Structure of report, Contents steps in drafting , Layout of research reporting and Styles of reporting. Construct the fundamental group of a topological space	K1 and K2
CO2	Understands the connection between covering spaces and fundamental group	K2
CO3	Work with cell complexes and the basic notions of homotopy theory	K4
CO4	Solve the calculations with differential forms and characterize the exterior Derivative	K5
CO5	Know Stroke's theorem and understand how this generalizes classical theorems in Calculus.	K6

K1- Remember: K2- Understand : K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	M	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M

Score rate : S- Strong = 3 , M-Medium = 2, L-Low:1

TOTAL SCORE: 49 X 3 + 6 X 2 = 159

Unit- I : Research Report:
Research Report: Structure of report- Contents steps in drafting – Layout of research reporting – Styles of reporting – Types of report- Guidelines to review report- Typing instructions- Oral presentation- Types of research process- Data collection - Secondary data – Thesis writing : Thesis at tertiary level writing.

Unit- II : The Fundamental Group:
The Fundamental Group: Homotopy of Paths – The Fundamental Group – Covering Spaces – The Fundamental Group of the Circle – Retraction and Fixed Points

Unit- III: The Fundamental Group:
The Fundamental Group: The Fundamental Theorem of Algebra – The Borsuk –Ulam Theorem – Deformation Retracts and Homotopy. Type – The Fundamental Group of Sn – Fundamental Groups of Some Surfaces

Unit -IV: Separation Theorem in the Plane:
Separation Theorem in the Plane: The Jordan Separation Theorem – Invariance of Domain – The Jordan Curve Theorem – Imbedding Graphs in the Plane.

Unit- V: First order systems in two variables and linearization:
First order systems in two variables and linearization: The general phase plane-some population models – Linear approximation at equilibrium points – Linear systems in matrix form -Averaging Methods: An energy balance method for limit cycles – Amplitude and frequency estimates – slowly varying amplitudes – nearly periodic solutions - periodic solutions: harmony balance – Equivalent linear equation by harmonic balance – Accuracy of a period estimate.

Text Books:

1. R. Panneer Selvam " Research Methodology," , Prentice Hall of India, New Delhi, 2005. Unit I
2. James R. Munkers, "Topology: A First Course ", Second Edition Prentice Hall of India Pvt Ltd, NW, 2000 Unit II, Unit III, and Unit IV
3. D.W.Jordan, &P.Smith " Nonlinear Ordinary Differential Equations" , , Clarendon Press, Oxford, 1977. Unit V

Reference Books:

1. W. S. Massey, " Algebraic Topology- An Introduction", Springer-Verlag , New York, 1976
2. G.F.Simmons, " Differential Equations ", Tata McGraw Hill, NewDelhi (1979).
3. J.K.Aggarwal , "Notes on Nonlinear Systems ", Van Nostrand, 1972.

Periodicals:

1. MathematicsNewsletter
2. Discrete Mathematical Sciences and Cryptography.
3. Journal of Topology and its Applications
4. Journal of Differential Geometry

Websites & E-Learning Sources:

1.http://www.mathforum.org

2. http://www.opensource.org

3.http://khanacademy.org

4. http://in.ixl.com

5.http://www.learningwave.com

Teaching Methodology

1. Problem Solving-Group Discussion
2. Quiz-Seminar
3. Peer Learning

***

Semester -I

Course Code	Course Name	Category	T	P	Credit
M21MTT12	**Advanced Algebra and Analysis**	**Core- II**	**10**	**-**	**4**

Objectives:

To enable the students to

1. Achieve an advanced mastery of representations of associative algebras.
2. Realise the importance of modules as central objects in algebra and to study some applications.
3. Gain knowledge of the theory of semi simple algebras
4. State the axioms of L_p spaces.
5. Apply appropriate techniques of integration to product spaces.

Course Outcomes:

Upon successful completion of this course , students will be able to:

CO 1: Integrate knowledge at the forefront of associative algebra which forms the basics of higher mathematics

CO 2: Investigate the properties of modules and appreciate its important results.
CO 3: Learn about semi simple algebras and be familiar with examples
CO 4: Define the L p spaces and determine whether functions are in L p
CO 5: Evaluate problems in product spaces using the powerful concept of integration

CO Number	CO Statement	Knowledge Level
CO1	Integrate knowledge at the forefront of associative algebra which forms the basics of higher mathematics.	K1 and K2
CO2	Investigate the properties of modules and appreciate its important results	K3 andK6
CO3	Learn about semi simple algebras and be familiar with examples.	K4
CO4	Define the L^p spaces and determine whether functions are in L^p	K2
CO5	Evaluate problems in product spaces using the powerful concept of integration	K5

K1- Remember: K2- Understand : K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	M	S	S	M	M	S	S	S
CO4	S	S	S	S	M	S	S	S	S	M	S
CO5	S	M	S	S	S	S	S	S	S	S	M

Score rate : S- Strong = 3 , M-Medium = 2, L-Low:1

TOTAL SCORE: 47 X 3 + 8 X 2 = 157

Unit –I : Free Abelian groups:

Free Abelian groups, Finitely generated Abelian groups and Examples, Krull-Smidt theorem – Indecomposable , Classification of Finite groups, Nilpotent groups and solvable groups, Normal series and subnormal series

Unit II : Modules :

Modules – R- Module – Sub module and Examples, Homomorphisms and Exact Sequences, Free modules and vector spaces, Projective modules and Injective modules, Hom and Duality, Tensor products, Modules over PID, Field Extension and Fundamental theorem of Galois theory, Splitting fields

Unit III: The Structure of Semi simple Algebras

The Structure of Semi simple Algebras – Semi simple Algebras and Examples – Minimal Right Ideal – Simple Algebras – Matrices of Homomorphisms – Wedderbum's Structure theorem - Maschke's Theorem and Examples – The Radical - The Radical of an Algebra – Nakayama's Lemma- The Jacobson Radical

Unit –IV: LP-Spaces:

LP-Spaces - Convex functions and inequalities – Jensen's Inequality – Conjugate Exponents – Essential supremum – Essential bounded- The LP-spaces - Approximation by continuous functions – Vanish at infinity

Unit –V: Integration on Product Spaces:

Integration on Product Spaces - Measurability on cartesian products - Product of the measurable function - σ - Finite measurable - The Fubini theorem - Counter Examples - Completion of product measures - Lebesgue measure -Convolutions – Borel Mesearable - Distribution functions

Text Books

1. Hungerford T.W., 2014, Algebra, Springer-Verlag, New York (For Unit I and II)
2. Richard S. Pierce, "Associative Algebras" Springger-Verlag, New York Heidelberg Berlin 2017 (For Unit III)
3. Walter Rudin,"Real And Complex Analysis" Third Edition McGRAW-HILL International Edition Mathematics series 1987 (For Units IV and V)

Periodicals:

The Mathematics Intelligencer

Mathematics Newsletters

Journal in Algebra and Number Theory

Journal of Algebraic combinatorics

WEBSITES & e-LEARNING SOURCES:

http://www.mathforum.org

https://sites.math.northwestern.edu/~len/d70/chap5.pdf

https://www.math.ksu.edu/~nagy/real-an/4-03-lp-spaces.pdf

https://link.springer.com/chapter/10.1007/978-3-642-88044-5_6

Teaching Methodology

1. Problem Solving-Group Discussion
2. Quiz-Seminar
3. Peer Learning

List of Specialization Paper /Area Paper

1. Fuzzy Graphs and Fuzzy Hyper Graphs
2. Fuzzy Theory and Applications
3. Topology and Image Processing
4. Non Linear Differential Equations
5. Inventory Control Models
6. Directed Study*

One from the list of special paper may be selected by the students depending on the area of their research.

*Any other paper as per the choice of any faculty member in the Department of Mathematics shall be added in this list. The syllabus will be framed by the Department and shall be implemented after getting approval from the Board of Studies.

Semester -II

Course Code	Course Name	Category	T	P	Credit
M21MTT21	**Fuzzy Graphs and Fuzzy Hyper Graphs**	**Specialization Paper**	**10**	**-**	**4**

Objectives:

- Fuzzy provides more reasonable and reachable results in all field.
- To import conditions, properties and types of fuzzy graph and fuzzy hyper graphs
- The learner will be gain research idea in fuzzy graph and fuzzy hyper graphs

Course Outcomes:

Upon successful completion of this course , students will be able

CO 1: to understand Fuzzy relations,Fuzzy equivalence Relations and Pattern Classification
CO 2 : to analyse the various Characterization of fuzzy grapes and their applications
CO 3 : to evaluate the the Gilmore and Hoffman characterization-and Operations on fuzzy Graphs
CO 4 : to create applications of Fuzzy Transversals of fuzzy graphsusing the Properties of Tr(H)
CO 5: to apply Coloring of fuzzy hyper graphs using various methods

CO Number	CO Statement	Knowledge Level
CO1	Understand Fuzzy relations, Fuzzy equivalence Relations and Pattern Classification	K1 and K2
CO2	Analyse the various Characterization of fuzzy grapes and their applications	K2 and K4
CO3	Evaluate the the Gilmore and Hoffman characterization-and Operations on fuzzy graphs	K5
CO4	Create applications of Fuzzy Transversals of fuzzy graphs.	K6
CO5	Coloring of fuzzy hyper graphs using various methods	K3 and k4

K1- Remember: K2- Understand : K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	M	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M

Score rate : S- Strong = 3 , M-Medium = 2, L-Low:1

TOTAL SCORE: 49 X 3 + 6 X 2 = 159

Unit -I: Fuzzy Subsets:
Fuzzy Subsets: Fuzzy relations- Introduction about Fuzzy relations – Definition and examples of Fuzzy relations- Fuzzy equivalence Relations- Introduction about Fuzzy equivalence Relations - Definition and examples of Fuzzy equivalence Relations Pattern Classification-Similarity relations.

Unit- II: Fuzzy Graphs:
Fuzzy Graphs: Paths and connectedness – Bridges and cut vertices-Forests and trees-Trees and cycles-Characterization of fuzzy trees-Fuzzy cut sets-Fuzzy chords, Fuzzy cotrees and fuzzy twigs- Fuzzy one chain with boundary 0, cobound and cocycles- Fuzzy cycle sets and Fuzzy cocycle set –Fuzzy Line graphs

Unit- III: Fuzzy Interval and Operation on Fuzzy Graphs:
Fuzzy Interval and Operation on Fuzzy Graphs: Fuzzy intersection graphs-Fuzzy interval graphs-The Fulkerson and gross characterization-The Gilmore and Hoffman characterization-Operations on fuzzy graphs-Cartesian products and composition-Union and join-On fuzzy tree definitions.

Unit -IV: Fuzzy Hyper Graph:
Fuzzy Hyper Graph: Fuzzy hyper graph- Introduction about Fuzzy hyper graph-Drfinition and examples of Fuzzy hyper graph- Application of Fuzzy hyper graph Fuzzy Transversals of fuzzy graphs-Properties of Tr(H) –Construction H^s.

Unit -V : Coloring and Intersection of Fuzzy Hyper Graph:
Coloring and Intersection of Fuzzy Hyper Graph: Coloring of fuzzy hyper graphs-Beta degree coloring procedures-Chromatic values of fuzzy coloring-Intersecting fuzzy hyper graphs-Characterization of strongly intersection hyper graph-Simply ordered intersecting hyper graph-H dominant Transversals.

Text Book:

1. John N. Mordeson, PremchandS. Nair "Fuzzy graphs and fuzzy hyper graphs", , Physica-Verlag, A Springer-Verlag Company, 2000

Reference Books:

1. Klir, G.J.U.St.Chair, U.H., and Yuvan, B 'Fuzzy set theory, Foundations and Applications', prentice Hall, Upper saddle river, N.J, 1997.
2. Rosenfeld, L.Zadeh, K.S.Fu, M.Shimura, 'Fuzzy sets and their applications',Academic press,1975
3. Berg, C.'Hyper graphs', North Holland , Amsterdam,1989.

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Semester -II

Course Code	Course Name	Category	T	P	Credit
M21MTT21	**Fuzzy Theory and Applications**	**Specialization Paper**	**10**	**-**	**4**

Objectives:

To enable students to

- understand the concepts of fuzzy sets and its operations.
- introduce advanced concepts in Fuzzy Mathematics leading to research.
- know fuzzy numbers and fuzzy relations.
- understand the application of fuzzy in various Engineering fields.
- impart knowledge and skills in fuzzy decision making proble

Course Outcomes:

Upon successful completion of this course , students will be able to

CO 1: Effectively use fuzzy operations.

CO 2 : Recognize fuzzy numbers as a foundation of fuzzy sets and fuzzy Mathematics

CO 3 : Represent the strength of association between elements of the two sets.

CO 4 : Predict non linear trends.

CO 5: Identify the formulation and solutions of design problems that are developed using fuzzy theory.

CO Number	CO Statement	Knowledge Level
CO1	Understand the use fuzzy operations	K1 and K2
CO2	Recognize fuzzy numbers as a foundation of fuzzy sets and fuzzy Mathematics	K2
CO3	Represent the strength of association between elements of the two sets	K4
CO4	Predict and evaluate the non linear trends	K5
CO5	Identify the formulation and solutions of design problems that aredeveloped using fuzzy theory.	K6

K1- Remember: K2- Understand : K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	M	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M

Score rate : S- Strong = 3 , M-Medium = 2, L-Low:1

Total Score: 49 X 3 + 6 X 2 = 159

Unit- I: From Classical (Crisp) Sets to Fuzzy Sets:
From Classical (Crisp) Sets to Fuzzy Sets: A Grand Paradigm Shift – Introduction –Crisp Sets: An Overview – Fuzzy Sets: Basic Types – Fuzzy Sets: Basic Concepts – Characteristics and Significance of the Paradigm Shift .Fuzzy Sets Versus Crisp Sets: Additional Properties of α – cuts – Representations of Fuzzy Sets – Extension Principle for Fuzzy Sets. Operations on Fuzzy Sets: Types of Operations – Fuzzy Complements.

Unit- II: Fuzzy Arithmetic and Fuzzy Relations:
Fuzzy Arithmetic: Fuzzy Numbers– Linguistic Variables – Arithmetic Operations On Intervals – Arithmetic Operations On Fuzzy Numbers – Lattice of Fuzzy Numbers – Fuzzy Equations.
Fuzzy Relations: Crisp Versus Fuzzy Relations – Projections and Cylindric Extensions – Binary Fuzzy Relations - Binary Relations on a Single Set – Fuzzy Equivalence Relations

Unit- III: Fuzzy Relations (cont.):
Fuzzy Relations (cont.): Fuzzy Ordering Relations – Fuzzy Morphisms – Sup-i Compositions of Fuzzy Relations –Inf-□ $_i$ Compositions of Fuzzy Relations.
Fuzzy Relation Equations: Solution Method – Fuzzy Relational Equations Based on sup- i compositions – Fuzzy Relational Equations based on inf-□ $_i$ Compositions

Unit- IV: Fuzzy Logic and Constructing Fuzzy Sets:
Fuzzy Logic: Fuzzy Propositions – Fuzzy Quantifiers– Linguistic Hedges – Inference From Conditional Fuzzy Propositions
Constructing Fuzzy Sets: Methods of Construction: An Overview – Direct Methods with One Expert – Indirect Method With One Expert

Unit -V:- Fuzzy Decision Making:
Fuzzy Decision Making: General Discussion – Individual Decision Making – Multiperson Decision Making – MultiCriteria Decision Making – MultiStage Decision Making – Fuzzy Ranking Methods – Fuzzy Linear Programming.

Text Book:

1. George Klir and Bo Yuan, " Fuzzy Sets And Fuzzy Logic – Theory and Applications ", 2009, PHI Learning Pvt Ltd, New Delhi.

   Unit I - Sections: 1.1 – 1.5, 2.1 – 2.3, 3.1 & 3.2.
   Unit II- Sections: 4.1 – 4.6, 5.1 – 5.5.
   Unit III- Sections: 5.7 – 5.10, 6.3 – 6.5.
   Unit IV- Sections: 8.3 – 8.6, 10.2, 10.3, 10.5, 12.2 &12.3
   Unit V- Sections: 15.1 – 15.7.

Reference Books:

1. Ahmad M. Ibrahim, "Introduction to Applied Fuzzy Electronics ". New Delhi : Prentice Hall India, 1997.

2. Bart.Kosko,"NeuralNetworks and fuzzy systems ", New Delhi :Prentice-Hall of India, 2003.

3. George Klir J. and Folger Tina A.," Fuzzy Sets, Uncertainty and Information ".New Delhi: Prentice Hall India, 2004.

4. Toshiro Terano,AsaiKiyoji, SugenoMichio, "Applied Fuzzy Systems ".New York : A.P. Professional, 1994.

5. ZadehLotfi A., " Fuzzy Sets and Their Applications to Cognitive and Decision Processes", New York, Academic Press, 1975.

Periodicals:

Journal of Intelligent & Fuzzy Systems
International Journal of Fuzzy System and Applications
International Journal of Fuzzy Computation and Modelling The Mathematics Intelligencer
Mathematics News Letter

WEBSITES AND E-LEARNING SOURCES:

http://mathforum.org
http://www.sjsu.edu/faculty/watkins/fuzzysets.htm
https://www.britannica.com/science/fuzzy-logic
https://www.tutorialspoint.com/fuzzy_logic/fuzzy_logic_decision_making.htm

Teaching Methodology

Lecture (chalk and talk),Problem Solving, Discussion and Interactive session Assignment and Seminar.

Semester -II

Course Code	Course Name	Category	T	P	Credit
M21MTT21	**Topology and Image Processing**	**Specialization Paper**	**10**	**-**	**4**

Objectives:

- To provide advanced level topological and function.
- To impact knowledge about connected compactness and axioms in R.
- Understand the concept of image process and compression.
- The learner will be gain research ideas in topology and image processing together.

Course Outcomes:

Upon successful completion of this course , Students will be able to

CO 1: Understand the concept of continuous functions and the product topology.

CO 2 : Understands the Connectedness and compactness

CO 3 : Work with The separation axioms and Normal spaces

CO 4 : Understand the concept of Digital Image Fundamentals

CO 5: Analyse Image compression standards, image segmentation and Detection of discontinuouities.

CO Number	CO Statement	Knowledge Level
CO1	Concept of continuous functions and the product topology	K1 and K2
CO2	Apply Connectedness and compactness concepts in image analysis	K3
CO3	Work with The separation axioms and Normal spaces	K4
CO4	Concept of Digital Image Fundamentals-Evaluation	K5
CO5	Analyse Image compression standards, image segmentation and Detection of discontinuouities.	K4

K1- Remember: K2- Understand : K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	M	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M

Score rate : S- Strong = 3 , M-Medium = 2, L-Low:1

TOTAL SCORE: 49 X 3 + 6 X 2 = 159

Unit- I: Topological Space and Continuous Functions:

Topological Space and Continuous Functions: Topological spaces – Basis for topology – The order of topology – The product topology on X*Y – The Subspace topology – Closed sets and limit points – continuous functions – the product topology – the metric topology – the quotient topology.

Unit- II: Connectedness and compactness:

Connectedness and compactness: Connected spaces – Connected sub spaces of the real line – Compactness and local connectedness – Compact spaces – Compact subspaces of the real line - Limit point compactness – Local compactness.

Unit -III: Count ability and separation axioms:

Count ability and separation axioms: The countability axioms – The separation axioms – Normal spaces – The Urysohn lemma – The Urysohn metrization theorem – The Tycon off theorem – The complete metric space.

Unit -IV: Digital Image Fundamentals:

Digital Image Fundamentals: Introduction – An image model- An image model in Two dimension - An image model in Three dimension- Sampling and quantization – Basic relationships between pixels – Examples for relationships between pixels -Image geometry – Properties of 2D fourier transform.

Unit -V: Image Compression:

Image Compression: Fundamentals – Image compression – models – Error free compression – Lossy compression – Image compression standards, image segmentation: Detection of discontinuouities – Edge linking and boundary detection – Thresholding – Region oriented segment – Use of motion segmentation.

Text Books:

1. James R.Munkres "Topology", second edition, PHI Learning private limited, new Delhi, 2011.
   Unit I :Chapter 2: section 12 – 21
   Unit II :Chapter 3: section 23 – 29
   Unit III :Chapter 4: section 30 – 34, Chapter 5: section 37, chapter 7: section 43 and 45
2. A.K.Jainprentil "Fundamentals of digital image processing", Hall of India 1989.
   Unit IV and Unit V.

Reference Books:

1. W.S. Massey "Algebraic Topology-An Introduction", Springer Verlay Network 1976.
2. C.Gonzalez and R.E.Woods "Digital Image Processing " Pearson Education, Inc", 2008

Teaching Methodology

Lecture (chalk and talk),Problem Solving, Discussion and Interactive session

Assignment and Seminar.

Semester -II

Course Code	Course Name	Category	T	P	Credit
M21MTT21	**Non Linear Differential Equations**	**Specialization Paper /**	**10**	**-**	**4**

Objectives:

- To provide knowledge in linear ODE and Non linear ODE with application
- To find solutions for undetermined conditions of balance and time estimate.
- To give oscillation solutions in varies applications.
- The learner will be gain supporting results for real time problems.

Course Outcomes:

Upon successful completion of this course , Students will be able to

CO 1: understand general phase plane and some population models.

CO 2 : work with Equivalent linear equation by harmonic balance and accuracy of a Period estimate.

CO 3 : work with amplitude equation for undammed pendulum and its applications

CO 4 : analyze Time Varying Systems.

CO 5: evaluate Stability of linear systems.

CO Number	CO Statement	Knowledge Level
CO1	Understand general phase plane and some population models	K1 and K2
CO2	*Work with Equivalent linear equation by harmonic balance and accuracy of a Period estimate*	K2 and K3
CO3	Work with amplitude equation for undammed pendulum and its applications	K3
CO4	Analyze Time Varying Systems	K4
CO5	Evaluate Stability of linear systems.	K5

K1- Remember: K2- Understand : K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	M	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M

Score rate : S- Strong = 3 , M-Medium = 2, L-Low:1

Total Score: 45 X 3 + 10 X 2 = 155

Unit- I : First order systems in two variables and linearization:

First order systems in two variables and linearization: Introduction and definition of First order systems in two variables .The general phase plane-some population models – Introduction , definition and examples of population models Linear approximation at equilibrium points – Linear systems in matrix form.

Unit -II: Averaging Methods:

Averaging Methods: An energy balance method for limit cycles – Amplitude and frequency estimates – slowly varying amplitudes – nearly periodic solutions - periodic solutions: harmony balance – Equivalent linear equation by harmonic balance – Accuracy of a period estimate.

Unit- III: Perturbation Methods:

Perturbation Methods: Outline of the direct method – Forced Oscillations far from resonance - Forced Oscillations near resonance with Weak excitation – Amplitude equation for undamped pendulum – Amplitude Perturbation for the pendulum equation – Lindstedt's Method – Forced oscillation of a self – excited equation – The Perturbation Method and Fourier series.

Unit- IV: Linear Systems:

Linear Systems: : Introduction and definition of Linear Systems -Time Varying Systems – Introduction and definition Time Varying Systems- Constant coefficient System – Introduction and definition Constant coefficient System -Periodic Coefficients – Floquet Theory – Wronskian.

Unit- V: Stability:

Stability: Introduction and definition of Stability -Poincare stability – solutions- paths and norms – Liapunov stability -Stability of linear systems – Introduction and definition Stability of linear systems -Comparison theorem for the zero solutions of nearly – linear systems- Examples .

Text Book:

1. D.W.Jordan, &P.Smith , "Nonlinear Ordinary Differential Equations" , , ClarendonPress, Oxford, 1977.

Reference Books:

1. G.F.Simmons , " Differential Equations", Tata McGraw Hill, NewDelhi (1979).
2. David A. Sanchez , "Ordinary Differential Equations and Stability Theory, Dover Publications, Inc. New York (1968).
3. J.K.Aggarwal , "Notes on Nonlinear Systems", Van Nostrand, 1972.

Teaching Methodology

Lecture (chalk and talk),Problem Solving, Discussion and Interactive session

Assignment and Seminar.

SEMESTER -II

Course Code	Course Name	Category	T	P	Credit
M21MTT21	**Inventory Control Models**	**Specialization Paper**	**10**	**-**	**4**

Objectives:

- To provide knowledge in Inventory control system.
- To solve inventory control problems using various techniques.
- To construct the required mathematical model for the given assumptions.
- To apply our models in suitable firms.
- .

Course Outcomes:

Upon successful completion of this course , Students will be able to

CO 1: Understand inventory control, Forecasting, Demand models , Constant model, Trend model, Trend-seasonal model,
CO 2 : Work with various type of Quantity discounts

CO 3 : Work with distribution of the inventory position, an important relationship, Compound Poisson demand, Normally distributed demand
CO 4 : Analyze Service levels.

CO 5: Evaluate Optimality of (s,S) policies, Updating order quantities and reorder points in practice.

CO Number	CO Statement	Knowledge Level
CO1	Understand inventory control, Forecasting, Demand models	K1 and K2
CO2	Evaluate various type of Quantity discounts	K5
CO3	Apply distribution of the inventory position, an important relationship,Compound Poisson demand, Normally distributed demand	K3
CO4	Analyze Service levels	K4
CO5	Evaluate Optimality of (s,S) policies, Updating order quantities and reorder points in practice.	K5

K1- Remember: K2- Understand : K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	M	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	M

Score rate : S- Strong = 3 , M-Medium = 2, L-Low:1

Total Score: 45 X 3 + 10 X 2 = 155

Unit- I: Importance and objectives of inventory control:
Importance and objectives of inventory control, Forecasting - Objectives and approaches, Demand models - Constant model, Trend model, Trend-seasonal model, Choosing demand model, Moving average, Exponential smoothing, Exponential smoothing with trend,Winter's trend-seasonal method, Using regression analysis, Costs and concepts - Considered costs and other assumptions, Different ordering systems.

Unit- II: Deterministic lot sizing model:
Deterministic lot sizing model -The classical economic order quantity model - Optimal order quantity, Sensitivity analysis, Reorder point, Finite production rate, Quantity discounts, Backorders allowed, Time varying demand, The Wagner-Whitin algorithm, The Silver-Meal heuristic, A heuristic that balances holding and ordering costs.

Unit- III: Single echelon systems:
Single echelon systems - Reorder points, Discrete stochastic demand - Compound Poisson demand, Logarithmic compounding distribution, Geometric compounding distribution, Smooth demand,Fitting discrete demand distributions in practice, Continuous stochastic demand - Normally distributed demand, Gamma distributed demand, Continuous review (R, Q) policy inventory leveldistribution - Distribution of the inventory position, An important relationship, Compound Poisson demand, Normally distributed demand.

Unit- IV: Service levels:
Service levels, Shortage costs, Determining the safety stock, Fill rate and ready rate constraints - Compound Poisson demand,Normally distributed demand, Fill rate – a different approach, Shortage cost per unit and time unit - Compound Poisson demand,Normally distributed demand,Shortage cost per unit, Continuous review (s, S) policy, Periodic review

fill rate - Basic assumptions, Compound Poisson demand - (R, Q) policy, Compound Poisson demand - (s, S) policy, Normally distributed demand - (R, Q) policy.

Unit- V: The Newsboy Model:

The newsboy model, A model with lost sales, Stochastic lead-times - Two types of stochastic lead-times, Handling sequential deliveries independent of the lead-timedemand, Handling independent lead-times, Comparison of the two types of stochastic lead-times, Joint optimization of order quantity and reorder point - Discrete demand of (R, Q) policy and (s, S) policy, An iterative technique, Fill rate constraint - a simple approach, Optimality of ordering policies - Optimality of(R, Q) policies when ordering in batches, Optimality of (s,S) policies, Updating order quantities and reorder points in practice.

Text Books:

1. Sven Axsater . "Inventory Control " (Second Edition), (Lund UniversityLund, Sweden), Springer Science, LLC, New Yark, USA, 2006.

2. G. Hadley (University of Chicago), T.M. Whitin "Analysis of Inventory Systems ", (University of California, Berkeley), Prentice-Hall, 1963.

Teaching Methodology

Lecture (chalk and talk),Problem Solving, Discussion and Interactive session

Assignment and Seminar

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MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL

DEPARTMENT OF MATHEMATICS

M.Sc. MATHEMATICS

SYLLABUS TO BE IMPLEMENTED FROM THE ACADEMIC YEAR

2021-2022

(CHOICE BASED CREDIT SYSTEM)

Mother Teresa Women's University, Kodaikanal
Department of Mathematics
Choice Based Credit System (CBCS)
(2021-2022 onwards)
M.Sc. Mathematics

1. About the Programme

M.Sc. (Master of Science) Mathematics is a Postgraduate Programme**,** that has a duration of 2-years which is divided into 4 semesters. The main aim of the Programme is intended to provide in-depth knowledge to the students in advanced Pure and Applied mathematics and prepare them for various research activities and career opportunities. The Programme is designed to impart proficiency in Mathematical application in day-to-day in simple and complex situations. The Programme also will enable the learners to shine as collaborators and innovators in addressing social, technical, and business challenges. Programme through its wide range of Courses trains the students as competent citizens with advanced mathematical knowledge and ethically sound humans with its insistence of human ethics. The Programme is intended to promote the culture of interdisciplinary studies and research that is much needed for the current scenario.

2. Programme Educational Objectives (PEOs)

The M.Sc. Mathematics Programme is designed to

PEO1	preparing students for productive careers after the completion of this Programme
PEO2	demonstrate professional acumen through learning new avenues in emerging fields of Pure and Applied Mathematics
PEO3	ensure continuous learning relevant inter–personal skills as an individual, as a member or as a leader throughout the professional career
PEO4	motivate to pursue higher studies and exhibit research skill to meet out academic demands of the country.
PEO5	improvise the women resource that is furnished with the mathematical skills that are necessary in the altering industrial and socio-economic development of the country
PEO6	instil a wide range of mathematical techniques and application of mathematical methods/tools in scientific and engineering domains.
PEO7	develop students' self-confidence in research process independently or within a group and have the ability to pursue multidisciplinary research in universities in India and abroad
PEO8	enhance the awareness of the graduates on public concern and to instill moral and ethical behaviors to shape them as moral humans

3. Eligibility : B.Sc. Mathematics

4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions (MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 90**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 lines space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the abovementioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

9. Programme Outcomes (POs)

On completion of the programme, the students will be able to

PO1	to carry out scientific investigation objectively without being biased with preconceived notions.
PO2	analyze problems, formulate a hypothesis, evaluate and validate results, and draw reasonable conclusions thereof.
PO3	pursue research in Mathematical Sciences and allied fields, or careers in industry.
PO4	acquire relevant knowledge and skills appropriate to professional activities and demonstrate highest standards of ethical issues in mathematical Sciences.
PO5	to become an enlightened citizen with commitment to deliver one's responsibilities within the scope of bestowed rights and privileges

10. Programme Specific Outcomes (PSOs)

On completion of the programme, the students will be able to

PSO1	understand the fundamental axioms in mathematics and capable of developing ideas based on them.
PSO2	pursue research studies in mathematics and related fields
PSO3	have advanced knowledge on topics in pure mathematics and to pursue higher degrees at reputed academic institutions.
PSO4	acquire skills in problem solving, thinking, creativity through assignments, etc.
PSO5	compete in competitive exams e.g. NET, GATE, etc

M.Sc. MATHEMATICS CURRICULUM

S. NO	Course Code	Course Title	Credits	Hours		CIA	ESE	Total
				L	P			
Semester I								
1	P21MTT11	Core I- Algebra	4	5	-	25	75	100
2	P21MTT12	Core-II- Real Analysis-I	4	5	-	25	75	100
3	P21MTT13	Core-III- Ordinary Differential Equations	4	5	-	25	75	100
4	P21MTT14	Core-IV-Graph Theory	4	5	-	25	75	100
5	P21MTT15	Core – V- Computer Oriented Numerical Methods	4	5	-	25	75	100
6	P21CSS11	**Supportive Course- I(Skill)-** Computer Skills for Web Designing and Video Editing	2	-	4	25	75	100
		Total	**22**	**30**		**-**	**-**	**600**
Semester II								
7	P21MTT21	Core VI-Vector Space and Linear Transformation	4	5	-	25	75	100
8	P21MTT22	Core-VII-Real Analysis –II	4	5	-	25	75	100
9	P21MTT23	Core-VIII-Partial Differential Equations	4	4	-	25	75	100
10	P21MTT24	Core-IX-Topology	4	5	-	25	75	100
11	P21MTT25	Core-X- Optimization Techniques	4	5	-	25	75	100
12		**Non-Major Elective-I**	4	4		25	75	100
13	P21MTS22	**Supportive Course II(Skill)-** MATLAB	2	-	2	25	75	100
		Total	**26**	**30**		**-**	**-**	**700**
Semester III								
14	P21MTT31	Core XI- Complex Analysis	4	5	-	25	75	100
15	P21MTT32	Core-XII- Measure Theory	4	5	-	25	75	100
16	P21MTT33	Core-XIII-Differential Geometry	4	4	-	25	75	100
17	P21MTT34	Core-XIV- Classical Dynamics	4	4	-	25	75	100
18	P21MTT35	Core-XV- Calculus of variations and Integral Equations	4	5	-	25	75	100
19	P21MTT36	Core XVI- Functional Analysis	4	5	-	25	75	100
20	P21WSS33	**Supportive Course III** Women Empowerment	2	2	-	25	75	100
		Total	**26**	**30**				**700**
Semester IV								
21	P21MTE411/ P21MTE412/ P21MTE413/ P21MTE414/	Elective-I* Number Theory/Automata Theory/Probability Theory and Statistics/Astronomy / Any MOOC Course$	4	4	-	25	75	100

22	P21MTE421/ P21MTE422/ P21MTE423/ P21MTE424/	Elective –II* Fuzzy sets and their Application/ Stochastic Processes /Fluid Dynamics/Tensor Analysis and Special Theory of Relativity/ Any MOOC Course$	4	4	-	25	75	100
23	P21MTR41	Project	8	22	-	25	75	100
		Total	**16**	**30**				**300**
		Grand Total	**90**	**120**				**2300**

Non Major Elective

The candidates who have joined the PG Programme, can also undergo Non Major Elective offered by other Departments.

Non Major Elective (NME) offered by Department of Mathematics

S.No	Course code	Non Major Elective Courses
1	P21MTN211	Numerical Methods
2	P21MTN212	Operation Research
3	P21MTN213	Discrete Mathematics
4	P21MTN214	Differential Equations
5	P21MTN215	Fourier series and Laplace Transforms
6	P21MTN216	Statistics
7	P21MTN217	Mathematical Aptitude

Additional Credit Courses (Mandatory)

1. **Semester –I**

Course Code	Course Name	Category	Credit
P21MTV11	Python Language and Python Lab	Value Added Program- I	2

2. **Semester –II**

Course Code	Course Name	Credit
P21MTI21	Internship/Industrial Training	2

3. **Semester –III**

Course Code	Course Name	Credit
P21MTO31	Online Courses - MOOC Courses	2

4. Semester –IV

Course Code	Course Name	Category	Credit
P21MTV42	Mathematical Modelling	Value Added Program- II	2

*Those who have CGPA 9 and want to do the project in industry/institution during IV semester., these two paper can be opted in III semester

$Students can take one 4 credit course in MOOC as elective or two 2 credit course in MOOC as elective with the approval of Department committee

Outside class hours (Attendance compulsory)

- Health, Yoga and Physical fitness.
- Library information access and utilisation
- Employability Training.
- Students Social Responsibility.

SEMESTER- I

COURSE CODE	P21MTT11	ALGEBRA	L	T	P	C
CORE- I			5	-	-	4

Objectives:

- To provide deep knowledge about various algebraic Structures.
- The learner will be able to recognize some advances of the theory of groups.
- Use Sylow's Theorems in the study of finite groups.
- Formulate some special types of rings and their properties.
- Recognize the interplay between fields and vector spaces.
- Apply the algebraic methods for solving Problems.

Unit-I: Counting principle:
Introduction about Counting principle – Product of subgroups and order of product subgroups - Normal subgroups and quotient groups – Homomorphisms of into and onto with kernel function- Automorphisms with the property - Cayley's theorem - Permutation groups for symmetric and alternating group

Unit-II: Another counting principle:
Introduction about Another counting principle – Normalizer and its applications - Sylow's theorems and p-sylow subgroup -Third part of p-Sylow's theorem and examples problems - Direct product – internal direct product of normal subgroups-Finite abelian groups-isomorphic abelian groups and non isomorphic abelian group of order prime theorems

Unit-III: Ring:
Definition and examples -Ring of real quaternion's-Some special Classes of Rings - zero divisor – integral domain-division ring- characteristic - Boolean ring – Homomorphisms of rings with kernel examples-Ideal and Quotient Rings- More Ideals and Quotient Rings- The field of Quotients of an Integral Domain

Unit- IV: Euclidean Rings:
Introduction about Euclidean rings -definition with theorems and lemma's - A Particular Euclidean ring with Gaussian integers theorems-Fermat theorem - Polynomial rings – division algorithm- polynomials over the rational field – Primitive polynomial wit Gauss' lemma-Eisenstein criterion theorem-Polynomial rings over commutative rings-Unique factorization domain-primitive and irreducible polynomial lemma's.

Unit -V: Extension Fields:
Introduction about Extension fields –definition of degree and finite extension of field– definition of algebraic and extension theorems -Roots of polynomials – remainder theorem based on lemmas – Splitting field and irreducible extension theorems-More about roots with lemmas and corollary – Definition of Simple extension and theorems-definition of Finite fields and lemmas and theorems

Text Book:

1.I. N. Herstein, "Topics in Algebra", 2nd edition, John Wiley & Sons, Singapore, 2006.

Unit I: Chapter 2: Sections 2.5, 2.6, 2.7, 2.8, 2.9, 2.10
Unit II: Chapter 2: Sections 2.11, 2.12, 2.13, 2.14
Unit III: Chapter 3: Sections 3.1, 3.2, 3.3, 3.4, 3.5, 3.6
Unit IV: Chapter 3: Sections 3.7, 3.8, 3.9, 3.10, 3.11
Unit V: Chapter 5: Sections 5.1, 5.3, 5.5 & Chapter 7: Section 7.1

Reference Books:

1. **John. B. Fraleigh**, "A First Course in Abstract Algebra", 7th Edition, Addison-Wesley, New Delhi, 2003.
2. **P. B. Bhattacharya, S. K. Jain & S. R. Nagpaul, "**Basic Abstract Algebra", Cambridge University Press, USA, 1986
3. **Charles Lanski,** "Concepts in Abstract Algebra", American Mathematical Society, USA, 2010.
4. **J.J. Rotman**, "Advanced Modern Algebra", 2nd Edition, Graduate Studies in Mathematics, Vol. 114, AMS, Providence, Rhode Island, 2010.
5. **G. Strang**, "Introduction to Linear Algebra", 2nd Edition, Prentice Hall of India Pvt. Ltd, 2013.

Course Outcomes

Upon the successful completion of the course

CO1: **S**tudents will have a working knowledge of important mathematical concepts in abstract algebra such as definition of a group, order of a finite group and order of an element – K2.

CO2: Students will be introduced to and have knowledge of many mathematical concepts studied in abstract mathematics such as permutation groups, factor groups and abelian groups – K3.

CO3: Students will actively participate in the transition of important concepts such homeomorphisms & isomorphism's from discrete mathematics to advanced abstract mathematics - K4.

CO4: **S**tudents will gain experience and confidence in proving theorems. A blended teaching method will be used requiring the students to prove theorems give the student the experience, knowledge, and confidence to move forward in the study of mathematics – K5.

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	M	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	M	S

S – Strong: M – Moderate L- Low

COURSE CODE	P21MTT12	REAL ANALYSIS- I	L	T	P	C
CORE- II			5	-	-	4

Objectives:

- To convey concepts of real valued functions in detail.
- To provide the deep knowledge about sequences and series.
- To make a clear difference between differentiability and continuity
- To know some basic theorems.

Note: The Question paper may contain problems to a maximum of 20%

Unit -I: Countable and Uncountable sets:
Finite Countable and Uncountable sets – definition of enumerable or denumerable, equivalence relation with theorems and examples- Metric spaces –Euclidean spaces examples- Basic definitions of metric spaces and its examples – Open and closed sets -Compact sets- definition of compact sets with union and intersection theorems and its properties- k- cell is compact-Weierstrass theorem

Unit –II: Perfect sets:
Introduction about Perfect sets – definition of perfect set and cantor set and its theorem- Connected sets-real line is connected property theorem- Convergent and divergence sequences in a metric space theorems –Subsequences - Cauchy sequences and complete - Upper and lower limits - Some special sequences theorems and examples– Series – harmonic series and geometric series examples - The number e - The root and ratio tests and its examples

Unit -III: Power series:
Definition of Power series – radius of convergence with problems - Summation by parts – partial summation formula-Leibnitz theorem-absolute convergence – conditionally convergent - definition and theorems and its examples-addition and multiplication of series with problems – Rearrangements

Unit-IV: Continuity function:
Continuity: Limits of functions - Continuous functions and their properties and theorems- continuity and compactness- uniform continuous-theorems -The derivative of a real function with properties and examples-Mean value theorems and generalized Mean value theorem- The continuity of derivatives - L'Hospital' rule

Unit -V: The Riemann-Stieltjes Integral:
Introduction of Riemann-Stieltjes Integral: Definition and existence of the integral – definition of refinement -upper and lower partition theorems-Properties of the Riemann-Stieltjes Integral and its theorems- definition of unit step function-Integration and differentiation –fundamental theorem of calculus- integration by parts- Integration of vector valued functions.

Text Book:

1.Walter Rudin, "Principles of Mathematical Analysis", 3rd Edition, McGraw – Hill International Book Company, Singapore, (1982).

Units I: Chapter- 2: 2.1 to 2.42
Unit II: Chapter- 2: 2.43 to 2.47 and Chapter -3:3.1 to 3.37
Unit III: Chapter- 3: 3.38 to 3.58
Unit IV: Chapter-4: 4.1 to 4.21 and Chapter -5: 5.1 to 5.13
Unit V: Chapter- 6:6.1 to 6.23

Reference Books:

1. **S. Kumaresan**, "Topology of Metric Spaces ", 2nd Edition, Narosa Publishing House, 2011.
2. **S. Ponnusamy**, "Foundations of Mathematical Analysis", Springer Birkhauser, 2012.
3. **S. K. Mappa**, Introduction to Real Analysis, 7th Edition, Sarat Book Distributors, Kolkatta, 2015
4. **Tom Apostol,** "Mathematical Analysis", Addison Wesley Publishing Company, London-1971.
5. **R. G. Bartle & D.R. Sherbert,** "Introduction to Real Analysis", John Wiley & Sons, New York, 1982.
6. **Kenneth A. Ross,** "Elementary Analysis: The theory of Calculus", Springer, New York, 2004.
7. **K. R. Stromberg,** "An Introduction to Classical Real Analysis", Wadsworth, 1981.
8. **G.F.Simmons,** "Introduction to Topology and Modern Analysis", McGraw – Hill, New Delhi, 2004.

Course Outcome:

Upon the successful completion of the course**,**

CO1: Students will be able to demonstrate competence with elementary properties of sets By proving identities involving union and intersection and Cartesian Products of Sets – K2
CO2: Students will be able to demonstrate competence with elementary properties of Functions by proving results involving composite functions and inverse functions – K3
CO3: Students will be able to demonstrate competence with the algebraic and order Properties of real numbers – K4
CO4: Students will be able to demonstrate competence with properties of real numbers by finding supremum and infimum of sets and using the completeness property of real numbers – K5
CO5: Students will be able to demonstrate ability to use Taylor Theorem, the Mean value Theorem, and use L'Hospital's Rule to compute limits of functions – K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	S	M	S	M	S	M	S
CO4	S	M	S	S	M	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	S	S

S – Strong: M – Moderate L- Low

COURSE CODE	P21MTT13	ORDINARY DIFFERENTIAL EQUATIONS	L	T	P	C
CORE- III			5	-	-	4

Objectives:

- Differential equations arise for many problems in oscillations of mechanical and electrical systems
- It plays a very important role in all modern scientific and engineering studies.
- To give an in-depth knowledge of differential equations and their applications.
- Solve the higher order differential equations in different types with initial and boundary conditions
- Use the method of separation of variables to reduce some partial differential equations to ordinary differential equations of 2nd order.
- To make the students to solve the practical problems used differential equations.

Unit-I: Second Order Linear Equations:

Introduction about Second Order Linear Equations - The General solution of the homogeneous equation– Wronskians - Linearly dependent and independent theorems and lemma's-The use of a known solution to find another –general solution with example- The method of undetermined Coefficients – Problems based on exponentials, sines and cosines, and polynomials. The method of variation of parameters -solving problems

Unit-II: Power Series Solutions:

Power Series definition- A review of power series– definition of power series, converges and diverges – Radius of convergence with examples-Definition analytic function and basic properties-Series solutions of first order equations with initial condition– Second order linear equations - Ordinary point-singular point-Legendre's equation - solving problems.

Unit-III: Special Functions:

Introduction about Special Functions- Regular Points- Singular Points - irregular singular points with examples– Airy equation - Hermite's equation - The generating function - Rodrigues' formula - Bessel equation - Frobenius series - Gauss's hyper geometric equation – The Point at infinity.

Unit-IV: Some Special Functions of Mathematical Physics:

Introduction of Some Special Functions in Mathematical Physics: Legendre Polynomials - generating function and Rodrigues' formula – Properties of Legendre Polynomials – Orthogonality Bessel Functions – The Gamma Function – Properties of Bessel Functions- Bessel function of the first kind and second kind-Proofs of the orthogonality properties.

Unit-V: System of First Order Equations:

System of First Order Equations Introduction - Linear Systems with proof of the homogeneous Linear Systems theorems- Homogeneous Linear Systems with Constant Coefficients -Solving problems– non homogeneous Linear Systems –examples-Nonlinear Systems with examples- Volterra's Prey – Predator Equations.

Text Book:

1. **G.F. Simmons,** "Differential Equations with Applications and Historical Notes", TMH, New Delhi, 1984.

   Unit I - Chapter 3: Sections 15, 16, 18 and 19.

   Unit II -Chapter 5: Sections 26 to 28

   Unit III -Chapter5: Sections 29 to 32

   Unit IV-Chapter8: Sections 44 to 47

   Unit V - Chapter 10: Sections 55 to 57

Reference Books:

1. **Williams E. Boyce and Richard C. Diprima** "Elementary Differential Equations and Boundary Value Problems " 10th edition John Wiley and Sons, New York 2012
2. **M.D. Raisinghania**, " Advanced Differential Equations ", S. Chand & Company Ltd., New Delhi 2012
3. **B. Rai, D.P. Choudhury and H.I. Freedman**, "A Course in Ordinary Differential Equations ", Narosa Publishing House Pvt. Ltd, New Delhi 2012
4. **W.T. Reid,** "Ordinary Differential Equations", John Wiley & Sons, New York, 1971.
5. **E.A. Coddington,** "An Introduction to Ordinary Differential Equation", Prentice Hall of India, New Delhi, 2007.
6. **D.Somasundaram,** "Ordinary Differential Equations", Narosa Publ., House, Chennai - 2002.

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO1: recognize differential equations that can be solved by each of the three methods – direct integration, separation of variables and integrating factor method – and use the appropriate method to solve them – K2

CO2: use an initial condition to find a particular solution of a differential equation, given a general solution – K2

CO3: check a solution of a differential equation in explicit or implicit form, by substituting it into the differential equation – K3

CO4: understand the terms 'exponential growth/decay', proportionate growth rate' and 'doubling/halving time' when applied to population models, and the terms' exponential decay', 'decay constant' and 'half- life' when applied to radioactivity – K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	M	S	S	S
CO2	S	M	S	S	S	M	M	M	M	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S

S – Strong: M – Moderate L- Low

COURSE CODE	P21MTT14	GRAPH THEORY	L	T	P	C
CORE- IV			5	-	-	4

Objectives:

- To impart the different types of graphs and operations.
- To give a depth knowledge about vertices and edge connectivity.
- To make knowledge in matching and colourings.
- To study related theorems.
- To shipped from digraphs and additional structure in networks.

Unit-I: Graphs and Trees:

Graphs and Sub graphs: Basic definitions of Graphs and simple graphs-Graph isomorphism : complete graph- Bipartite graph- examples of isomorpihic and nonisomorphic graphs-The incidence and adjacency matrices : Eigen values -proof of automorpshism group of G-Subgraphs: Spanning subgraph-induced subgraph - Vertex degrees: Handshaking theorem - minimum and maximum degrees of graph and its relation- Paths and connection: connected and disconnected graph with proof of the theorems- Cycles - Trees -Cut edges and bonds - Cut vertices -Cayley's formula.

Unit-II: Connectivity, Euler Tours and Hamilton Cycles:

Connectivity: vertex connectivity and edge connectivity with examples and theorems- Blocks-proof of the Merger's theorem-Euler Tours and Hamilton Cycles: Euler tours- Hamilton cycles-Eulerian graph and non Eulerian graph with examples and theorems- Hamiltonian graph non Hamiltonian graph with examples and theorems-Dirac theorem- The Chinese postman problem -The travelling salesman problem.

Unit-III: Matchings and Edge Colourings:

Matchings: maximum and perfect matching's in graphs with examples- augmenting path – matchings and coverings in bipartite graphs: Marriage theorem – minimum covering with proof of the theorems and lemmas-Perfect matchings -Halls and Tutte's theorems -Edge chromatic number - Vizing's theorem.

Unit-IV: Independent Set, Cliques and Vertex Colourings:

Independent Set: maximum independent sets - vertex (edge) independence number and covering number with proof of the theorems- Clique- Ramsey's theorems with examples-Turan's theorem - Chromatic number : vertex colourable and edge colourable-critical graph-properties of critical graphs- Brooks theorem – Hajos Conjecture

Unit-V: Directed Graphs and Networks:

Directed graphs: Directed walk, trail, path, cycle - indegrees and outdegrees with examples - reachable - tournament –directed Hamiltonian path- directed Hamiltonian cycle with proof of the theorems- Networks: capacity function-flows- resultant flow -maximum flow- minimum cuts - The Max-flow Min-cut theorem

Text Book:

1. **J. A. Bondy and U. S. R. Murty,** "Graph theory with applications", The MacMillan Press Ltd., 1976.

   Unit I: chapter 1: 1.1 – 1.7 and chapter 2: 2.1 – 2.4
   Unit II: chapter 3: 3.1 – 3.2 and chapter 4: 4.1 – 4.4
   Unit III: chapter 5: 5.1 – 5.3 and chapter 6: 6.1 – 6.2
   Unit IV:chapter 7: 7.1 – 7.3 and chapter 8: 8.1 – 8.3
   Unit V: chapter 10: 10.1 – 10.3 and chapter 11: 11.1 – 11.3

Reference Books

1. **Narsingh Deo,** "Graph Theory with applications to Engineering and Computer Science", PHI learning Pvt Ltd, New Delhi, 2013
2. **L.R. Foulds**, "Graph Theory Applications", Narosa publishing House, 1993.

Course Outcomes

Upon the successful completion of the course, students will be able to

CO1: state all of the technical definitions covered in the course (such as a graph, tree, colouring, cut edges, cut vertices, connectivity's, cycle and tours, digraph, flows and cuts) – K2
CO2: state all of the relevant theorems covered in the course. – K3
CO3: formulate graph theoretic models to solve real world problems (THE MAX-FLOW MIN-CUT) – K4
CO4: analyze combinatorial objects satisfying certain properties and answer questions related to existence (proving the existence or non-existence of such objects), construction (describing how to create such objects in the case they exist), enumeration (computing the number of such objects), and optimization (determining which objects satisfy a certain external property) – K4
CO5: decision/network will take existing/proposed network /social to avoid ambiguity – K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate; K6- create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S – Strong: M – Moderate L- Low

COURSE CODE	P21MTT15	COMPUTER ORIENTED NUMERICAL METHODS	L	T	P	C
CORE- V			5	-	-	4

Objectives:

- To develop the mathematical skills of the students in the areas of numerical methods.
- To teach theory and applications of numerical methods in a large number of engineering subjects which require solutions of linear systems, finding Eigen values, Eigen Vectors, Interpolation, and applications, solving ODEs, PDEs and dealing with statistical problems like testing of hypothesis.
- To lay foundation of computational mathematics for specialized studies and research.

Unit – I: Transcendental and Polynomial Equation

Transcendental and Polynomial Equation Introduction- Bisection Method- steps to solve problems in Bisection method - Iteration method based on first degree equation- problems in first degree equation -Iteration method based on second degree equation- problems in second degree equation- Rate of Convergence.

Unit –II: System of Linear Algebraic Equations and Eigen value Problems:

System of Linear Algebraic Equations and Eigen value Problems introduction- Direct Method- Fixed point iteration method-Newton's method- solution of linear system by Gaussian elimination and Gauss –Jordon methods-Iterations Methods- Eigen values and Eigen Vectors- Jacobi method for Symmetric Matrices-Givens Method for Symmetric Matrices-Power Method.

Unit – III: Interpolation and Approximation:

Interpolation and Approximation introduction-Lagrange and Newton Interpolation- Introduction – Formula- Problems in Lagrange and Newton Interpolation -Finite Difference Operators- Interpolating Polynomials Using Finite Differences- Hermit Interpolation- Introduction – Formula- Problems in Hermit Interpolation- Piecewise and Spline Interpolation- Introduction – Formula- Problems in Piecewise and Spline Interpolation

Unit – IV: Differentiation and Integration:

Differentiation and Integration introduction- Numerical Differentiation- - Extrapolation Method- Numerical Integration: trapezoidal and Simpsons 1/3 and 3/8 rules - Formula- Problems in trapezoidal and Simpsons 1/3 and 3/8 rules- Romberg Integration – Double Integration-. Problems in Romberg Integration and Double Integration

Unit –V: Ordinary Differential Equations:

Introduction of Ordinary Differential Equations- Initial Value Problems: Single step Method- Taylor series method-Euler method for first order equation-fourth order Runge-Kutta method for solving first and second order equations-Multi Step Methods : Milne's and Adam's Predictor- Corrector Method

Text Book:

1. **M.K.Jain, S.R.K.Iyengar, R.K.Jain.** "Numerical Methods For Scientific And Engineering Computation "(Fifth Edition). New Age International Publishers. (2007)

Unit-I: Chapter 2: Section: 2.1 – 2.5.
Unit-II: Chapter 3: Section: 3.1, 3.2, 3.4, 3.5, 3.7, 3.8 & 3.10
Unit-III: Chapter 4: Section: 4.1- 4.6
Unit- IV: Chapter 5: Section: 5.1, 5.2, 5.4, 5.6, 5.10 & 5.11
Unit – V: Chapter 6: Section: 6.4, 6.6 & 6.7

Reference Book:

1. **P.Kandasamy, K.Thilagavathi and K. Gunavathi**, "Numerical Methods", S.Chand and Company Ltd , New Delhi 2013.

Course Outcomes

CO	Course Outcomes	Knowledge Level
CO1	Apply numerical methods to find our solution of algebraic equations using different methods under different conditions and numerical solution of system of algebraic equations.	K3
CO2	Apply various interpolation methods and finite difference concepts.	K3
CO3	Workout numerical differentiation and integration whenever and wherever routine methods are not applicable.	K3
CO4	Work numerically on the ordinary differential equations using different methods through the theory of finite differences.	K3
CO5	Work numerically on the partial differential equations using different methods through the theory of finite differences.	K3

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	S
CO2	S	S	S	S	M	S	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	S	M	S	S	S	S	S

S- Strong M-Medium L-Low

SEMESTER- II

COURSE CODE	P21MTT21	VECTOR SPACE AND LINEAR TRANSFORMATION	L	T	P	C
CORE- VI			5	-	-	4

Objectives

- To provide sound foundation in linear Algebra, as well as understanding of the principles underlying in linear Algebra and deep knowledge about various algebraic structures.
- To prepare students to understand principles, concepts necessary to formulate and give a depth knowledge about elementary matrix operations.
- To prepare the students for further courses in higher mathematics and related disciplines and solve linear equation.

Unit-I: Vector Spaces:

Vector introduction – Vector spaces – Subspaces – Linear combinations and systems of linear equations – Exercise problems- Linear dependence and linear independence – Bases and dimensions – Maximal linearly independent subsets- Exercise problems

Unit-II: Linear Transformation:

Introduction of Linear Transformation-The Algebra of Linear transformation - finite dimensional-invertible-range and rank-idempotent - Characteristic Roots and matrices-minimal polynomial-characteristic vector- Exercise problems in Characteristic Roots and matrices- Exercise problems in characteristic vector.

Unit-III: Linear Transformation Cont.:

Types of Linear Transformation -Canonical Forms: Triangular Form- Canonical Forms: Nilpotent transformations- Canonical Forms: A Decomposition of V: Jordan Form-Canonical Forms: rational canonical Form.

Unit-IV: Linear Transformation Cont.

In Linear Transformation Trace and Transpose - characteristic roots based on lemmas- symmetric and skew symmetric matrix- adjoint – determinants - Hermitian, Unitary and normal Transformations-Real Quadratic Forms.

Unit - V: Diagonalization:

Diagonalization Introduction Eigen values and Eigen vectors –Properties of Eigen values and the Cayley Hamilton theorem - Matrix limits and Markov chains – Invariant subspaces - Diagonalizability – similarity transformation and orthogonal transformation of a symmetric matrix to diagonal form- -orthogonal reduction to its canonical form

Text Book:

1. **Stephen H.Friedberg, Arnold J. Insel, Lawrence E. Spence,** "Linear Algebra", Pearson New International Edition, fourth edition , 2014
   Unit I- Chapter 1: Sec1.1- Sec1.7
   Unit V-Chapter 5: Sec 5.1- Sec 5.4
2. **I.N.Herstein**, "Topics In Algebra", Second Edition Published by John Wiley and Sons, Singapore 2006
   Unit II-Chapter 6: Sec 6.1-Sec 6.3
   Unit III- Chapter 6: Sec 6.4- Sec 6.7
   Unit IV – Chapter 6: Sec 6.8- Sec 6.11

Reference Books:

1. **Kenneth M Hoffman and Ray Kunze**, "Linear Algebra", 2nd Edition, Prentice-Hall of India Pvt. Ltd, New Delhi, 2013
2. **John. B. Fraleigh,** "A First Course in Abstract Algebra", 7th Edition, Addison-Wesley,New Delhi, 2003.
3. **S. Kumerason,** "Linear Algebra" Prentoice Hall of India Pvt Ltd New Delhi, 2000.
4. **D.S.Malik, J.N.Mordeson and M.K.Sen**, "Fundamental of Abstract Algebra", McGraw Hill(International Edition),New York. 1997.

Course Outcomes:

Upon successful completion of this course students will be able to

CO1: Determine relationship between coefficient matrix inevertability and solutions to a system of linear equations and the inverse matrices – K2

CO2: Find a basis for the row space, column space and null space of a matrix and find the rank and nullity of a matrix – K3

CO3: Find the matrix representation of a linear transformation given bases of the relevant relevant vector spaces – K4

CO4: Use computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, vector spaces, Eigen values and Eigen vectors, orthogonality and diagonalization. (Computational and Algebraic Skills) – K5

CO5**:** Work collaboratively with peers and instructors to acquire mathematical and understanding and to formulate and solve problems and present solutions – K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	*PO3*	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	*S*	S	S	S	S	S	M	S
CO2	S	S	*S*	M	S	S	S	S	S	S
CO3	S	S	*S*	S	S	S	M	S	M	S
CO4	S	S	*M*	S	S	S	S	S	S	S
CO5	S	S	*S*	S	M	S	S	S	S	S

S- Strong = 3, M-Medium = 2, L-Low = 1

COURSE CODE	P21MTT22	REAL ANALYSIS-II	L	T	P	C
CORE- VII			5	-	-	4

Objectives:

- To introduce the concept of integration of real-valued functions.
- To give a deep knowledge about the real valued function.
- To know about linear transformation.
- To solve the problems of differentiation of integrals.

Unit-I: Sequences and Series:

Sequences and Series of Functions: Discussion of Main problem - Uniform Convergence – Uniform convergence and continuity - Uniform convergence and Integration – Uniform convergence and differentiation – Equi continuous families of functions

Unit- II: The Stone-Weierstrass Theorem and some special functions:

The Stone-Weierstrass theorem and some special functions statement and proof - corollary - uniform closure -separate points -Power series - Taylor's series -The exponential and Logarithmic functions - The trigonometric functions- solving problems

Unit- III: The algebraic completeness of the complex field:

Introduction of algebraic completeness of the complex field-Fourier series-Trigonometric polynomial - Fourier coefficient - orthogonal -Bessel inequality - Dirichlet kernel - localization theorem - Parseval's theorem - The Gamma functions - Stirling's formula and Functions of several variables: Linear transformations- linear combination- Linear operators on X.

Unit -IV: Differentiation:

Differentiation introduction- Preliminaries- Differentiable- Partial derivatives -Directional derivative-The contraction principle - The inverse function theorem - The implicit function theorem -The rank theorem -null space, range - projections– Determinants - multiplication of theorem -Jacobians- Derivatives of higher order- second order partial derivatives

Unit -V: Differentiation of Integrals:

Differentiation of Integrals introduction- Mean value theorem and its examples-Integration of Differential forms: Integrations- examples -Primitive mappings-Partitions of unity-Change of variables-Differential forms- Stoke's theorem- examples- elementary properties- product of basic k- forms- differentiation-change of variables

Text Book:

1. **Walter Rudin,** "Principles of Mathematical Analysis", 3rd Edition, McGraw – Hill International Book Company, Singapore, 1982.

   Unit I: Chapter 7: 7.1 to 7.25

   Unit II: Chapter 7: 7.26 to 7.33 and Chapter 8: 8.1 to 8.7

   Unit III: Chapter 8: 8.8 to 8.22 and Chapter 9: 9.1 to 9.09

   Unit IV: Chapter 9: 9.10 to 9.41

   Unit V: Chapter 9: 9.42 to 9.43 and Chapter 10: 10.1 to 10.25

References Books:

1. **S. Kumaresan**, "Topology of Metric Spaces ", 2nd Edition, Narosa Publishing House, 2011.
2. **S. Ponnusamy**, "Foundations of Mathematical Analysis", Springer Birkhauser, 2012.
3. S. K. Mappa, Introduction to Real Analysis, 7th Edition, Sarat Book Distributors, Kolkatta, 2015
4. **Tom Apostol,** "Mathematical Analysis", Addison Wesley Publishing Company, London-1971.
5. **R. G. Bartle & D.R. Sherbert,** "Introduction to Real Analysis", John Wiley & Sons, New York, 1982.
6. **Kenneth A. Ross,** "Elementary Analysis: The theory of Calculus", Springer, New York, 2004.
7. **K. R. Stromberg,** "An Introduction to Classical Real Analysis", Wadsworth, 1981.

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO1: Investigate the ideas of continuity and inverse images of open and closed sets, functions continuous on compact sets – K2

CO2: Differentiate the concepts of connectedness and implement them on various sets – K3

CO3: Examine the derivatives of functions and apply few theorems based on it – K4

CO4: Investigate properties of monotonic functions – K5

CO5: Learn the properties of Riemann- Stieltjes integral – K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	S	M	S	S	S	S	S
CO4	S	M	S	S	S	S	M	M	S	S
CO5	S	S	M	S	S	S	M	S	S	M

S- Strong = 3, M-Medium = 2, L-Low = 1

COURSE CODE	P21MTT23	PARTIAL DIFFERENTIAL EQUATIONS	L	T	P	C
CORE- VIII			4	-	-	4

Objectives:

- Differential equations arise for many problems in oscillations of mechanical and electrical systems
- It plays a very important role in all modern scientific and engineering studies.
- To give an in-depth knowledge of differential equations and their applications.
- Solve the higher order differential equations in different types with initial and boundary conditions
- Use the method of separation of variables to reduce some partial differential equations to ordinary differential equations of 2nd order.
- To make the students to solve the practical problems used differential equations.

Unit - I: Partial Differential Equations:

Partial Differential Equations of the First Order: Origins of First order Partial Differential Equations – Linear Equations of First order – Compatible Systems of First order Equations – Char pit's Method - Special types of First order Equations – Solutions satisfying given conditions – Jacobi's Method.

UNIT-II: Second Order Partial Differential Equations:

Partial Differential Equations of the Second order **:** The origin of second order equations – Linear Partial Differential Equations with constant coefficients – Equations with Variable Coefficients – Characteristics Curves of Second order Equations – Separation of variables.

Unit -III: Wave Equation:

Introduction about Wave Equation - Elementary Solutions of the One – dimensional Wave Equation – General Solutions of the Wave Equation - Green's Function for the wave Equation – The Non homogeneous Wave Equation – Riesz's Integrals .problems in this method .

Unit- IV: Laplace and Diffusion Equation:

Laplace and Diffusion Equation introduction - Separation of variables – Elementary Solutions of the Diffusion Equation – Problems in this relevant Exercise. Separation of variables – Use of Green's Functions. Problems in the applications of Green's Functions

Unit -V: Boundary Value Problems:

Introduction of Boundary Value Problems - Eigen values- problems to find Eigen values - Eigen functions Problems using Eigen functions and the vibrating String - The Heat Equation – Sturm Liouville problems. Application in the real time problems.

Text Book:

1. **Ian.N.Sneddon,** "Elements of Partial Differential Equations", Dover Publications, INC, Mineola, Newyork.(2006)
2. **George F.Simmons,** "Differential Equations with Applications and Historical Notes", McGrawhill, Inc, Newyork.(1991)

Unit I: Chapter 2: Section 2.4,9,10,11,12,13 (TB: 1)
Unit II: Chapter 3: Section 3.1,4,5,6,9 (TB: 1)
Unit III: Chapter 5: Section 5.2,6,7,8,9 (TB: 1)
Unit IV: Chapter 4: Section 4.5 and Chapter 6: Section 6.3,4,5,6 (TB: 1)
Unit V: Chapter 7: Section 7.40, 41, 43 (TB: 2)

References Books:

1. **Williams E. Boyce and Richard C. Diprima** "Elementary Differential Equations and Boundary Value Problems " 10th edition John Wiley and Sons, New York 2012
2. **M.D. Raisinghania**, " Advanced Differential Equations ", S. Chand & Company Ltd., New Delhi 2012

Course Outcomes:

Upon the successful completion of the course, students will be able to**;**

CO1: recognize differential equations that can be solved by each of the three methods – direct integration, separation of variables and integrating factor method – and use the appropriate method to solve them – K2

CO2: use an initial condition to find a particular solution of a differential equation, given a general solution – K3

CO3: check a solution of a differential equation in explicit or implicit form, by substituting it into the differential equation – K4

CO4: understand the terms 'exponential growth/decay', proportionate growth rate' and 'doubling/halving time' when applied to population models, and the terms 'exponential decay', 'decay constant' and 'half- life' when applied to radioactivity – K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	M	S	S	S
CO2	S	M	S	S	S	M	M	M	M	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	S	S	S	S

S- Strong = 3, M-Medium = 2, L-Low = 1

COURSE CODE	P21MTT24	TOPOLOGY	L	T	P	C
CORE- IX			5	-	-	4

Objectives:

- Students will learn the fundamental concepts of point-set topology.
- Introduce students to the concepts of open and closed sets abstractly, not necessarily only on the real line approach
- Provide the awareness of tools to students to carrying out advanced research work in pure mathematics Course.

Unit- I: Topological Spaces and Continuous Functions:

Topological Spaces and Continuous Functions introduction-Topological spaces- Basis for a Topology- The order Topology- The Product Topology on X×Y- The subspace Topology – Closed sets and Limit points- theorems and examples-relation between interior of A and closure of A -Hausdorff spaces and theorems-Continuous Functions- homeomorphism with examples-The pasting lemma-The product Topology-definition of box and product topology-comparison of the box and product topology

Unit - II: Metric Topology and Connectedness:

Metric Topology definition- The Metric Topology- diameter-standard bounded metric-norm Uniform metric topology- Metrizable-The sequence lemma- Uniform limit theorem-Weierstrass M-test based on problems-Connectedness: Connected Spaces –proof of the theorems- Connected Subspaces of the Real line- Components and Local Connectedness.

Unit- III: Compactness:

Compactness introduction- Compact Spaces- open cover-theorems and examples –The Tube Lemma-finite intersection property with theorem-Compact subspaces of the Real Line-Extreme value theorem-the lebesgue number lemma-Uniform continuity theorem-Limit Point Compactness- sequentially compact-Local Compactness-one point compactification with proof of the theorems.

Unit - IV: Countability and Separation Axioms:

Countability and Separation Axioms introduction - The Separation Axioms- first and second countability axioms and theorems - Lindelof space - Sorgenfrey plane example-Normal Spaces and theorems- The Urysohn Lemma- The Urysohn Metrization Theorem - immbedding theorem

Unit -V: Extension Theorem:

Introduction about Extension Theorem- The Tietze Extension Theorem- The Tychonoff Theorems - The Stone-Cech Compactification- Metrization Theorems: Local finiteness-refinement-The Nagata-Smirov Metrization Theorem- Its relevant Exercise problems.

Text Book:

1. **James. R. Munkres,** "Topology: A first course", 2nd Edition, Prentice Hall of India Pvt Ltd, New Delhi. 2013

   Unit I: Chapter 2- Section: 12- Section 19

   Unit II: Chapter 2- Section: 20, 21 and Chapter 3-Section: 23- Section: 25

   Unit III: Chapter 3- Section: 26- Section 29

   Unit IV: Chapter 4- Section: 30- Section 34

   Unit V: Chapter 5- Section: 37, 38- Chapter 6: Section 39, 40, 9.1 to9.3

Reference Books:

1. **G.F. Simmons** "Introduction to Topology and modern Analysis", Tata McGraw Hill edition.
   B. Mendelson, "Introduction to Topology", CBS Publishers, Delhi, 1985.
2. **Size- Tsen Hu,** "Introduction to General Topology", Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1966.
3. **S. Lipschutz**, "General Topology", Schaum's Series, McGraw-Hill New Delhi, 1965.
4. **K. D. Joshi,** "Introduction to General Topology", New Age International Pvt. Ltd, 1983.
5. **J. L. Kelly**, "General Topology", Springer-Verlag, New York, 1975

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO1: know how the topology on a space is determined by the collection of open sets, by the collection of closed sets, or by a basis of neighbourhoods at each point.–K2.

CO2: know the definition and basic properties of connected spaces, path connected spaces, compact paces, and locally compact spaces – K3

CO3: know what it means for a metric space to be complete, and you can characterize compact metric spaces – K4

CO4: familiar with the Urysohn lemma and the Tietze extension theorem, and you can characterize metrizable spaces – K5

CO5**:** familiar with the construction of the fundamental group of a topological space and applications to covering spaces and homology theory – K5.

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	M	S	S	M	S
CO3	S	S	M	S	M	S	S	S	S	S
CO4	S	M	S	S	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	S	S	S

S- Strong = 3, M-Medium = 2, L-Low = 1

COURSE CODE	P21MTT25	OPTIMIZATION TECHNIQUES	L	T	P	C
CORE- X			5	-	-	4

Objectives:

- Ability to understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively;
- Provides a quantitative technique or a scientific approach for making better decisions for operations under the control.
- Use integer programming problem to solve system of linear equations.
- To provide the depth knowledge about inventory control theory and make students to solve the inventory problems.

Unit-I: Integer Programming:

Integer Programming introduction – Gomory's all Integer Programming Problem method - Construction of Gomory's Constraints - Fractional Cut Method - All integer- Fractional Cut Method - Mixed integer-Branch and Bound Method-Applications of Integer programming.

Unit-II: Dynamic Programming:

Dynamic Programming introduction – The Recursive equation approach-Characteristics of Dynamic Programming - Dynamic Programming Algorithm- Solutions of Discrete D.P.P-Some Applications- Solutions of L.P.P by Dynamic Programming.

Unit- III: Queueing Theory:

Queueing Theory introduction – Queueing System –Elements of Queueing System-Operating Characteristics of Queueing System – Probability distribution in Queueing System Classification of Queueing models –Definition of Transient and Steady States-Poisson Queueing System

Unit-IV: Non Linear Programming:

Non Linear Programming introduction - Formulation of Non - Linear Programming Problem(NLPP)- General Non Linear Programming problem- Constraints optimization with equality Constraints- Constraints optimization with inequality Constraints-Saddle point problems-Saddle points and NLPP.

Unit - V: Non Linear Programming Methods:

Non Linear Programming Methods introduction – Graphical Solution- Kuhn-Tucker Conditions with Non-Negative Constraints – Quadratic Programming –Wolfe's Modified Simples Methods-Beal's Method- Separable Convex Programming –Separable Programming Algorithm.

Text Book:

1. **Kanti Swarup, P.K. Gupta, Man Mohan,** "Operations Research", Sultan Chand & Sons, Educational Publishers, New Delhi.2013

   Unit – I: Chapter 7 Section 7.1-7.7
   Unit – II: Chapter 13- Sections 13.1-13.7
   Unit – III: Chapter 20- Sections 20.1-20.8
   Unit – IV: Chapter 24- Sections 24.1-24.7
   Unit – V: Chapter 25- Sections 25.1-25.8

Reference Books:

1. **Panneerselvam.R**, "Operations Research", 2nd Edition, PHI Learning Private Limited, Delhi, 2015
2. **Prem Kumar Gupta.Er, Hira.D.S**. "Operations Research", 7th Edition,S.Chand & Company Pvt.Ltd.2014
3. **Hiller.F.S & Lieberman.J** "Introduction to Operation Research ", 7th Edition, Tata–MCGraw Hill Publishing Company, NewDelhi, 2001.
4. **G. Srinivasan,** "Operations Research principles and applications", Second Edition, PHI Learning Private Limited, New Delhi-110001, 2012.

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO1: analyze the real-life systems with limited constraints – K2.
CO2: identify the mathematical nature of a given optimization problem – K3
CO3: analyze a range of classes of optimization problems – K4
CO4: identify solution methods for the optimization problems studied – K5
CO5: depict the systems in a mathematical model form – K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	M	S
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	S	S	M	S	S	S	S	S

S- Strong=3, M-Medium=2, L-Low = 1

SEMESTER -III

COURSE CODE	P21MTT31	COMPLEX ANALYSIS	L	T	P	C
CORE- XI			5	-	-	4

Objectives:

- To impart various concepts about the sequence and series, analytic functions in the complex plane.
- Provide deep knowledge about mapping and transformation and the learner will gain knowledge of power series of analytic function
- Learner will be proficient in applications of Cauchy's theorem
- To present students the elements and importance of the Complex analysis.
- To define and recognize the basic properties of the complex numbers.

Unit -I: Functions, Limit, and Continuity:

Functions, Limit, and Continuity introduction- Sequence and series –Concepts of limits and continuity- continuous and discontinuous function- Examples- Stereographic projection – Rieamann's Sphere- limit at infinity-– sequence and series of function- uniform convergence of sequence and series of functions with examples- Weiestrass's M- test Theorem.

Unit -II: Analytic Functions and Power Series:

Analytic Functions and Power Series introduction- Differentiability and Cauchy-Riemann equations – complex differentiable- analytic or holomorphic -Harmonic functions – Finding harmonic conjugates - power series as an Analytic functions –root test and ratio test – Exponential and Trigonometric functions – Periodic function

Unit -III: Complex Integration:

Complex Integration introduction -Plane – properties of complex line integrals – Weak form of Cauchy's Theorem – Cauchy - Goursat Theorem – Cauchy's Theorem for a Disk- Cauchy's integral Theorem and Examples – Consequence of simply connectivity – simply connected – Winding number –Homotopy version of Cauchy's theorem

Unit -IV: Mapping and Transformation:

Mapping And Transformation introduction -Cauchy integral formula and theorems - Gauss Mean value Theorem –Cauchy's inequality and examples - Morera's theorem. Existence of Harmonic Conjugate –Taylor's Theorem and Examples –Zeros of Analytic functions - Identity theorem- Laurent serious –Laurent Theorem –Principle of conformal mapping.

Unit -V: Maximum Principle:

Maximum Principle and Schwarz' Lemma – Liouville's Theorem: Maximum Modulus principle – Hadamard's Three circles/lines theorem – Schwarz' Lemma and its consequence- Liouville's Theorem- Meromorphic Functions - Infinite sums and Meromorphic functions-Infinite products of Complex numbers.

Text Book:

1. **S.Ponnusamy, "**Foundations of Complex Analysis", 2rd Edition, Narosa Publishing House Ltd, Chennai, 2005.
   Unit I - Chapter 1: 1.6 and Chapter 2: 2.2 – 2.4
   Unit II – Chapter 3: 3.1 – 3.4
   Unit III - Chapter 4: 4.1 – 4.6
   Unit IV- Chapter 4: 4.7 –4.12 and Chapter 5: 5.1
   Unit V – Chapter 6: 6.1 – 6.4 and Chapter 11: 11.1-11.2

Reference Books:

1. **John B. Conway —**"Function of one Complex Variable" 2nd Edition, Springers International Students Edition. 2012
2. **Karunakaran,** "Complex Analysis", Narosa Publishing House, New Delhi, 2002.
3. **R.V. Churchill & J. W. Brown,** "Complex Variables & Applications", Mc.Graw Hill,1990.
4. **John. B. Conway,** "Functions of One Complex Variable", Narosa Pub. House, 2002.
5. **Lars V. Ahlfors,** "Complex Analysis", Third Ed. McGraw-Hill Book Company, Tokyo, 1979.

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO1: explain and apply Cauchy's integral formula and some of its consequences – K2

CO2: explain the convergence of power series and develop analytical capabilities in Taylor or Laurent series in a given domain – K3

CO3: define the fundamental concepts of complex numbers and its properties, Exponential, logarithmic, trigonometric and hyperbolic complex functions – K4.

CO4: describe Holomorphic and harmonic complex functions and list different examples – K5

CO5**:** state Complex integral on a path – Cauchy theorem and Cauchy integral formula name zeros and singularities of a Complex function and the residue theorem – K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S	S	S	S	M	S
CO2	S	S	S	S	S	M	S	S	S	S
CO3	S	S	M	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	M	S	S	S
CO5	S	S	M	S	S	M	S	S	S	S

S- Strong = 3, M-Medium=2, L-Low = 1

COURSE CODE	P21MTT32	MEASURE THEORY	L	T	P	C
CORE- XII			5	-	-	4

Objectives:

- Understand the concepts of outer measures and integrals
- Provide the relationship between Riemann and Lebesgue integral
- Learner will be derive integration and derivates by using Radon-Nikodym Theorem and Fubini's Theorem
- Gain understanding of the abstract measure theory and definition and main properties of the integral.
- To construct Lebesgue's measure on the real line and in n-dimensional Euclidean space.
- To explain the basic advanced directions of the theory.

Unit- I: Lebesgue Measure:
Lebesgue Measureintroduction- Lebesgue Outer Measure – Measurable Sets Regularity Measurable Functions – every interval is measurable- Borel set- outer measure of interval equals it's length- regular measure- Borel and Lebesgue Measurability

Unit-II: Borel and Lebesgue Measure:
Borel And Lebesgue Measure introduction– Hausdorff measures on the Real Line – Hausdorff Dimension - Integration of non-negative Functions -Fatou's Lemma-Lebesgue's Monotone Convergence Theorem – General Integral – Lebesgue's Dominated Convergence Theorem - Integration of series – Riemann and Lebesgue Integral

Unit-III: R-S Integral:
R-S Integral introduction- Abstract Measures space – Measures and Outer Measures- Extension of a Measure – Uniqueness of Extension - Completion of a Measure – Measure Spaces – Integration with respect to a Measure – L^p Spaces – Convex Functions –Jensen's Inequality – Completeness.

Unit-IV: Signed Measure:
Signed Measure introduction - Signed Measure and the Hahn Decomposition - Definition of Positive Set, Negative Set, Null Set– the Jordan Decomposition –Definition of Mutually singular– Radon-Nikodym Theorem – Some Application of The Radon-Nikodym Theorem – Randon-Nikodym derivation –Lebesgue Decomposition Theorem

Unit- V: Measurability in a Product Space:
Measurability in a Product Space introduction – Definition of Measurable Rectangle and Elementary Sets- Fubini's Theorem– The Product Measure and Fubini's Theorem -Definition of Monotone Class- Fubini's Theorem – Theorem on Fubini's Theorem

Text Book:

1. **G.De Barra,** "Measure Theory and Integration", 1st edt, New age international (p) Limited, 2003
   Unit – I: Chapter II: Sections 2.1 to 2.5
   Unit – II: Chapter III: Sections 3.1 to 3.4
   Unit – III: Chapter V: Sections 5.1 to 5.6
   Unit – IV: Chapter VII: Sections 7.1 and 7.2, Chapter VIII: Sections 8.1 and 8.2
   Unit – V: Chapter X: Sections 10.1 and 10.2

Reference Books:

1. **P.R. Halmos,** "Measure Theory", D.VanNostrand Company, Inc. Princeton, N.J., 1950
2. **H.L.Royden** "Real Analysis", Prentice Hall of India 2001 edition.
3. **I.K. Rana,** "An Introduction to Measure and Integration", Narosa Publishing House, NewDelhi, 1999
4. **D.L. Cohn,** "Measure Theory", Birkhauser, Switzerland, 1980

Course Outcomes:

CO	CO Statement	Knowledge Level
CO1	Understanding the basic concepts of the definition of general Lebesque integral.	K2
CO2	Derives the concepts of Borel sets, measurable functions, differentiation of monotone functions	K3
CO3	Demonstrate statement of main results in fundamental integral theorems, monotone convergence theorem, and its related proves and results.	K4
CO4	Demonstrate the proof in integration in product spaces and signed measures.	K5
CO5	Apply the theory of this course to solve real problems in difficult situations.	K6

K1- Remember: K2- Understand: K3-Apply, K4 - Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	M	S	S	M

S- Strong = 3, M-Medium = 2, L-Low = 1

COURSE CODE	P21MTT33	DIFFERENTIAL GEOMETRY	L	T	P	C
CORE- XIII			4	-	-	4

Objectives:

- To introduce space curves, surfaces and its properties.
- The learner will acquire knowledge in problem solving in curves and surfaces in geometrical approach.
- To make the students to solve the problems in planes, surface in curves, geodesic equations and geodesic curvatures.

Unit - I: Representation and Theory of Space Curves:

Representation and theory of Space Curves introduction-Representation of space curves-Unique parametric representation of a space curve- Arc length - tangent and osculating plane - principal normal and binormal - curvature and torsion - contact between curves and surfaces - osculating circle and osculating sphere - locus of centres of spherical curvature.

Unit- II: Evolutes of a Plane and Space Curve:

Evolutes of a Plane and Space Curveintroduction- Tangent surfaces - Involutes and evolutes Betrand curves - Spherical indicatrix - Intrinsic equations of space curves – Fundamental existence theorem for space curves - Helices.

Unit-III: The First Fundamental Form and Local Intrinsic Properties of a Surface:

The First Fundamental Form and Local Intrinsic Properties of a Surface introduction-Definition of a surface - Nature of points on a surface - Representation of a surface - Curves on surfaces - Tangent plane and surface normal - The general surfaces of revolution – Helicoids - Metric on a surface - The first fundamental form - Direction coefficients on a surface.

Unit- IV: Families of curves:

Families of curves introduction-- Orthogonal trajectories - Double family of curves – Isometric correspondence - Intrinsic properties - Geodesics on a surface: Geodesics and their differential equations - Canonical geodesic equations - Geodesics on surface of revolution - Normal property of geodesics - Differential equations of geodesics using normal property.

Unit-V: Existence Theorems:

Existence theorems proof- Geodesic parallels - Geodesic polar coordinates – Geodesic curvature - Gauss-bonnet theorem-Meusnieu's theorem-Gaussian curvature Euler's theorem-Duplin's indicarix-Surface of revolution conjugate system-Asymptric lines-isometric lines.

Text Book:

1. **D. Somasundaram,** "Differential Geometry: A first course", Narosa Publishing House, New - Delhi, India, 2005.

Unit I: Sections 1.2-1.7, 1.10-1.12
Unit II: Sections 1.13-1.18
Unit III: Sections 2.2-2.10
Unit IV: Sections 2.11-2.15, 3.2-3.6
Unit V: Sections 3.7-3.12

Reference Books:

1. **T.J. Willmore**, "An Introduction to Differential Geometry", Oxford University Press,New Delhi, 2006.
2. **J. N. Sharma & A. R. Vasistha**, "Differential Geormetry", KedarNath Ram Nath, Meerut, 1998.
3. **Dirk J. Struik:** "Lectures on Classical Differential Geometry" (second edition), Addison Wesley Publishing Company.

Course Outcomes:

CO	CO Statement	Knowledge Level
CO1	Understand planes, spaces curves, arc, nature of points, geodesic concepts	K2
CO2	Prove theorems planes, surfaces, Identification of important types of curves in surfaces, including principal curves, asymptotic curves and geodesics using fundamental existence theorem for space curves	K3
CO3	Enumerate some standard examples in geometry, such as surfaces of constant Gaussian curvature, compact and non - compact surfaces, and surfaces of revolution	K4
CO4	Evaluate Gaussian and mean curvatures using variety of methods including patch computations .Differential equations of geodesics using normal property	K5
CO5	Apply/Create real time situation.	K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	M	M	S	L	S	S	M	S	S	S

S- Strong = 3, M-Medium = 2, L-Low = 1

COURSE CODE	P21MTT34	CLASSICAL DYNAMICS	L	T	P	C
CORE- XIV			4	-	-	4

Objectives:

- To develop familiarity with the physical concepts and facility with the mathematical methods of classical dynamics
- To represent the equations of motion for complicated mechanical systems using the Lagrangian and Hamiltonian formulation of classical dynamics

Unit-I: Introductory Concepts:

Introductory Concepts introduction- The mechanical system-Equations of motion-Units -Generalised Coordinates -Degrees of freedom -Generalized Coordinates-Configuration space-Examples- constraints -holonomic constraints - non-holonomic constraints -Unilateral constraints-virtual work-virtual displacement-Principle of virtual work- D'Alembert's principle- Generalized forces-Examples - Energy and momentum-Potential energy-Work and kinetic energy-Conservation of energy-Equilibrium and stability-Kinetic energy of a system-Angular momentum-Generalized momentum-Examples.

Unit-II: Lagrange's Equation:

Lagrange's Equation introduction- Derivation and examples -Kinetic energy-Lagrange's equation-From of the equations of motion-Nonholonomic systems- Integrals of the Motion-Ignorable coordinates-the Kepler problem -Routhian function-Conservative system -Natural systems-Liouville's system-Examples.

Unit-III: Hamilton's Equations:

Hamilton's Equations introduction-Hamilton's principle-Stationary values of a function -Constrained stationary values-Stationary value of a definite integral-The brachistochrone problem-Examples-Geodesic path - Hamilton's equations -Derivation of Hamilton's equation-The form of the Hamiltonian function-Legendre transformation-Examples- Other variational principles -Modified Hamilton's principle-Principle of least action- phase space-Trajectories -Extended phase space -Liouville'theorem.

Unit-IV: Hamilton - Jacobi Theory:

Hamilton - Jacobi Theory introduction- Hamilton's Principal Function-The canonical integral -Pfaffian forms – The Hamilton - Jacobi equation-Jacobi's theorem-Conservative systems and ignorable coordinates-Examples– Separability- Liouville's system-Stackle's theorem -Examples.

Unit-V: Canonical Transformations:

Canonical Transformations introduction -Differential forms and Generating functions-Canonical transformations-Principal forms of generating function-Further comments on the Hamilton-Jacobi method -Examples – Special Transformations -Some simple transformation -Homogeneous canonical transformation-Point transformations-Momentum transformations -Examples– Lagrange and Poisson Brackets-Lagrange brackets-Poisson brackets-The bilinear covariant -Examples.

Text Book:

1. **Donald T. Greenwood**, "Classical Dynamics", PHI Pvt. Ltd., New Delhi, 1985.
   Unit I - Chapter: 1.1-1.5
   Unit II - Chapter: 2.1-2.4
   Unit III - Chapter: 3.1, 3.2 and 3.4 (3.3 Omitted)
   Unit IV - Chapter: 4.1-4.4
   Unit V - Chapter: 5.1-5.3

Reference Books:

1. **H. Goldstein,** "Classical Mechanics", (2nd Edition), Narosa Publishing House, New Delhi, 1998.
2. **John L Synge and Byron A Griffith**, "Priniciples of Mechanics", McGraw-Hill, New York, 1959.
3. **Narayan Chandra Rana &Promod Sharad Chandra Joag,** "Classical Mechanics", Tata McGraw Hill, 1991.

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO1: solve the Lagrange's equations for simple configurations using various Methods – K2

CO2: understand the concept of Hamilton Jacobi Theory – K3

CO3: understand the concept canonical Transformations – K4

CO4: develop skills in formulating and solving physics problems – K5

CO5: get idea of dynamical systems are of relatively recent origin, the concept of motion in phase- space and its geometrical depiction is simple – K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	S	M	S	S	S	S	S
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	M	S	S
CO4	S	M	S	S	S	S	S	S	S	S
CO5	S	S	S	S	M	M	S	M	S	S

S- Strong =3, M-Medium = 2, L-Low = 1

COURSE CODE	P21MTT35	CALCULUS OF VARIATIONS AND INTEGRAL EQUATIONS	L	T	P	C
CORE- XV			5	-	-	4

Objectives:

- To introduce the concept of maxima, and minima functions al for family of curves of unknown functions.
- To give a knowledge about separable equations, fundamental lemmas of calculations variation, Fredholm integrals, Volterra integral equation and make students to solve the problems.
- To study linear/non integral problems and methods of successive approximations.
- To solve problems in the field of extremals, Jacobi conditions, Legendre condition, transforming equations, conditional/unconditional integral equations.

Unit-I: The Method of Variations in Problems with Fixed Boundaries:
The method of variations in problems with fixed boundaries introduction -Variation and its properties - Euler's equation - Functional of the form $\int F(x,y_1,y_2,\ldots y_n, y_1',y_2',\ldots y_n')\,dx$. Functional dependent on higher order derivatives - Functionals dependent on the functions of several independent variables - Variational problems in parametric form - Some applications.

Unit-II: Conditions for an Extremum:
Sufficient conditions for an Extremum: Field of extremals - The function E(x,y,p,y') - Transforming the Euler equations to the canonical form- Extremals with Corners .- One-Sided Variations - Problems - An elementary Problem with Moving Boundaries.

Unit-III: Direct Methods in Variational Problems:
Direct Methods in Variational Problems introduction-Direct methods - Euler's finite difference method - The Ritz method - Kantorovich's method.

Unit -IV: Integral Equations:
Linear Integral Equations: Definition, Regularity conditions – special kind of kernels – Eigen values and Eigen functions – convolution Integral – the inner and scalar product of two functions – Notation – reduction to a system of Algebraic equations – examples – Fredholm alternative - examples – an approximate method

Unit -V: Successive Approximations:
Method of Successive Approximations: Iterative scheme – examples – Volterra Integral equation – examples – some results about the resolvent kernel. Classica l Fredholm Theory: the method of solution of Fredholm – Fredholm's first theorem – Fredholm's second theorem – Fredholm's third theorem.

Text Books:

1. L.**Elsgolts,** "Differential equations and the calculus of variations", MIR publishers, Moscow 1970.

   Unit – I Chapter 6
   Unit – II Chapter 8
   Unit – III Chapter 10

2. **Ram.P.Kanwal**, "Linear Integral Equations Theory and Practice", Academic Press 1971.

   [1] Unit – IV Chapters 1 and 2
   Unit – V Chapters 3 and 4

Reference Books:

1. **S.J. Mikhlin,"** Linear Integral Equations" (translated from Russian), Hindustan Book Agency, 1960.
2. **I.N. Snedden,** "Mixed Boundary Value Problems in Potential Theory", North Holland, 1966.

Course Outcomes:

CO	CO Statement	Knowledge Level
CO1	Demonstrate to understand competence with the basic ideas of The Method of Variations in Problems with fixed Boundaries, and unknown functions are in integral equations	K2
CO2	Develop and solve problems in integral equations , special kind of equation for several independent variables	K3, K4
CO3	Analyse Parametric forms with moving boundaries and other problems and kernel for integral equations	K4
CO4	Apply Euler's finite difference method ,The Ritz method and Kantorovich's method in Vibrational Problems, and in the field of extremely	K6
CO5	Evaluate the extremals of functionals , solving applied problems , Solve differential and integral equations Compose clear and accurate proofs using the concepts of reduction to a system of Algebraic equations	K4,K5, K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	M

S- Strong =3, M-Medium = 2, L-Low = 1

COURSE CODE	P21MTT36	FUNCTIONAL ANALYSIS	L	T	P	C
CORE- XVI			5	-	-	4

Objectives:

- To introduce three structure theorems of Function as Hahn – Banach theorem, open mapping theorem and uniform boundedness principle from Hilbert space.
- To study the finite dimensional spectrum theory.

Unit-I: Banach Spaces

Banach Spaces introduction - The definitions and some examples-Continuous linear transformations-The Hahn-Banach Theorem- The Natural imbedding of N in N^{**}- The Open mapping theorem and closed graph theorem-The conjugate of an operator-properties of conjugate of an operator.

Unit-II: Hilbert Spaces:

Hilbert Spaces introduction- The definitions and some simple properties-orthonormal bases-orthogonal Complements-orthonormal sets-The Conjugate Space H^* - The Adjoint of an operator-Self-adjoint operators-Normal and Unitary operators.

Unit-III: Spectral Theory:

Finite-Dimensional Spectral Theory: Matrices -Basic operations of matrices-determinants and the spectrum of an operator -The spectral theorem for operators on a finite dimensional Hilbert space- - A survey of the situation

Unit -IV: Banach Algebras:

General preliminaries on Banach Algebras: The definition and some examples-Regular and singular elements in Banach algebra-Topological divisors of zero-The Spectrum of an element in a Banach algebra-The formula for the spectrum radius-The radical and semi-simplicity.

Unit-V: The Structure of Commutative Banach Algebras:

The Structure of Commutative Banach Algebras introduction- The Gelfand mapping – Applications of the formula r(x) = lim || xn ||1/n - Involutions in Banach Algebras – The Gelfand-Neumark theorem.

Text Book:

1. **G.F.Simmons** "Introduction to Topology and Modern Analysis" ,Tata McGraw Hill Edn, 2004.

   Unit I: Chapter 9
   Unit II: Chapter 10
   Unit III: Chapter 11
   Unit IV: Chapter 12
   Unit V: Chapter 13

Reference Books:

1. B. V. Limaye, Functional Analysis, Revised Third Edition, New Age International, 2017.
2. M. Thamban Nair, Functional Analysis - A First Course, Prentice Hall of India, 2010.
3. S. Ponnusamy, Foundations of Functional Analysis, Narosa Publishing House, 2002.
4. S. Kesavan, Functional Analysis, TRIM series, Hindustan Book Agency, New Delhi, 2009.
5. Rajendra Bhatia, Lectures on Functional Analysis, TRIM series, Hindustan Book Agency, New Delhi, 2009.

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO	CO Statement	Knowledge Level
CO1	Describe properties of normed linear spaces and construct examples of such spaces	K2
CO2	Apply basic theoretical techniques to analyze linear functionals and operators on Banach and Hilbert spaces.	K3
CO3	Apply Finite-Dimensional Spectral Theory survey of the situation	K4
CO4	Apply theorems to do problems	K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	M	S
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S

S- Strong=3, M-Medium=2, L-Low = 1

SEMESTER –IV

COURSE CODE	P21MTE411	CHOICE -I	L	T	P	C
ELECTIVE -I		NUMBER THEORY	4	-	-	4

Objectives:

- To expose the students to the charm, niceties and nuances in the world of numbers.
- To highlight some of the Applications of the Theory of Numbers.
- The Learner will gain deep knowledge to solve the problems on algebraic number theory.
- The Learner will be know the various type of equations

Unit- I: Arithmetical Functions and Dirichlet Multiplication:

Arithmetical Functions and Dirichlet Multiplication introduction- The Möbius function - Euler totient function - a relation connecting ϕ and μ - a product formula for $\phi(n)$ - the Dirichlet product of arithmetic functions - Dirichlet inverses and the Mobius inversion formula - the Mangoldt function - Multiplicative function - multiplicative functions and Dirichlet Multiplication - The inverse of a completely multiplicative function - Liouville's function - The divisor functions – Generalised convolutions - Formal Power series - The Bell series of an arithmetical function - Bell Series and Dirichlet multiplication - derivatives of arithmetical functions - The Selberg identity.

Unit -II: Averages of Arithmetical Functions:

Averages of Arithmetical Functions introduction- The big oh notation - asymptotic equality of functions - Euler's summation formula-Some elementary asymptotic formulas - average order of d(n) - average order of the divisor functions $\sigma_\alpha(n)$ - average order of $\phi(n)$ - an application to the distribution of lattice points visible from the origin - average order of $\mu(n)$ and of $\Delta(n)$ - the partial sums of a Dirichlet product - applications to $\mu(n)$ and $\Lambda(n)$ - another identity for the partial sums of a Dirichlet product

Unit- III: Congruences:

Introduction about Congruences- Definition and basic properties of Congruences - Residue classes and complete residue system - Linear congruences - reduced residue systems and the Euler - Fermat theorem - polynomial congruences modulo p - Langrange's theorem - applications of Lagrange's theorem - Simultaneous Linear Congruences: The Chinese remainder theorem - applications of the Chinese remainder theorem - Polynomial congruences with prime power moduli - the principle of cross classification - a decomposition property of reduced residue systems.

Unit- IV: Quadratic Residues and Quadratic Reciprocity Law:

Quadratic Residues and Quadratic Reciprocity Law introduction**:** Quadratic residues - Legendre's symbol and its properties - evaluation of (-1/p) and (2/p) - Gauss' Lemma - the quadratic reciprocity Law - applications of the reciprocity law - the Jacobi symbol - Applications to Diophantine equations.

Unit- V: Partition Function:
Partition Function introduction Partitions – Definition- Example -Graphs - Formal power series- Definition- Example - Euler's identity - Definition- Example -Euler's formula- Definition- Example -Jacobi's formula - Definition- Example- a divisibility property- Definition- Example-Exercise problems.

Text Books:

1. **Tom M. Apostol**, "Introduction to Analytic Number Theory", Springer International Student Edition, 1998.
2. **Niven Herbert S. Zuckerman,** "Introduction to the Theory of Numbers", Wiley Eastern University Edition, 1984

Unit I :	:	Chapter 2 Section 2.2 - 2.19 (Book 1)
Unit II :		Chapter 3 Section 3.2 - 3.12 (Book 1)
Unit III:		Chapter 5 Section 5.1 - 5.11 (Book 1)
Unit IV:		Chapter 9 Section 9.1- 9. 8 (Book 1)
Unit V:		Chapter 10 Section 10.1-10.6 (Book 2)

Reference Books:

1. "Elementary Number Theory", **David M Burton,** Seventh edition. https://www.pdfdrive.com/elementary-number-theory-7th-ed-by-david-m-burton-e58704232.html
2. "Basic Number Theory"**, S. B. Malik**, First edition, 1998. https://www.madrasshoppe.com/basic-number-theory-sb-malik-9780706987492-9834.html

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO	CO Statement	Knowledge Level
CO1	Demonstrate factual knowledge including the mathematical notation and terminology of number theory	K2
CO2	Construct mathematical proofs of statements and find counterexamples to false statements in Number Theory.	K3
CO3	Apply theoretical knowledge to problems of computer security	K4
CO4	Analyze the logic and methods behind the major proofs in number theory.	K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	**PO4**	**PO5**	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S

S- Strong =3, M-Medium=2, L-Low = 1

COURSE CODE	P21MTE412	CHOICE -II	L	T	P	C
ELECTIVE -I		AUTOMATA THEORY	4	-	-	4

Objectives:

- To make the students to understand the nuances of Automata and Grammar.
- To explain various types of automata and grammar.
- Introduce the fundamental concepts of formal languages, grammars and automata theory.
- Identify different formal language classes and their relationships
- To make them to understand the applications of these techniques in computer science.

Unit-I: Finite Automata and Regular Expressions:

Finite Automata and Regular Expressions introduction- Definitions and examples - Additional forms of Proof – Inductive Proofs- Deterministic and Non deterministic finite Automata - Finite Automata with – moves- Finite Automata with Epsilon Transitions.

Unit-II: Context Free Grammar:

Context Free Grammar introduction- Regular expressions and their relationship with automation - Proving Languages not to be regular – Closure Properties of Regular Languages – Equivalence and Minimization of Automata- Grammar - Ambiguous and unambiguous grammars - Derivation trees – Chomsky Normal form

Unit-III: Pushdown Automaton:

Pushdown Automaton introduction- Parse Trees – Ambiguity in Grammars and Language- Pushdown Automaton - Definition and examples - Relation with Context free languages- Equivalence of Pushdown Automata and CFG, Deterministic Pushdown Automata.

Unit- IV: Finite Automata and Lexical Analysis:

Finite Automata and Lexical Analysis introduction**:** Role of a lexical analyzer - Minimizing the number of states of a DFA - Implementation of a lexical analyzer.

Unit -V: Basic Parsing Techniques:

Basic Parsing Techniques: Parsers introduction - Bottom up Parsers - Shift reduces - operator precedence - Top down Parsers - Recursive descent - Predictive parsers.

Text Books:

1. **John E. Hopcroft and Jeffrey D. Ullman**, "Introduction to Automata theory, Languages and Computations", Narosa Publishing House, Chennai, 2000.
   Unit I: Chapter 2: Sections2.1-2.4,
   Unit II: Chapter 2, Section 2.5, Chapter 4, Sections 4.1-4.3, 4.5, 4.6 and
   Unit III: Chapter 5: Section 5.2, 5.3
2. **A.V. Aho and Jeffrey D. Ullman,** "Principles of Compiler Design", Narosa Publishing House, Chennai, 2002.
   Unit IV: Chapter 3: Section 3.1-3.8 and
   Unit V: Chapter 5: Section 5.1-5.5

Reference Books:

1. **John . E. Hopcraft, Rajeev Motwani and Jeffrey D. Ullman**, "Introduction to Automata Theory, Languages and Computationc", Pearson Education, 2013
2. **Kenneth H. Rosen**, "Discrete Mathematics and it's Applications", 7th Edition/ McGraw Hill Education, New York, 2012
3. **B.S.Vatssa**, "Discrete Mathematics",WISHWA PRAKASHAN,1993.
4. **V.Sundaresan,K.S.Ganapathy Subramanian, K.Ganesan**, "Discrete Mathematics", A.Rd.Publications, 1998.
5. **T.Veerarajan**, "Discrete Mathematics", McGraw Hill Education (India)Pvt.Ltd,New Delhi, 2014.
6. **Harry R. Lewis and Christos H. Papadimitriou**, "Elements of the Theory of Computation", Second Edition, Prentice Hall, 1997.
7. **A.V. Aho, Monica S. Lam, R. Sethi, J.D. Ullman,** "Compilers: Principles, Techniques and Tools", Second Edition, Addison-Wesley, 2007.

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO1: acquire a fundamental understanding of the core concepts in automata theory and formal languages – K2

CO2: design grammars and automata (recognizers) for different language classes – K3

CO3: identify formal language classes and prove language membership properties – K4

CO4: prove and disprove theorems establishing key properties of formal languages and automata – K5

CO5: solve the sums based on automata and grammar – K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	M
CO2	S	S	S	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	M	S	M	S	S	S

S- Strong =3, M-Medium = 2, L-Low = 1

COURSE CODE	P21MTE413	CHOICE -III	L	T	P	C
ELECTIVE -I		PROBABILITY THEORY AND STATISTICS	4	-	-	4

Objective:

- To learn the advanced theory of possibility and distributions and Estimations.
- To understand the concepts of probability and its properties.
- The learner identifying situations where one-way ANOVA and Latin square

Unit- I: Theory of Probability:

Theory of Probability introduction- Axiomatic approach to axioms of Probability, Conditional probability –Multiplicative law of Probability-Total probability and Baye's theorem – Independent events. Discrete random variable - continuous random variables – Properties of distribution function-Function of random variable- Two-dimension random variable - Marginal Probability Distributions –Conditional Probability Distributions- independent random variables.

Unit-II: Moment Generating Function:

Mathematical Expectations introduction- Expectation, functions of a random variable, properties of expected values – Moment Generating Function: Moments -Moment Generating Function and properties - Characteristic Functions: Probability Generating Function- Correlation: properties of correlation coefficient – Regression: properties of regression co-efficient –Multiple and Partial Correlation: relation between Multiple and partial Correlation Coefficients.

.

Unit-III: Distributions:

Introduction about Distributions: Geometric Distribution - Memoryless property of geometric distribution -The Normal Distribution - Uniform Distribution – Exponential Distribution – Gamma Distributions - Beta Distributions- Sampling distribution - Chi Square, t, F Distribution – Students t Distribution – F-Distribution

Unit-IV: Estimation:

Estimation introduction- Concepts of Point and Interval Estimator –Efficiency - Consistent Estimator –Sufficient Estimator – Properties of Estimator –invariance property of consistent estimator – method of Maximum Likelihood Estimators-Minimum chi square Estimator.

Unit-V: Classifications and types:

Classifications: One way and two way classification -ANOVA- design of Experiments: Experimental Units –basic principles in the design of Experiments- Completely block designs - Completely Randomized Design -Randomized Block design – Latin square designs- analysis of Latin square designs- merits and demerits of Completely Randomized Design - merits and demerits of Random Block design and Latin square design –Factorial Experiments.

Text Book:

1. **P.R.Vital ,** "Mathematical Statistics", Margham publications, Edition 2012.
   Unit I - Chapter 1: 1.4 – 1.48 and Chapter 2 : 2.1 – 2.33
   Unit II- Chapter 3: 3.1 – 3.18, Chapter 5, Chapter 6, Chapter 8, Chapter 9 and Chapter 11
   Unit III- Chapter 15, Chapter 16, Chapter 17, Chapter 18, Chapter 19,Chapter 20, and Chapter 2
   Unit IV- Chapter 23 Unit V -Chapter 26 and Chapter 28.

Reference Books:

1. **Robert V. Hogg & Allen T. Craig,** "Introduction to Mathematical Statistics", 5th Edition, Pearson Education, Singapore, 2002.
2. **Irwin Miller &Marylees Miller, John E. Freund's** "Mathematical Statistics", 6th Edition, Pearson Education, New Delhi, 2002.
3. **John E. Freund**, "Mathematical Statistics", 5 th edition, Prentice Hall India, 1994.
4. **S.M. Ross,** "Introduction to Probability Models", Academic Press, India, 2000.

Course Outcomes:

CO	CO Statement	Knowledge Level
CO1	Demonstrate the basic concepts of statistics, probability and random variables	K2
CO2	Apply the concepts in finding the moments of the distributions.	K3
CO3	Identify the type of the distribution and estimation	K4
CO4	Understand the basics of sampling distribution theory	K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping With Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S

S- Strong =3, M-Medium=2, L-Low = 1

COURSE CODE	P21MTE414	CHOICE -IV	L	T	P	C
ELECTIVE -I		ASTRONOMY	4	-	-	4

Objectives:

To acquire the knowledge about the celestial objects and planets.

- Develop skills to design observing projects with research telescopes and projects drawing
- upon data in the literature and in archives.
- To be familiar with the appearance of a range of common astronomical objects, such as asteroids, comets, satellites, planets, stars, and galaxies.

Unit I: Spherical trigonometry:

Spherical trigonometry (only the four formulae) Celestial sphere – Four systems of coordinates Conversion of Coordinates- Diurnal Motion -Sidereal time – West Hour angle of a body expressed in time units and Azimuth at rising – Latitude of a Place –Morning and Evening Stars- Circumpolar star

Unit II: The Earth

The Earth – Zones of the earth – Perpetual Day and Perpetual Night – Terrestrial latitude and Longitude – Date Line – Shape of Earth – Dip of Horizon - Effects of Dip Twilight-, Duration of Twilight, Twilight throughout night, Shortest Twilight, Civil, nautical and astronomical twilights

Unit III: Refraction:

Refraction – Tangent Formula, Constant of Refraction , Refraction on Horizontal and Vertical Arcs – Refraction of any Arc, Cassini's Formula, Horizontal Refraction, Geocentric parallax –Horizontal Parallax - Effect of Geocentric Parallax on Right Ascension and Declination – Angular Diameter – Geocentric Parallax and Refraction

Unit IV : Kepler's Laws of planetary Motion:

Kepler's Laws – Kepler's Laws of planetary Motion – Longitude of Perigee – Forward motion of the apse line – Eccentricity of Earth orbit – Newton's Law of Gravitation – Newton's deductions from Kepler's Law –Mean Anomaly –Geocentric and Heliocentric latitudes and longitudes

Unit V: Eclipses

Eclipses introduction – Umbra and Penumbra -Lunar Eclipse – Solar eclipse – Condition for a Lunar Eclipse – Synodic period of nodes Ecliptic Limits – Maximum and minimum number of eclipses near a node in a year – Saros of Chaldeans – Eclipses Seasons – duration of Lunar and solar eclipses- Importance of total solar eclipses

Text Book:

1. **S,Kumaravelu. & Susheela Kumaravelu** "Astronomy for Degree classes", Rainbow Printers, Nagercoil, 2000.

Reference Books:

1. **V.B.Bhatia** , "Text book for Astronomy and Astrophysics with elements of Cosmology", 2 nd Edition, Narosa Publishing House, New Delhi, 2001.
2. **Subramanian, K., Subramanian, L, V,.Venkatraman,.& Brothers** "A text book of Astronomy," (1st Edition). Educational Publishers (1965)
3. **Daniel Fleish ., Julia Kregenow "**Mathematics of Astronomy ",(1st Edition). Cambridge University Press, New York -.(2013)
4. **Jean Meeus** "More Mathematical Astronomy morsels ",(1st Edition).Willmann Bell Publishing,(2002).

Course Outcomes (CO):

CO	CO Statement	Knowledge Level
CO1	Defining about the observed properties of physical systems that comprise the known universe	K1
CO2	Demonstrate their ability to read, understand, and critically analyze the astronomical/physical concepts.	K2
CO3	Applying their physics and mathematical skills to problems in the areas of planetary science.	K3
CO4	Analyze to draw valid scientific conclusions and communicate those conclusions in a clear and articulate manner	K4

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping With Programme Outcomes

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	M	S	S	S	S

S- Strong =3, M-Medium=2, L-Low = 1

COURSE CODE	P21MTE421	CHOICE -I	L	T	P	C
ELECTIVE -II		FUZZY SETS AND THEIR APPLICATIONS	4	-	-	4

Objectives:

- To introduce the concept of fuzzy theory and study its application in real problems
- To study the uncertainty environment through the fuzzy sets that incorporates
- Imprecision and subjectivity into the model formulation and solution process.
- To understand the fuzzy relations and fuzzy arithmetic.
- To explain the concept of operations on fuzzy sets**.**

Unit-I: From Classical Sets To Fuzzy Sets

From Classical Sets To Fuzzy Sets: A Grand paradigm shift, Introduction - Fuzzy Sets Verses Crisp Sets : An Overview - Fuzzy Sets : Basic types – Fuzzy sets : Basic Concepts – Characteristics and Significance of the paradigm shift – Additional Properties of α – cuts – Representations of Fuzzy sets First Dcomposition theorem – Second Decomposition theorem– Third Decomposition theorem- Extension Principle for fuzzy sets**.**

Unit-II: Operations on Fuzzy Sets

Operations on Fuzzy Sets:Types of operations – Fuzzy complements – First Characterization Theorem of Fuzzy Complements - Second Characterization Theorem of Fuzzy Complements - Fuzzy Intersections: t-Norms – Some classes of Fuzzy Intersections (t–Norms) - Fuzzy Unions: t-Conorms - Some classes of Fuzzy Unions (t– Conorms) - Combinations of Operations – Aggregation Operations**.**

Unit-III: Fuzzy Arithmetic:

Fuzzy Arithmetic introduction -Fuzzy Numbers – Membership functions of Fuzzy numbers theorem - Linguistic variables -Arithmetic operations on intervals –Arithmetic operations on Fuzzy numbers – Lattice of Fuzzy numbers – Fuzzy Equations – Equation A + X = B and Equation A * X = B.

Unit-IV: Fuzzy Relations:

Fuzzy Relations introduction Crisp and Fuzzy Relations – Projections and Cylindric Extensions – Binary Fuzzy Relations – Binary Relations on a Single Set – Fuzzy Equivalence Relations – Fuzzy Compatibility Relations –Fuzzy Ordering Relations – Fuzzy Morphisms – SUP-i Compositions of Fuzzy Relations – INF-omega Compositions of Fuzzy Relations.

Unit-V: Fuzzy Decision Making

Fuzzy Decision Making introduction -General Discussion - Individual decision making – Multiperson Making – Multicriteria Decision Making – Multistage Decision Making – Fuzzy Ranking methods – Fuzzy Linear programming. ltiperson Decision Making-Ranking methods – Fuzzy Linear programming.

Text Book:

1. **George J. Klir and Bo Yuan**, "Fuzzy sets and Fuzzy Logic Theory and Applications", Prentice Hall of India, (2005).

UnitI- Chapter 1 Sections 1.3, 1.4, Chapter :2 Sections 2.1 and 2.3
Unit II Chapter 3 Sections 3.1, 3.2, 3.3, 3.4, 3.5-
Unit III Chapter 4 Sections 4.1, 4.2, 4.3, 4.4.-
Unit IV- Chapter 5 Sections 5.3, 5.4, 5.5, 5.6, 5.7, 5.8
Unit V- Chapter 15 Sections 15.2,15.3, 15.6, 15.7

Reference Books

1. **H.J. Zimmermann**, "Fuzzy Set Theory and its Applications", Allied Publishers Limited (1991).
2. **M. Ganesh,** "Introduction to Fuzzy sets and Fuzzy logic", Prentice Hall of India, New Delhi (2006).

Course Outcomes:

CO	CO Statement	Knowledge Level
CO1	Demonstrate the basic concepts of fuzzy sets and membership functions , Know various AI search algorithms	K2
CO2	Ability to find examples for crisp equivalence relation.	K3
CO3	Applying the concept in Fuzzy Morphisms.	K4
CO4	Understand the basics of sampling distribution theory	K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping With Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	M	S	M	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S

S- Strong = 3, M-Medium=2, L-Low=1

COURSE CODE	P21MTE422	CHOICE -II	L	T	P	C
ELECTIVE -II		STOCHASTIC PROCESSES	4	-	-	4

Objectives:

- To give a depth knowledge about Markov chain and Process.
- To understanding the stochastic models for much real life probabilistic situations and expected results.
- To learn the well known models like birth – death and queueing to reorient the knowledge of stochastic analysis.
- The learner understands in depth knowledge about ergording, renewal theory and its application in discrete and continuous process.

Unit-I: Stochastic Processes:
Basic Definitions: Stochastic Processes: An Introduction - Markov Chains : Definition and Examples Higher Transition Probabilities - Generalization of Independent Beronoulli Trials: Sequence of Chain – Dependent Trails - Classification of States and Chains – Determination of Higher Transition Probabilities - Stability of A Markov System – Graph Theoretic Approach.

Unit-II: Sequence of Chains:
Sequence of Chains introduction – definition of Sequence of Chains Poisson Process -Poisson Process and Related Distributions – Generalizations of Poisson Process - Birth and Death Process Introduction – Definition of Birth and Death Process

Unit –III: Classification of States:
Classification of States: Introduction -Brownian Motion – Wiener Process – Differential Equations for AWiener Process -Kolmogorov Equation – First Passage Time Distribution for wiener Process – Ornstein- Uhlenbeck Process.

Unit- IV: Birth and Death Distribution Process:
Introduction about Birth and Death Distribution Process: Renewal Process - Renewal Processes in Continuous Time – Renewal Equation - Stopping Time- Wald's Equation Introduction - Wald's Equation Renewal Theorems

Unit- V: Renewal Theorems:
Introduction of Renewal Theorems- Renewal Theorems -Delayed and Equilibrium Renewal Process introduction – Delayed and Equilibrium Renewal Process- Introduction about Residual and Excess Lifetimes-.Applications of Residual and Excess Lifetimes.

Text Books:

1.J.Medhi "Stochastic process", Second edition- New Age International Publishers.(2008)

Unit I: Chapter 1: 1.5; Chapter 2: 2.1 to 2.7
Unit II: Chapter 3: 3.1 to 3.4
Unit III: Chapter 4: 4.1 to 4.6
Unit IV: Chapter 6: 6.1 to 6.5

Unit V: Chapter 6: 6.6 to 6.11

Reference Books:

1. V.G. Kulkarni, Introduction to Modelling and Analysis of Stochastic Systems, Second Edition, Springer (2011)
2. **Samuel Karlin and Howard M. Taylor,** "A First Course in stochastic process", second edition, Academic Press. 1975
3. **Samuel Karlin and Howard M. Taylor**, "A Second course in stochastic process", Academic Press, 1981.
4. **Narayan Bhat, U,** "Elements of Applied Stochastic Processes", Second Edition John Wiley & Sons,New York.
5. **Feller,** "An Tntroduction to Probability theory and its applications", Volume 1. Third edition, John Wiley & Sons, New York.

Course Outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate the basic concepts of Stochastic process, Markov chains	K2
CO2	Apply the concepts in Birth and Death Distribution Process	K K3
CO3	Identify the type of the Differential Equations for A Wiener Process -Kolmogorov Equation	4 K4
CO4	Understand the basics of sampling distribution theory	K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	M	M	S	M

S- Strong =3, M-Medium = 2, L-Low=1

COURSE CODE	P21MTE423	CHOICE -III	L	T	P	C
ELECTIVE -II		FLUID DYNAMICS	4	-	-	4

Objectives:

- It is a subject of almost all fields of engineering, astrophysics, biomedicine, and metrology. Basic concepts of fluid dynamics aredelt with in this paper.
- To understand the concepts of irrotational motion, two dimensional motion and real fluids.
- To provide clear knowledge about fluid dynamics and apply this concepts on real time problems.
- To study the concepts of the laminar boundary layer.

Unit I: Fluid

Introductory Notions – Velocity – Stream Lines and path lines – Stream tubes and Filaments – Fluid Body – Density –pressure**.** Differentiation following the fluid – Equation of continuity – Boundary conditions (Kinematical and physical) - Rate of change of linear momentum – Equation of motion of an inviscid fluid.

Unit II: Euler's momentum theorem

Euler's momentum theorem proof - conservative forces - Bernoulli's theorem in steady motion – Energy equation for inviscid fluid – circulation – Kelvin's theorem – vortex motion – Helmholtz equation.

Unit III: Two-dimensional motion

Two-dimensional motion introduction – two-dimensional functions – complex potential -Basic singularities – source, vortex and doublet. Circle theorem - Flow past a circular cylinder with circulation – conformal transformation – Blasius's theorem – lift force.

Unit IV: Viscous flow

Viscous flow Definition-– Navier Stokes Equations – vorticity and circulation in a viscous fluid – steady flow through an arbitrary cylinder under pressure – steady couette flow between cylinders in relative motion – steady flow between parallel planes.

Unit V: Incompressible flow:

The Laminar boundary layer in incompressible flow - Boundary layer concept – Boundary layer equations. Displacement thickness – momentum thickness – kinetic energy thickness – integral equation of boundary layer – flow parallel to semi-infinite flat plate – Blasius's equation and its solution in series.

Text Books

1. L.M.Milne Thomson, Theoretical Hydro dynamics, Macmillan Company, Vedition, 1968.

(For Units I and II)

Unit I	Chapter 1	Sections1.0 – 1.3
	Chapter 3	Sections 3.10 – 3.40 (omit sections 3.32)
Unit II	Chapter 3	Sections 3.41 to 3.53 (omit sections 3.44)

2. N.Curle and H.J.Davies, Modern Fluid Dynamics – Vol. I, D.Van nostrand Company Ltd, London, 1968. (For Units III, IV and V)

Unit III	Chapter 3	Sections 3.1 – 3.7 (omit 3.4 & 3.5.3)
Unit IV	Chapter 5	Sections 5.1 to 5.3 (omit 5.3.4 and 5.3.5)
Unit V	Chapter 6	Sections 6.1 – 6.3 (omit 6.2.2 and 6.3.2 to 6.3.5)

Reference Books

1. F.Chorlton, Text book of Fluid Dynamics , CBS Publishers and distributors, New Delhi-32, 1998.
2. M.D.Raisinghawia, Fluid Dynamics, S.Chand and Company Ltd, New Delhi - 55

Course Outcomes:

CO	CO Statement	Knowledge Level
CO1	Understand the fundamental knowledge of fluids and its properties	K2
CO2	Describe the concepts and equations of fluid dynamics.	K3
CO3	Apply thermodynamic control volume concepts in fluid dynamics for applications that include momentum, mass and energy balances	K4
CO4	Analyze the approximate solutions of the Navier-Stokes equation	K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	M	S	S	S	M	S

S- Strong =3, M-Medium =2, L-Low=1

COURSE CODE	P21MTE424	CHOICE -IV	L	T	P	C
ELECTIVE -II		TENSOR ANALYSIS AND SPECIAL THEORY OF RELATIVITY	4	-	-	4

Objectives:

- To introduce the notion of Tensor and study its properties.
- To study the theory of relativity.
- To understand the concepts of invariance, metric tensor and Einstein tensor.
- To study specific theory of relativity and relativistic dynamics.

Unit- I: Invariance:

Invariance - Transformations of coordinates and its properties - Transformation by invariance - Transformation by covariance and contra variance - Covariance and contra variance - Tensor and Tensor character of their laws - Algebras of tensors - Quotient tensors - Symmetric and skew symmetric tensors – Relative tensors.

Unit-II: Metric Tensor:

Metric Tensor - The fundamental and associated tensors - Christoffel's symbols - Transformations of Chrisffel's symbols- Covariant Differentiation of Tensors - Formulas for covariant Differentiation- Ricci Theorem - Riemann -Christoffel Tensor and their properties.

Unit -III: Einstein Tensor:

Einstein Tenso rintroduction - Riemannian and Euclidean Spaces (Existence Theorem)- Introduction about The e-systems and the generalized Kronecker deltas - The e-systems and the generalized Kronecker deltas Application of the e-systems.

Unit-IV: Special Theory of Relativity:

Special Theory of Relativity: Galilean Transformation - Maxwell's equations - The ether Theory – The Principle of Relativity Relativistic Kinamatics : Lorentz Transformation equations - Events and simultaneity - Example Einstein Train - Time dilation - Longitudinal Contraction -Invariant Interval - Proper time and Proper distance – World line - Example - twin paradox - addition of velocities - Relativistic Doppler effect.

Unit-V: Relativistic Dynamics :

Relativistic Dynamics : Momentum – energy – Momentum-energy four vector – Force – Conservation of Energy – Mass and energy – Example – inelastic collision – Principle of equivalence – Lagrangian and Hamiltonian formulations . Accelerated Systems: Rocket with constant acceleration – example – Rocket with constant thrust

Text Books:

1. **I.S. Sokolnikoff,** "Tensor Analysis", John Wiley and Sons, New York, 1964
2. **D. Greenwood**, "Classical Dynamics", Prentice Hall of India, New Delhi, 1985

Unit I Chapter 2: Sections 18 to 28 of [1]
Unit II Chapter 2: Sections 29 to 37 of [1]

Unit III Chapter 2: Section 38 to 41 of [1]
Unit IV Chapter 7: Sections 7.1 and 7.2 of [2]
Unit V Chapter 7: Sections 7.3 and 7.4 of [2]

Reference Books:

1. **J.L. Synge and A.Schildt,** "Tensor Calculus", Toronto, 1949.
2. **A.S. Eddington,** "The Mathematical Theory of Relativity", Cambridge University Press, 1930.
3. **P.G. Bergman, "**An Introduction to Theory of Relativity", New york, 1942.
4. **C.E. Weatherburn,** "Riemannian Geometry and Tensor Calculus", Cambridge, 1938.

Course Outcomes:

CO Number	CO Statement	Knowledge Level
CO1	Understand concept of tensor variables and difference from scalar or vector variables.	K2
CO2	Derive base vectors, metric tensors and strain tensors in an arbitrary coordinate system..	K3
CO3	Investigate the Christoffel symbols which provide a concrete representation of the connection of (pseudo-)Riemannian geometry in terms of coordinates on the manifold	K4
CO4	Apply Riemannan-Christoffel tensor to problems of differential geometry, electrodynamics and relativity	K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	S	S	S	M

S- Strong= 3, M-Medium = 2, L-Low=1

COURSE CODE	P21MTR41	PROJECT	L	T	P	C
PROJECT			-	-	22	8

Rules And Regulation Of The Project:

1. The Project Area/title must be any one of the following
   (i)Pure Mathematics
   (ii)Applied Mathematics
   (iii)Mathematical Application in Real Time Activities.
2. Student allotment Method will be decided by the Department Faculties
   (In October 2nd week)
3. They are Four Project Common Meet(In Front of All Faculty) Power point presentation
   (i). First Meet – November last week. Work done - Topic and Area will be decided (5 marks)
   (ii). Second Meet – January 1st week. Work done-25% work (5 marks)
   (iii). Third Meet –February 1st week, Work done -50% work (5 marks)
   (iv). Fourth Meet – March 1st week, work done -90% work (5 marks)
4. Project Record Submission – Third week of March

NON MAJOR ELECTIVE – MATHEMATICS DEPARTMENT OFFERING COURCES TO OTHER DEPARTMENT

COURSE CODE	P21MTN211	NUMERICAL METHODS	L	T	P	C
SEMESTER -II			4	-	-	4

Objectives:

- To develop efficient algorithms for solving problems in Science, Engineering and Technology.
- The leaner will analyze the different aspects of numerical solution of algebraic and transcendental equations.
- Students will be able to identify the basic concept of numerical differentiation and integration, principle of least squares.
- The learner will become knowledgeable in solving solution to simultaneous linear equations.

Unit- I: Algebraic and Transcendental Equations:

Solution of Algebraic and Transcendental Equations- Bisection Method – Problems in Bisection Method – Iteration Method –Condition for Convergence – Regular Falsi Method-Newton's Method. Problems in Regular Falsi Method and Newton's Method

Unit - II: simultaneous Linear Algebraic Equations:

Solutions of simultaneous Linear Algebraic Equation - Gauss Elimination Method –Gauss Jordan Method –Method of Factorization-Gauss Jacobi – Gauss Siedel Method . Problems in Gauss Elimination, Gauss Jordan , Factorization-Gauss Jacobi and Gauss Siedel Method

Unit - III: Finite Differences:

Finite Differences introduction- First and Higher Order Differences –Forward and Backward Differences – Properties of Operator - Differences of a Polynomial - Factorial Polynomials- Relation between the Operators Δ ,E and D- Summation of the series.

Unit - IV: Interpolation:

Interpolation- Gregory Newton Forward and Backward Formula – Gauss Forward and Backward Formula- Stirling's Formula-Interpolation with Unequal Intervals: Divided differences-Newton's Interpolation Formula-Lagrange's Interpolation Inverse Interpolation.

Unit - V: Numerical Differentiation and Integration:

Numerical Differentiation and Integration introduction - Newton's Forward and Backward Difference Formula – Problems solving using Newton's Forward and Backward Difference Formula- Stirling's Formula to Compute Derivatives-Trapezoidal rule- Simpsons $1/3^{rd}$ and $3/8^{th}$ rule Problems using Trapezoidal rule- Simpsons $1/3^{rd}$ and $3/8^{th}$ rule.

Text Book:

1. **P.Kandasamy , K.Thilagavathi and K. Gunavathi**, "Numerical Methods", S.Chand and Company Ltd New Delhi 2013.

   Unit I – Chapter 3 -3.1 to 3.4
   Unit II – Chapter 4 -4.1 ,4.2,4.4,4.7 to 4.9
   Unit III – Chapter 5- 5.1 to5.4,5.7
   Unit IV –Chapter 6, 7 -7.1 to 7.5 & 8
   Unit V – Chapter 9

Reference Books:

1. **Arumuga, Issac, Somasundaram**,"Numerical Analysis", New Gamma Publishing House, Palayam Kottai 2003.
2. **G. Balaji**, "Numerical Methods", G.Balaji Publishers, Chennai 2007

Course Outcome:

On the successful course completion, students will be able to:		Cognitive Level
CO1	Understand the equations using different methods under differ conditions and numerical solutions of system algebraic equation	K1
CO2	Apply various interpolation methods and finite different concepts	K3
CO3	Analyse differentiation and integration whenever and where ever routine methods are not applicable	K4
CO4	Evaluate the ordinary differential equations using different methods through the theory of finite differences.	K5
CO5	Evaluate the partial differential equations using different methods through the theory of finite differences.	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

COURSE CODE	P21MTN212	OPERATION RESEARCH	L	T	P	C
SEMESTER -II			4	-	-	4

Objectives

- To impart the basic concepts and applications of linear programming.
- The leaner will formulate a linear programming problem and solve them graphically and simplex method
- The leaner will be able to understand the concepts of duality programming
- The leaner will analyze the different aspects of transportation problems and also assignment problems
- Students will be able to identify the basic analysis of various inventory models.
- The leaner will develop, organize, evaluate short, long term processes and solve problems

Unit - I: Linear Programming problem:

Introductions- Linear Programming: Mathematical formulation of linear programming problem- Basic Solution - Solving Linear Programming problem using Graphical solution- Unbounded and Infeasible solution in graphical methods -Simplex method - Use of Artificial Variables: – Big M Method – Two Phase Method – Problems using this methods

Unit -II: Transportation Problem:

Transportation Problem introduction- Mathematical formulation of the problem - Finding Initial Basic Feasible Solution using North - West Corner Rule - Row minima methods- Column minima method - Matrix Minima Method - Vogel's Approximation Method - Optimum solution – MODI method .

Unit- III: Assignment Problem:

Assignment Problem: Introduction – Definition of Assignment Problem -Mathematical formulation of Assignment Problem - Assignment Algorithm – Problem solving using Assignment Algorithm- Application of Assignment Problem: Minimization case routing problem

Unit- IV: Replacement Problem:

Replacement Problem: Introduction about Replace problem –Definition Replace problem -and System Reliability – Replacement of Equipment that Deteriorates Gradually- Exercise Problems - Replacement of Equipment the Fails Suddenly-problems in replacement of Equipment the Fails Suddenly

Unit - V: Network Scheduling by Pregame Evaluation and Review Techniques PERT/ Critical Path Method -CPM:

Network Scheduling by PERT/CPM : Introduction network and Basic Components- Rules of Construction –Problems in Network Scheduling using CPM -Critical Path Analysis – Probability Considerations in PERT – Problems in Network Scheduling using PERT Distinction between PERT and CPM.

Text Book:

1. **Kanti Swarup, P.K. Gupta, Man Mohan,** "Operations Research", Sultan Chand & Sons, Educational Publishers, New Delhi.2013

Reference Books:

1. **Panneerselvam.R**, "Operations Research", 2nd Edition, PHI Learning Private Limited, Delhi, 2015
2. **Prem Kumar Gupta.Er, Hira.D.S**. "Operations Research",7th Edition,S.Chand & Company Pvt.Ltd.2014
3. **Hiller.F.S & Lieberman.J** "Introduction to Operation Research ",7th Edition, Tata–MCGraw Hill Publishing Company, NewDelhi, 2001.
4. **G. Srinivasan,** "Operations Research principles and applications", Second Edition, PHI Learning Private Limited, New Delhi-110001, 2012.
5. **Taha H.A., "**Operations Research An introduction" Prennce Hall of India Private Ltd 1st Edition New Delhi (2008) .

Course Outcome:

On the successful course completion, students will be able to:		Cognitive Level
CO1	understand the application of OR and frame a LP Problem with solution – graphic and through solver add in excel	K1
CO2	analyze and interpret results of transportation and problem using appropriate method Solutions of assignment and problem using appropriate method	K2
CO3	evaluate simple model of L.P.P.	K3
CO4	understand and evaluate of CPM and PERT define basic components of Network and find critical path	K3
CO5	find the replacement period of equipment that failssuddenly/gradually	K4, K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

COURSE CODE	P21MTN213	DISCRETE MATHEMATICS	L	T	P	C
SEMESTER -II			4	-	-	4

Objectives:

- To study of and, or and not logics by truth tables.
- To study of normal forms.
- Analysis Free and Bound variable formulas.
- Understand Types of Grammar, function of Pushdown automata

Unit- I: Mathematical Logic:

Mathematical Logic Statement and Notation – Connection – Negation Conjunction – Disjunction – Statement Formulas and Truth Tables – Logical Capabilities of Programming Languages – Conditional and Bi Conditional – Well Formed Formula – Tautologies –Equivalence of Formula – Duality Law Tautological Implication.

Unit - II: Normal Forms:

Normal Forms introduction- Disjunctive Normal Forms – Theorem based on Disjunctive Normal Forms - Conversion of given statements into Disjunctive Normal Forms- based on Conjunctive Normal Forms – Theorem based on Conjunctive Normal Forms - Conversion of given statements into Conjunctive Normal Forms -Principal Disjunctive Normal Forms – Principal Conjunctive Norms-Conversion of Disjunctive Normal Forms to Principal Disjunctive Normal Forms-Conversion of Conjunctive Norms to Principal Conjunctive Norms

Unit- III: Theory of Inference:

Theory of inference introduction – Truth Table Technique – Rules of Inference - Inconsistent Premises – Indirect Method of Proof – Predicate calculus- Free and Bound Variables – Valid Formulas and Equivalences – Inference Theory of Predicate Calculus.

Unit - IV: Grammar :

Grammar introduction - alphabet - basic characters- string – Length of string – concatenation of sting -Definition –Types of Grammar – Phrase Structure Grammar – Context Sensitive Grammar – Context Free Grammar – Regular Grammar – Languages Generated by these Grammars. Conversion of one type grammar into other type .

Unit - V: NDFSA to DFSA and Pushdown Automata:

Automata -Definition – Deterministic finite state Automata (DFSA) – Examples for Deterministic finite state Automata - Non-Deterministic finite state Automata NDFSA) – Examples for Non Deterministic finite state Automata Conversion of NDFSA to DFSA- Problem solving in the Conversion of NDFSA to DFSA Pushdown automata- Simple Theorem.

Text Books:

1. **J.P.Tremblay**, **R. Manohar –** "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw – Hill Edition 1997

   Unit I- Chapter :1- 1-1,1-2:1-2.1 to 1-2.11.

   Unit II-Chapter :1-3.1 to 1-3.4

   Unit III- Chapter: 1-4.1to 1- 4.3 .1-5 to1-5.4,1-6:1-6.1 -1-6.4

2. **Dr.Rani Siromoney, "**Formal Languages and Automata, The Chiristian Literature Society"**, Revised Edition 1979.**

   Unit IV-Chapter2 : 2.1 to 2.6

   Unit V-Chapter 5: 5.1 and Chapter 6

Reference Books:

1. **John . E. Hopcraft, Rajeev Motwani and Jeffrey D. Ullman**, "Introduction to Automata Theory, Languages and Computationc", Pearson Education, 2013
2. **Kenneth H. Rosen**, "Discrete Mathematics and it's Applications", 7th Edition/ McGraw Hill Education, New York, 2012
3. **B.S.Vatssa**, "Discrete Mathematics",WISHWA PRAKASHAN,1993.
4. **V.Sundaresan,K.S.Ganapathy Subramanian, K.Ganesan**, "Discrete Mathematics", A.Rd.Publications, 1998.
5. **T.Veerarajan**, "Discrete Mathematics", McGraw Hill Education (India)Pvt.Ltd,New Delhi, 2014.

Course Outcome:

On the successful course completion, students will be able to:		Cognitive Level
CO1	Understanding of some Logic truth tables	K2
CO2	Prove / define basic normal forms	K3
CO3	To analyses the concepts of free and bound variable formulas	K4
CO4	Understanding the concepts of Grammars	K4
CO5	Basic concepts of Languages and basic definitions of Automata	K6

K1- Remember: K2- Understand : K3-Apply, K4- Analyse, K5- Evaluate; K6- create

COURSE CODE	P21MTN214	DIFFERENTIAL EQUATIONS	L	T	P	C
SEMESTER -II			4	-	-	4

Objectives:

- To introduce the basic concepts of differential equations and Laplace Transforms.
- Understand the basic concepts of first order differential equation and it applications.
- Determine solutions to second order linear homogeneous, non-homogeneous differential equations with constant coefficients.
- Understand the elementary theory of partial differential equations, and solve it using various techniques.

Unit- I: **Differential Equations of the first order and first degree:**

Differential Equations of the first order and first degree introduction- Definition – Examples for differential Equations of the first order and first degree - Variable separable method – Homogeneous Linear equation and non – Homogeneous Linear equation- Bernoulli's equations- exact differential equations.

Unit-II: Equation of the first order and higher degree:

Equation of the first order and higher degree introduction- Definition – Examples of Equation of the first order and higher degree- Equations Solvable for dy/dx — Examples in Equations Solvable for dy/dx- Equations solvable for y – Examples in Equations solvable for y-Equations solvable for x – Examples in Equations solvable for x- Clairaut's form.

Unit- III: Linear equations with constant Co- efficient:

Linear equations with constant Co- efficient introduction- Definition – complementary function of a Linear equation with constant Co – efficient – particular Integral – General method of finding P.I – special methods for finding P.I of the functions of the type e^{ax} , cos ax or sin ax , e^{ax} V where V is any function of x , x^m – Linear equations with Variable Co – efficient, Equations reducible to the linear equations.

Unit - IV: Simultaneous Differential Equations:

Simultaneous Differential Equations introduction- Simultaneous equations of the first order and first degree – Simultaneous linear differential equations: Linear equations of the second order: Complete solution given a known integral – Reduction to the normal form – Change of Independent Variables – Variation of Parameters – Methods of operations factors.

Unit - V: Partial Differential Equations(PDE):

Formation of Partial Differential Equations (PDE) – Lagrange method of solving linear Partial Differential Equations – Solution of Partial Differential Equations of type F(p,q)=0- Solution of Partial Differential Equations of type F(z,p,q)=0- Solution of Partial Differential Equations of type F(x,p) = G(y,q) - Clairaut's form and Charpit's method- Solution of Partial Differential Equations using Charpit's method.

Text Book:

1. **S.Narayanan and T.K. Manickavachagam pillai**, "Differential equations and its applications" S. Viswanathan Printers and Publishers Pvt. Ltd., Madras 2014.

Reference Books:

1. Arumugam and Isaac - "Differential equations and applications", - New gamma publishing house – 1999.

2. P.Kandasamy and K. Thilagavathi "Mathematics for Branch I: Volume III" S. Chand and Company Ltd., New Delhi - 2004.

Course Outcome:

On the successful course completion, students will be able to:		Cognitive Level
CO1	solve linear equations with variable coefficients.	K2
CO2	understand the fundamental properties of the PDE	K1&K2
CO3	apply the Differentation Of Higher Order Methods to solve Practical life problems	K3
CO4	solve partial differential equations using Lagrange's method and Charpit's method	K3&K4
CO5	create real life problems into ordinary differential equations.	K4 &K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 – Create

COURSE CODE	P21MTN215	FOURIER AND LAPLACE TRANSFORMATIONS	L	T	P	C
SEMESTER - II			4	-	-	4

Objectives:

- To enhances basic skills in the areas of Fourier series.
- To acquaint the student with the Fourier transform techniques used in wide variety of situations.
- To study about Fourier series and their applications.
- To introduce the basic concepts of Laplace Transforms.
- First solutions by applying Laplace transform methods.

Unit – I: Fourier series:

Fourier series introduction- Definition –Examples for Fourier series - Dirchlet's conditions Definition -Fourier series of periodicity 2π and 2l –Examples for Fourier series of periodicity 2π and 2l Odd and Even functions – Root mean square value of a function - Problems in this method Parseval's Theorem.

Unit – II: Half range series:

Half range series definition - Half range sine series – Definition -Examples in Half range sine series Half range cosine series – Definition -Examples in Half range cosine series- Harmonic analysis – Definition -Examples of Harmonic analysis -Complex form of Fourier series- problem in Complex form of Fourier series

Unit – III: Fourier Transform:

Fourier Transform introduction – Definition –Examples in Fourier Transform -Properties – Fourier integral theorem – Fourier Sine transforms - Definition –Examples in Sine transforms- Fourier Cosine transforms – Definition –Examples in Fourier Cosine transforms- Convolution Theorem – Parseval's identity**.**

Unit – IV: Laplace Transforms:

Laplace Transforms introduction - Definition – Types of Laplace transform – Examples in each type - Laplace transform of periodic functions – Definition-Examples in Laplace transform of periodic functions- Some general Theorems

.

Unit – V: Inverse Laplace Transforms:

Inverse Laplace Transforms: Definition of Inverse Laplace Transforms – Linearity of Inverse Laplace Transforms- Properties of of Inverse Laplace Transforms-, first shifting Theorem – second shifting Theorem – change of scale- property and examples.

Text Books:

1. **P.Kandasamy and K.Thilagavathy** , "Mathematics, Vol. IV", S.Chand and company Ltd., - 2004. UNIT I: Chapter I UNIT II: Chapter I and UNIT III: Chapter IV

2. **S.Narayanan and T.K Manickavachagam Pillai,** " Differential equations and its applications" S.Viswanathan Printers and Publishers Pvt. Ltd.,Madras 2014.

   UNIT IV and UNIT V: Chapter 9 – Sec. 1 to 7

Reference Books:

1. Laplace Transforms" by **A.R. Vasistha and Dr.R.K. Gupta** Published by Krishna Prakashan Media Pvt, Ltd., Meerut.2012
2. Laplace transform and Fourier transform" by **Dr.J.K Goyal and K.P.Gupta**, Published by Pragathi Prakashan Media Pvt, Ltd., Meerut.2013

Course Outcomes:

CO Number	CO statement	Knowledge level
CO1	Integral equations of Fourier Transforms	K4
CO2	Demonstrate the Fourier Transforms	K3
CO3	Understand the fundamental properties of the Laplace transforms	K1&K2
CO4	Apply the Laplace inverse transforms to solve simultaneous equations	K3

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate, K6 – Create

COURSE CODE	P21MTN216	Statistics	L	T	P	C
SEMESTER - II			4	-	-	4

Objectives:

- To enhances basic skills in the areas of data collection.
- To acquaint the student with the average calculation in various situation.
- To study about deviation of data from the central values.
- To know the testing tools and methods **.**

Unit – I: Primary and Secondary data:

Collection of Data –Primary data-Secondary data-choice of methods-Direct personal Observation-Indirect oral Interview-Information Through Agencies-Mailed questionnaire Schedules send through Enumerators, Sources of secondary data- Data precautions in the in the use of secondary data- Sample questionnaire

Unit – II: Central Tendency and Variation:

Measure of Central Tendency- Meaning- Definition – Arithmetic Mean - Median- Definition Mode - Definition -Geometric mean- Definition- Harmonic mean – Definition- Individual data- Discrete series and continuous series – Problem in all the three types.

Measure of Variation: Measure of dispersion- range- Quartail deviation- Mean Deviation Standard deviation - Individual data- Discrete series and continuous series – Problem in all the three types.

Unit – III: Correlation and Regression:

Correlation and Regression introduction -Types of correlation graphical representation of Correlation - Karl Pearson's coefficient of correlation – Rank correlation- Coefficient of rank correlation.

Regression: Significance of regression-difference between correlation and regression-RegressionLines - Regression equations

Unit – IV: Theoretical distributions:

Theoretical distributions introduction - Binomial distribution –properties of binomial distribution-simple problems in binomial distribution - Poisson distribution- simple problems in Poisson distribution -Normal distributions – properties of Normal distributions - practical problems in Normal distributions.

Unit – V: Sampling Theory and Testing of Significance:

Sampling Theory and Testing of Significance introduction - Estimation-Hypothesis-Test of significance- Small sample test - Student 't' test –Large sample test for significance of average-Student F-test- Chi –Square test for Goodness of fit-Simple practical problems using - Chi –Square test

Text Books:

1, R.S.N. Pillai and V.Bagavathi,, "Statistics", Sultan Chand, New Delhi, 2008.
2. Gupta S.P, "Statistical Methods", Sultan Chand, New Delhi, 33rd Edition, 2005

Reference Book:

1. **S.C.Gupta and V.K.Kapoor**, "Fundamentals of Mathematical Statisitics", Sultan Chand and Sons, New Delhi -2, 2011

Course Outcomes:

CO Number	CO statement	Knowledge level
CO1	Analyse –Primary data-Secondary data	K4
CO2	Measure of Central Tendency and Measure of Variation	K3
CO3	Understand and apply Correlation and Regression	K1&K2
CO4	Understand Theoretical distributions	K2
CO5	Sampling Theory and Testing of Significance: Estimation-Evaluate	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate, K6 – Create

COURSE CODE	P21MTN217	MATHEMATICAL APTITUDE	L	T	P	C
Elective - NME			4	-	-	4

Objectives:

- To impart skills in numerical and quantitative techniques.
- Able to critically evaluate various real life situations by resorting to Analysis of key issues and factors.
- Able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

Unit I :

Numbers – HCF – LCM – Square Roots & Cube Roots- Problems on numbers. (Chapters 1, 2,5, 7)

Unit II :

Decimal Fractions, Simplification, Time & Distance. (Chapter 3,4,17)

Unit III :

Surds and Indices – Percentage – Profit and Loss- Simple Interest. (Chapters 9, 10,11, 21)

Unit IV:

Ratio and Proportion – Partnership – Allegation or Mixture- Probability. (Chapters 12, 13, 20, 31)

Unit V :

Average – Problems on Age- Calender. (Chapters 6,8,27)

Text Book:

Dr.R.S.Aggarwal, "Quantitative Aptitude for Competitive Examinations" , S.Chand & Company Ltd., Ram Nagar, New Delhi -2007.

Link: https://books.shunyafoundation.com/book-quantitative-aptitude-by-r-s-aggarwal-published-by-s-chand-english/dp/ODTRGH2E

Relationship Matrix for Course Outcomes, Programme Outcomes and Programme Specific Outcomes

	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S	S	S	S	M	M
CO2	S	M	S	M	M	M	M	S	S	M
CO3	S	S	S	S	S	S	M	S	S	S
CO4	M	M	S	M	S	S	S	M	S	S
CO5	M	S	S	S	S	M	S	S	S	M

*S-Strong; M-Medium; L-Low

COURSE CODE	P21MTS22	MATLAB	L	T	P	C
SUPPORTIVE COURSE -II			-	2	-	2

Objectives:

- To impart the programming concepts of Matlab
- Specific outcome of learning the learner will be able to use Matlab for interactive computations Able to draw 2D and 3D graphs.
- Understand richness of Matlab rather than using algebraic Number theory M.S. Word for documentation
- Able to applying programming techniques to solve the programs at advanced level.

Unit -I: MATLAB: Brief Introduction:

MATLAB: Importing and Visualizing Images- Importing and displaying images -Converting between image types -Exporting images- Interactive Exploration of Images- Obtaining pixel intensity values- Extracting a region of interest- Computing pixel statistics –

Introduction To MATLAB**:** Brief Introduction - Installation of MATLAB – History - Use of MATLAB - Key features.

MATLAB Software: Introduction to MATLAB Software – MATLAB window - Command window – Workspace - Command history - Setting directory - working with the MATLAB user interface - Basic commands - Assigning variables - Operations with variables

Unit -II: Data Files and Data Types:

Data Files and Data Types **i**ntroduction **-** Character and string - Arrays and vectors – Column vectors - Row vectors.

Basic Mathematics:

BODMAS Rules - Arithmetic operations - Operators and special characters -Mathematical and logical operators - solving arithmetic equations

Unit -III: Operations on Matrix:

Operations on Matrix introduction -Creating rows and columns Matrix - Matrix operations - Finding transpose, determinant and inverse -Solving matrix

Other Operations**:** Trigonometric functions -Complex numbers- fractions -Real numbers- Complex numbers

Unit-IV: Image processing:

Image processing with Measuring object sizes-Creating a custom interactive tool- Pre-processing Images - Adjusting image contrast -Reducing noise in an image -Using sliding neighbourhood operations -Using block processing operations

Unit -V: Symbolic Math:

Symbolic Math in MATLAB**:** Calculus: Numerical Integration- Linear Algebra- Roots of Polynomials- Algebraic equations Differential Equations (1st & 2nd order) -Transforms (Fourier, Laplace, etc)- Ordinary Differential equations -Examples of few ODEs

Text Books:

1. **Y. Kirani Singh & B. B. Chaudhuri, "**MATLAB Programming", Prentice-Hall of India Pvt. Ltd, New Delhi, 2008.

2. **Desmond. J.Higham &Nicholas J.Hiham**, "MATLAB Guide", 2nd edition SIAM , 2005.

Course Outcomes:

Upon the successful completion of the course, students will be able to

CO1: use MATLAB for interactive computations.
CO2: familiar with memory and file management in MATLAB.
CO3: generate plots and export this for use in reports and presentations.
CO4: cooperating and working with others using subversion
CO5: debugging and optimising their programs

CO	CO Statement	Knowledge Level
CO1	Demonstrate the basic concepts of types of mat lab mathematical operators, Relational, binary and logical operators	K2
CO2	Apply the concepts in expanding and reducing size- reshaping, shifting and sorting matrices.	K3
CO3	Identify different types of Matlab and Matlab file	K4
CO4	Understand the basics of document layout and organization	K5
CO5	Emphasis on estimating a document class and fine tuning text .	K6

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	S	S	M	S	S	S	M	S

S- Strong = 3, M-Medium= 2, L-Low = 1

VALUE ADDED PROGRAM

COURSE CODE	P21MTV11	PYTHON LANGUAGE	L	T	P	C
SEMESTER - I			-	-	-	2

Objectives:

- To understand the fundamentals of Python Programming.
- To get knowledge about the Functions in Python.
- To understand the concepts of List and String methods.
- To gain idea about exception handling and classes.

Unit- I: Introduction to Python:

Introduction to Python: Introduction – Python Overview – Getting Started with Python –Comments – Python Identifiers – Reserved Keywords – Variables – Standard Data types.

Unit- II: Operators:

Types of Operators - Statement and Expressions – String Operations – Boolean Expressions – Control Statements – Iteration While Statement – Input from Keyboard.

Unit- III: Functions:

Functions introduction – Built-in Functions – Composition of Functions – User defined Functions Parameters and Arguments –Function Calls- The return statement – Python Recursive Functions The Anonymous function – Writing Python Scripts.

Unit –IV: Strings and Lists:

Introduction about Strings and Lists: Strings - Lists. Tuples and Dictionaries: Tuples – Dictionaries.

Unit –V: Files and Exceptions:

Files and Exceptions introduction - Text Files – Directories – Exceptions – Exceptions with Arguments- User defined Exceptions- Classes and Objects.

Text Book:

1. **E. Balagurusamy,** "Problem Solving and Python Programming by ", McGraw-Hill first edition (2017)m

Reference Books:

1. **Ashok Namdev Kamthane, , Amit Ashok Kamthane**, "Programming and Problem Solving with Python". (2017),

2. **John B. Schneider Shira Lynn Broschat Jess Dahmen),** "Algorithmic Problem Solving with Python".(2019

Course Outcomes (CO)

CO1	To implement basic concepts of operators and functions.	K1
CO2	To Review various string, list, tuple and dictionaries.	K2
CO3	To evaluate the functionality of an exception handling.	K3
CO4	To analyze the concept of classes and objects.	K4

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	S	S	M	S	S	S	M	S

S- Strong = 3, M-Medium= 2, L-Low = 1

COURSE CODE	P21MTV11	PYTHON LAB	L	T	P	C
Value Added Program- I			-	-	-	2

Objectives:

- To gain knowledge about the fundamentals of python programming.
- To understand the concepts of string, list, tuple.
- To implement the concept of exception handling, classes and objects

List of Practical Programmes:

1. Write a python program to print the prime numbers in given range.
2. Write a python program m to calculate the area of a triangle.
3. Write a python program to find HCF of the given numbers.
4. Write a python program to create a simple calculator.
5. Write a python program to display Fibonacci series sequence using recursion.
6. Write a python program to demonstrate the string methods.
7. Write a python program to demonstrate the built-in list methods.
8. Write a python program to define a function that prints a tuple whose values are the
9. Cube of numbers between 1 1nd 10.
10. Write a python program to demonstrate exception handling.
11. Write a python program to demonstrate classes and their attributes.

Course Outcomes (CO)

CO1	To implement basic operators and function concepts.	K3
CO2	To Review various string and list methods.	K4
CO3	To execute exception handling.	K5

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S

S- Strong = 3, M-Medium= 2, L-Low = 1

COURSE CODE	P21MTV42	Mathematical Modelling	L	T	P	C
SEMESTER - IV			-	-	-	2

Objectives :

- To enrich mathematical application thinking
- Solve practical problems
- Develop mathematical Models

Unit- I: Introduction about Simulation and Mathematical Modeling:

Introduction about Simulation and Mathematical Modeling : Basic definitions of Trigonometry - develop mathematical models for trigonometry application

Unit- II: Introduction about the applications of Operation Research:
Introduction about the applications of Operation Research – Develop mathematical models for Cost minimization –Minimum Resource utilization-Time minimization-Queuing model**.**

Unit -III: Introduction to Graph Theory:
Introduction to Graph Theory –Application-Develop Mathematical Modeling for real time application

Unit- IV: Numerical Methods:
Numerical Methods- Introduction –Application – Mathematical models using Numerical Methods for real time problems

Unit- V: Introduction to Ordinary and Partial Differential Equations:
Introduction to Ordinary and Partial Differential Equations- Mathematical Models to solve real time problems**.**

Text Book:

1. **Robert.E.Moyer "** Schaum's outline of Trigonometry" fifth edition . The Mcgraw-Hill Companies New Delhi 2015
2. **S. Narayanan and T.K. Manickavachagam pillai**, "Differential equations and its applications" S. Viswanathan Printers and Publishers Pvt. Ltd., Madras 2014
3. **Kanti Swarup, P.K .Gupta,Man Mohan**"Operations Research", Sultanchand and sons , Edition – 2017.
4. **P.Kandasamy , K.Thilagavathi and K. Gunavathi**, "Numerical Methods", S.Chand and Company Ltd , New Delhi 2013.
5. **S.A.Choudum**, "A first Course in Graph Theory", Macmillan india limited, 1999.

COURSE OUTCOME:

CO1	Develop Mathematical Models For Trigonometry Application	K3
CO2	To Review minimum Resource utilization.	K4
CO3	Develop Mathematical Modeling for real time	K5
CO4	To analyze Mathematical Models to solve real time problems.	K5

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

Mapping with Programme Outcomes:

COs/POs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S
CO4	S	S	M	S	S	S	S	M	S	S

S- Strong = 3, M-Medium= 2, L-Low = 1

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Mother Teresa Women's University, Kodaikanal

Department of Mathematics

Course: Ph.D

Specialized Area of Study: Inventory Management and Control

SYLLABUS

Unit 1: Deterministic lot size models and their extensions

Introduction – The simplest lot size model – No stock outs – Additional properties of the model, An example – Accounting for integrality of demand – Case where backorders are permitted – The lost sales case.

The case of a finite production rate – Constraints – Constraints; An example – Periodic review formulation – Quantity discounts – "All units" discounts – Incremental quantity discounts.

Unit 2: Probability theory and stochastic processes

Introduction – Basic laws of probabilities – Discrete random variables – Continuous random variables – Expected values – Time averages and Ensemble averages – Probabilistic description of demands – Joint distributions – Convolutions – Markov processes discrete in space and time – Markov processes discrete in space and continuous in time – Other types of Markov processes – Properties of the Poisson distribution – The normal distribution – Properties of the normal distribution.

Unit 3: Lot size-reorder point models with stochastic demands

Introduction – Heuristic approximate treatment of the backorders case – Heuristic approximate treatment for the lost sales case – discussion of the simple models and a numerical example – Exact formulas for the backorders case with Poisson demands and constant procurement lead time – An important special case – The normal approximation – An example involving the use of the exact form of K .

[P.T.O]

Unit 4: Periodic review models with stochastic demands

Introduction – Simple, Appropriate <*R,T*> models – The exact formulation of the <*nQ,r,T*> model for the backorders case with Poisson demands and constant lead times – Approximate form of the <*nQ,r,T*> model for large *Q* – The <*nQ,r,T*> model for normally distributed demands – Exact equations for <*R,T*> models – The <*Q,r*> model as the limit as $T \rightarrow 0$ of the <*nQ,r,T*> model.

Unit 5: Single period models

Introduction – The general single period model with time independent costs- Examples – Constrained multiple item problems – Single period models with time dependent costs - Marginal analysis.

Text Book:

1. Analysis of Inventory Systems, G. Hadley (University of Chicago), T.M. Whitin (University of California, Berkeley), Prentice-Hall, 1963.

Department of Commerce

MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL-624102

B.COM. (CHOICE BASED CREDIT SYSTEM)

(Full-time)

SYLLABUS, REGULATION AND SCHEME OF EVALUATION

(From 2021-2022 onwards)

Mother Teresa Women's University, Kodaikanal

Department of Commerce
Choice Based Credit System (CBCS)
(2021-2022 onwards)
Bachelor of Commerce

1. About the Programme:

The Revised syllabus for B.Com. Programme is recommended from the academic year 2021– 2022 onwards. Regulations scheme of examinations and syllabus for B.Com. is based on UGC/TANSCHE guidelines under Choice Based Credit System (CBCS).The Bachelor's Degree in B.Com. is awarded to the student on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes, and values) and academic criteria expected of graduates at the end of the Programme. Therefore, the learning outcomes of this particular Programme are aimed at facilitating the students to acquire these attributes, keeping in view of the changes in the current socio-economic environment. The Learning Outcomes-based Curriculum Framework (LOCF) of B.Com. has been designed keeping in view of the graduate attributes, qualification descriptors, Programme Learning Outcomes, and Course Learning Outcomes.

2. Program Educational Objectives (PEOs)

PEO1	Students will able to understand the concepts of Commerce.
PEO2	Students will develop comprehensive professional skills in the field of Commerce.
PEO3	Students will develop an understanding of various commerce functions such as finance, accounting, financial analysis, project evaluation, and cost accounting.
PEO4	Students will be able to prove the proficiency with the ability to complete exams like C.A, C.S and CMA.
PEO5	Students can do Commerce oriented research and consequence of this, they canbecome Professors in Colleges and Universities.

3. Eligibility

Candidate should have passed the Higher Secondary Examination or CBSE Examination from the school.

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**10**	**25**	**10**	**25**
External	**30**	**75**	**30**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade
(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction

70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

9. Program Outcomes (POs)

On successful completion of the B.COM Program, students will be able to	
PO1	build the wide range of knowledge in the areas of accounting concepts and techniques to meet the current and future requirement of the industry.
PO2	develop the strong knowledge in the areas such as finance, taxation and laws relating to commerce helps to relate the conceptual with the analytical skills in thefield of auditing, finance etc.
PO3	nurture the skills in personal, interpersonal, intellectual skills to develop their professional career and growth.
PO4	disseminate knowledge in developing decision making and problem solving skills to undertake their own venture as a feasible career option.
PO5	develop the needed knowledge in business and academics to develop their employability

10. Program Specific Outcomes (PSOs)

After the successful completion of B.COM Program, the students are expected to	
PSO1	have strong base on the course relevant to the area of commerce whichhelps to choose their career
PSO2	acquire knowledge and skills which build confidence to identify their career opportunities in multiple dimensions.

PSO3	nurture intellectual, personal, interpersonal and social skills with afocus on relevant professional career particularly, to maximize professional growth.
PSO4	empower necessary competencies and decision making skills to foster the innovative thinking to become an entrepreneur.
PSO5	become expert in the field of communication withethical consciousness.
PSO6	equip with the practical skills to work as accountants, audit assistants, tax consultants, and computer operators as well as other financial supporting services.
PSO7	develop advanced accounting career skills, applying both quantitative and qualitative knowledge to their future careers in Business.
PSO8	get placement in Higher Education Institutions and can make research in the field of Finance, Banking and Commerce.

B.COM. CURRICULUM

Course Code	Title of the Course	Credits	Hours		Maximum Marks		
			L	P	CIA	EIA	Total
FIRST SEMESTER							
U21LTA11	Part I-TAMIL I	3	6	-	25	75	100
U21LEN11	Part II- ENGLISH I	3	6	-	25	75	100
U21COT11	CORE I – Financial Accounting –I	4	6	-	25	75	100
U21COT12	CORE II – Business Organization and Management	4	5	-	25	75	100
U21COA11	ALLIED I –Business Economics	4	5	-	25	75	100
U21EVS11	Environmental Studies	2	2	-	25	75	100
U21PECM11	PROFESSIONAL ENGLISH I	4	6	-	25	75	100
		24	**36**		**-**	**-**	**700**
SECOND SEMESTER							
U21LTA22	Part I-TAMIL II	3	6	-	25	75	100
U21LEN22	Part II -ENGLISH II	3	6	-	25	75	100
U21COT21	CORE III- Financial Accounting-II	4	5	-	25	75	100
U21COT22	CORE IV – Principles of Marketing	4	5	-	25	75	100
U21COA22	ALLIED-II-Business Communication	4	5	-	25	75	100
U21VAE21	Value Education	3	3	-	25	75	100
U21PECM22	PROFESSIONAL ENGLISH II	4	6	-	25	75	100
Total		**25**	**36**		**-**	**-**	**700**
THIRD SEMESTER							
U21LTA33	Part I-TAMIL III	3	6	-	25	75	100
U21LEN33	Part II -ENGLISH III	3	6	-	25	75	100
U21COT31	CORE V – Business statistics	4	5	-	25	75	100
U21COA33	ALLIED III- Principles of Insurance	4	5	-	25	75	100
U21COE311/ U21COE312	ELECTIVE –I 1.Human Resource Management 2. Training and Development	3	4	-	25	75	100
U21CSS31	SBE-1-Computer Skills for Office Management	2	2	-	40	60	100
	Non-Major Elective – I	2	2	-	25	75	100
U21PECM33	PROFESSIONAL ENGLISH II – Add on course	4	6	-	25	75	100
	Total	**25**	**36**		**-**	**-**	800
FOURTH SEMESTER							
U21LTA44	Part I-TAMIL IV	3	6	-	25	75	100
U21LEN44	Part II-ENGLISH IV	3	6	-	25	75	100
U21COT41	CORE VI- Cost Accounting	4	4	-	25	75	100
U21COT42	CORE VII- Business Environment	4	4	-	25	75	100

U21COA44	ALLIED IV-Business Mathematics	4	4	-	25	75	100
U21COE421/ U21COE422	Elective III – 1.Elements of E-Commerce 2.Digital Marketing	3	3	-	25	75	100
U21MSS41	SBE II- Managerial Skills	2	2		40	60	100
	Non -Major Elective II	2	2	-	25	75	100
U21PECM44	PROFESSIONAL ENGLISH III – Add on course	4	6	-	25	75	100
	Total	**29**	**37**				**900**
	FIFTH SEMESTER						
U21COT51	CORE VIII- Management Accounting	4	5	-	25	75	100
U21COT52	CORE IX -Auditing	4	5	-	25	75	100
U21COT53	CORE X-Income Tax Law and Practice	4	5	-	25	75	100
U21COT54	CORE XI-Entrepreneurial Development	4	5	-	25	75	100
U21COT55	CORE XII- Banking Theory, Law and Practice	4	5	-	25	75	100
U21COE531/ U21COE532	ELECTIVE-III 1.Fundamentals of Investment 2.Artificial Intelligence For Business	3	3	-	25	75	100
U21COS53	SKILL BASED ELECTIVE – PAPER I – Company Law	2	2	-	25	75	100
	Total	**25**	**30**		**-**	**-**	**700**
	SIXTH SEMESTER						
U21COT61	CORE XIII- Corporate Accounting	4	6	-	25	75	100
U21COT62	CORE XVI- Business Taxation	4	6	-	25	75	100
U21COT63	CORE XV – Financial Markets and Institutions	4	5	-	25	75	100
U21COT64	CORE-XVI - Financial Management	4	4		25	75	100
U21COT65	CORE XVII- Financial Services	4	4		25	75	100
U21COE641/ U21COE642	ELECTIVE –IV-1. Business Law 2.Corporate Governance	3	3	-	25	75	100
U21COS61	Skill Based Elective II-Personal Selling and Salesmanship	2	2		25	75	100
U21EAS61	Extension Activities	3	-	-	-	-	100
	Total	**28**	**30**		**-**	**-**	**800**
	Grand Total	**156**	**205**				**4600**

Non Major Elective

1. NME- I - U21CON31-Personal Finance and Planning (Practical)
2. NME –II - U21CON42-Commerce (Practical)

Additional Two Credit Courses

1. U21COO31-Online Course – III Semester,
2. U21COI41-Internship – IV Semester,
3. U21COV51-Value added course: Project Finance - Semester

SEMESTER-I

COURSE CODE	U21COT11	FINANCIAL ACCOUNTING-I	L	T	P	C
CORE I			6	-	-	4

Course Objectives:

The main objectives of this course are :

1. To enable the students to learn basic Financial Accounting.
2. To make the students skillfully to prepare and present the final accounts of sole trader.
3. To learn about various types of errors and calculation of depreciation in accounts.
4. To understand about Bill of Exchange and accounting for professionals.
5. To understand about the various accounts in Non-Trading Concern.

Unit 1 : **Introduction to Accountancy**

Accounting-Introduction-Meaning and Definition-Meaning and Scope of Accounting-Types of Accounting-Accounting concepts and Conventions- Functions of Accounting -Objectives of accounting-Book-keeping and accounting-Double entry system- Accounting Rules- Journal-ledger-Subsidiary Books- Preparation of Trial Balance -Advantages and disadvantages of Accounting.

Unit 2 : Errors rectification and Final Accounts

Average Due date – Account Current. Classification of errors – Rectification of errors – Preparation of Suspense Account. Bank Reconciliation Statement. Final accounts with adjustments – closing stock, outstanding expenses, unexpired or prepaid expense, accrued income, income received in advance, depreciation, additional bad debts, provision for doubtful debts, provide for a discount on debtors, interest on capital, interest in drawing, discount on creditors and creation of various reserves

Unit 3: Methods of Depreciation

Accounting for depreciation – Need for and significance of depreciation, Depreciation, Reserves and Provisions - Depreciation, Depletion and Amortization - Objectives of providing depreciation - causes of depreciation - methods of recording depreciation - straight line method - Diminishing Balance Method - Changes in method of depreciation - Machine Hour Rate Method - Depletion Method - Revaluation Method.

Unit 4 : Bills of Exchange

Bill of exchange – Types of Bill of Exchange-Promissory Note-Importance of Promissory note in Bill of Exchange- Accounting Treatment of Bill of Exchange-Bill Is Discounted With the Bank-Accommodation bills – Average due date – Account current.

Unit 5: Receipts and Payments

Receipt and Payment Account -Features of Receipt and Payment Accounts-Concept. Accounts of Non – Profitable Concerns- Receipts and Payments - Income and Expenditure Account and Balance Sheet.

Note: Question Paper shall cover 40% Theory and 60% Problem

Text books:

1. S.P. Jain & K.L. Narang, " Advanced Accounting", Kalyani publishers New Delhi, Delhi, Volume – I, 18th Revised Edition, 2014.

2. T.S.Reddy and A.Murthy, " Financial Accounting", Margam publications, Chennai – 600 017, 7th revised edition 2015.
3. R.L. Gupta and Radhasamy, "Advanced accounting" S.Chand & company ltd., New Delhi, edition 2013**.**

Reference books:

1. Dr. M.A. Arulanandam & Dr. K.S. Raman, "Advanced Accountancy" Himalaya publications, New Delhi, 1st edition 2015.
2. M.C. Shukla, T.S. Grewal & S.C. Gupta, "Advanced accounts", Sultan & chand publications, New Delhi 2013.
3. P.L. Nagarajan N.Vinayagam, Mani.P.L "Principles of Accountancy", S.Chand & company ltd, New Delhi – 2013.
4. T.S. Grewal," Introduction to Accountancy", S.Chand & company ltd, New Delhi – 2014. 5. P.L. Tulsian – Advanced Accountancy – Tata MC Grow Hill companies.

Course outcomes: At the end of the course, students would be able to:

1	recall Accounting Concepts and Conventions and use Accounting rules to record business transactions in the form of Journal, Ledger, subsidiary books and preparation of Trial Balance.	K1
2	understand the steps involved in locating errors and prepare them to understand the to preparation of final accounts for sole traders.	K2
3	outline the concepts of Bills of exchange, Average due date and Account Current	K2
4	examine the concepts of consignment and joint venture.	K4
5	analyze the bank reconciliation statement, Receipts and payments, Income and expenditure and Balance sheet and accounting for professionals to enhance the knowledge.	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping Outcomes- POs and PSOs

	PO					PSO								Means Score of COS
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	4	3	4	3	4	43/13=3.30
CO-2	4	3	4	3	3	3	3	4	4	3	3	3	4	44/13=3.38
CO-3	3	3	4	3	3	4	4	4	4	3	4	3	3	46/13=3.53
CO-4	4	3	4	3	4	4	3	4	3	4	3	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	3	3	4	3	4	45/13=3.46 **17.28/5=3.456**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT12	BUSINESS ORGANIZATION AND MANAGEMENT	L	T	P	C
CORE II			5	-	-	4

Course Objectives:

The main objectives of this course are :

1. To understand different forms of organization
2. To understand various factors affecting business organization and functioning of stock exchange
3. To provide insight about office functioning, data processing system and EDP

Unit 1: Concept If Business and Organization

Concepts of Business, Trade, Industry and Commerce- Objectives and functions of Business– Social Responsibility of a business, Responsible Business, Ethical Conduct & Human Values. Forms of Business Organization-Meaning, Characteristics, Advantages and Disadvantages of Sole Proprietorship – Meaning, Characteristics, Advantages and Disadvantages of Partnership - Kinds of Partners - Partnership Deed - Concept of Limited liability partnership – Meaning, Characteristics, Advantages and Disadvantages of Hindu Undivided Family – Meaning, Advantages and Disadvantages of Co-operative Organization.

Unit 2: Company Clauses and Articles of Association

Joint Stock Company- Meaning, Definition, Characteristics - Advantages and Disadvantages, Code of Business Ethics. Kinds of Companies - Promotion - Stages of Promotion - Promoter - Characteristics - Kinds - Preparation of Important Documents - Memorandum of Association - Clauses - Articles of Association - Contents –Prospectus - Contents – Red herring Prospectus- Statement In lieu of Prospectus (as per Companies Act, 2013).

Unit 3:Functions of Management

Management - Meaning - Characteristics - Fayol's 14 Principles of Management. Functions of Management - Levels of Management – Skills of Management- Scientific Management - meaning, objectives, relevance and criticism.

Unit 4: Process of Organization

Planning -Meaning, Characteristics, Types of Plans, Advantages and Disadvantages – Approaches to Planning - Management by Objectives (MBO) - Steps in MBO - Benefits –Weaknesses. Organizing - Process of Organizing; Principles of Organization - Formal and Informal Organization - Line, Staff Organizations, Line and Staff Conflicts. Functional Organization, Span of Management - Meaning - Determining Span - Factors influencing the Span of Supervision.

Unit 5: Steps in Management Process

Meaning of Authority, Power, responsibility and accountability - Delegation of Authority Decentralization of Authority - Definition, importance, process, and principles of Coordination techniques of Effective Coordination. Control-Meaning, Relationship between planning and control, Steps in Control – Types (post, current, and pre-control). Requirements for effective control.

Note: Question Paper shall cover 100% Theory\

Text Books:

1. Basu, C. R. (1998). Business Organization and Management. New Delhi: McGraw Hill Publishing India. Chhabra, T. N. (2011).
2. Business Organization and Management. New Delhi: Sun India Publications. Gupta, C. B. (2011).

Reference Books:

1. Modern Business Organization. New Delhi: Mayur Paperbacks. Kaul, V. K. (2012).
2. Business Organization and Management, Text and Cases. New Delhi: Pearson Education. Koontz, H., & Weihrich, H. (2008).
3. Essentials of Management. New York: McGraw Hill Education. Singh, B. P., & Singh, A. K. (2002).

Course outcomes: At the end of the course, students would be able to:

1	understand the concepts of business and its forms of organizations involved insole trader, partnership firms, companies and co-operative societies and public enterprise.	K2
2	analyze the business factors which are involved in sources of finance.	K4
3	explain the functioning of stock exchanges SEBI, DEMAT of shares.	K2
4	remember office functions, layout and accommodation.	K1
5	outline office equipments and EDP.	K2
	K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create	

Mapping Outcomes- POs and PSOs

	PO					PSO								Means Score of COS
	1	2	3	4	5	1	2	3	4	5	6	7	8	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	42/13=3.23
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	44/13=3.38
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.83/5=3.366**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COA11	BUSINESS ECONOMICS	L	T	P	C
ALLIED- I			5	-	-	4

Course Objectives:

The main objectives of the course are

1.To make an economic analysis, with particular application to decision-making in business, and the effects of policy on the broader economic environment in which business decisions must be made.

2. To learn and understand these concepts and principles and to apply them to a variety of economic situations.

3. To understand the Demand and Supply functions and its Law

4. To analyse the cost and production function.

5. To understand the perfect and imperfect completion in an Business Environment.

Unit 1: Introduction of Economics

Introduction to Managerial Economics Business Economics: Definitions, scope, role in Business decisions- Economics systems – theories of economics -Interdependence of Micro and Macro Economics – theory of firm - Production Possibility Curve - Opportunity Cost – consumer preference- utility analysis and Types of Utility -Introduction to Cardinal and Ordinal Approaches- indifference curve analysis - roles of business economist.

Unit 2: Law of Function

Production Laws and Functions Production Concept - Importance and Factors of Production- Theory Production Function: Meaning, Concept of productivity and technology – production laws- Short Run and long run production function - Introduction to Iso-quants.

Unit 3: Demand and Supply

Demand and Supply laws Demand and its Determination: Demand function - Determinants of demand - Demand elasticity, degrees and methods – Price, Income and cross elasticity - Use of elasticity for analyzing demand - Demand forecasting: Introduction and techniques – supply law – elasticity of supply.

Unit 4:Cost Output Relationship in Short and Long Run

Cost Output Relationship Cost analysis: Cost concepts and classification, cost-output relationship Determinants of cost - short run and long run cost theory - Modern Theory of Cost - Relationship between cost and production function - cost control and cost reduction - Concept of Revenue - Different Types of Revenues- scale of economies.

Unit 5:Market and Competition

Market Structure Market structure - Perfect competition: features, Assumptions -Equilibrium of the firm and the industry in the short and the long runs - imperfect competitions: Monopoly: features - Short-run and long-run equilibrium of monopoly firm -Price discrimination -Monopolistic Competition: features Assumption; Short – run and Long run Equilibriums - Oligopoly: features Causes for the existence of oligopolistic firms in the market rather than perfect Competition - difference between perfect and Imperfect competitions.

Note: Question Paper shall cover 100% Theory

Text Books:

1. S.Shankaran, Business Economics - Margham Publications - Ch -17
2. P.L. Mehta, Managerial Economics - Analysis, Problems & Cases ,Sultan Chand & Sons. New

Delhi– 02.
3. C.M.Chaudhary, Business Economics - RBSA Publishers - Jaipur - 03**.**

Reference Books:

1. Francis Cherunilam, Business Environment - Himalaya Publishing House Mumbai – 04.
2. Peter Mitchelson and Andrew Mann, Economics for Business - Thomas Nelson Australia
3. H.L. Ahuja, Business Economics – Micro & Macro - Sultan Chand & Sons – New Delhi – 55.
4. Yogesh Maheswari, Managerial Economics, PHI Learning, Newdelhi, 2005 Gupta G.S.,
5. Managerial Economics, Tata Mcgraw-Hill, New Delhi Moyer &Harris,
6. Geetika, Ghosh & Choudhury, Managerial Economics, Cengage Learning, New Delhi, 2005.
7. Managerial Economics, Tata Mcgraw Hill, New Delhi, 2011.

Course outcomes: At the end of the course, students would be able to:

1	understand the Business systems, the reason for existence of Firms, consumer preference and application of utility analysis and knowing role of business economist.	K1, K2,K3
2	understand and estimate production function, stages of production and forms of production function and laws	K1, K2,K3
3	understand basic concepts of demand and supply and its determinants, the determinants of elasticity and applications of different forecasting techniques.	K1, K2,K3
4	understand cost function, Analysis cost and concepts of relevant costs and revenues**.**	K1, K2,K3
5	compare and contrast four basic market types, concepts of monopolistic and oligopoly competition and its effect of non-price factors on products and services.	K1, K2,K3
	K1 - Remember; **K2 -** Understand; **K3 -** Apply; **K4 -** Analyze; **K5 -** Evaluate; **K6 -** Create	

Mapping Outcomes- POs and PSOs

	PO					**PSO**								**Means Score of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	44/13=3.38
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	43/13=3.30
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.90/5=3.38**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

SEMESTER II

COURSE CODE	U21COT21	FINANCIAL ACCOUNTING-II	L	T	P	C
CORE-III			4	1	-	4

Course objectives:

The main objectives of this course are :

1. To explore various types of partnership accounts
2. To understand the basic concepts of Partnership accounts
3. To offer an idea about insolvency of partnership accounts
4. To promote knowledge about department and branch accounting
5. To facilitate knowledge about hire purchase and installment system of accounting

Unit 1:Hire Purchase System

Hire-purchase and installment purchase system; Meaning of hire-purchase contract; Legal provision regarding hire-purchase contract; Accounting records for goods of substantial sale values, and accounting records for goods of small values; Installment purchase system; After sales service-Accounting procedure – Calculation of interest - Default and Repossession – Installment Purchase System:

Unit 2: Branch and Departmental accounts

Introduction – Meaning – Objectives – Types of Branches - Dependent Branches – Features – Supply of Goods at Cost Price - Invoice Price – Branch Account in the books of Head Office (Debtors System Only)-Goods and cash-in-transit – Inter branch transactions. Departmental accounts – Allocation of expenses – Inter departmental branches.

Unit 3: Partnership firms

Partnership Accounts: Essential characteristics of partnership; Partnership deed; Final accounts; Adjustments after closing the accounts; Fixed and fluctuating capital; Goodwill; Joint Life Policy; Change in Profit Sharing Ratio. Reconstitution of a partnership firm -Amalgamation of partnership firms; Dissolution of a partnership firm -Modes of dissolution of a firm; Accounting entries;

Unit 4: Revaluation of assets and liabilities

Retirement of partner – Calculation of New ratio and gaining ratio – Revaluation of assets and liabilities – Treatment of goodwill – Adjustment of goodwill through capital A/c only – Settlements of accounts-Admission of new partner-Accounting treatment-Adjustment entries. Death of a partner; Accounting treatment-Adjustment entries.

Unit5: Dissolution and Insolvency of partner

Partnership Accounts - Dissolution of firm - Settlement of accounts - accounting treatment for goodwill and unrecorded assets and liabilities - Insolvency of a partner - Garner vs Murray - Fixed and Fluctuating -Capital - all partners insolvency - Gradual realization and Piecemeal distribution - proportionate Capital Method - Maximum loss Method.

Note: Question Paper shall cover 20% Theory and 80% Problem

Text books:

1. S.P. Jain & K.L. Narang, " Advanced Accounting", Kalyani publishers New Delhi, Delhi, Volume – I, 18th Revised Edition, 2014.
2. T.S.Reddy and A.Murthy, " Financial Accounting", Margam publications, Chennai – 600 017, 7th revised edition 2015.
3. S.P. Jain & K.L. Narang, " Patnership Accounting", Kalyani publishers New Delhi

Reference books:

1. Dr. M.A. Arulanandam & Dr. K.S. Raman, "Advanced Accountancy" Himalaya publications, New Delhi, 1st edition 2015.
2. M.C. Shukla, T.S. Grewal & S.C. Gupta, "Advanced accounts", Sultan & chand publications, New Delhi 2013.
3. R.L. Gupta and Radhasamy, "Advanced accounting" S.Chand & company ltd., New Delhi, edition 2013.
4. T.S. Grewal," Introduction to Accountancy", S.Chand & company Ltd, New Delhi – 2014.
5. P.L. Tulsian – Advanced Accountancy – Tata MC Grow Hill companies.

Course outcomes: At the end of the course, students would be able to:

1	describe the concepts based on depreciation and its methods in books of accounts.	K1
2	outline about the nature of Investment and Royal excluding Sublease.	K2
3	identify the essential characteristics of single entry system.	K3
4	apply the basic concepts of departmental and branch accounting.	K4
5	familiarize the procedure relating to hire purchase and installment in books of accounts	K2
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

	POS					**PSOS**								**Means Score of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	4	3	4	3	4	43/13=3.30
CO-2	4	3	4	3	3	3	3	4	4	3	3	3	4	44/13=3.38
CO-3	3	3	4	3	3	4	4	4	4	3	4	3	3	46/13=3.53
CO-4	4	3	4	3	4	4	3	4	3	4	3	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	3	3	4	3	4	45/13=3.46 **17.28/5=3.456**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT22	PRINCIPLES OF MARKETING	L	T	P	C
CORE-IV			5	-	-	4

Course Objectives:

The main objectives of this course are :

1. To conceptualize an idea about marketing and related terms
2. To provide insight about various forms and types of marketing
3. To analyze various components of marketing channels
4. To understand various concepts relating to consumer behavior
5. To introduce the components of marketing mix

Unit 1: Marketing Concepts

Marketing – Definition of market and marketing – Importance of Marketing – Modern marketing concept – Global marketing – E-marketing and Tele marketing – Meaning and concepts – Marketing ethics – Career opportunities in marketing- Green marketing- Online marketing- Neuro marketing.

Unit 2: Marketing Functions

Marketing functions-Buying -Selling -Transportation -Storage - Financing -Risk Bearing - Standardization - Market Information. Segmentation, Targeting and Positioning: Introduction, Concept of Market Segmentation, Benefits of Market Segmentation, Requisites of Effective Market Segmentation, The Process of Market Segmentation, Bases for Segmenting Consumer Markets, Targeting (T), Market Positioning (P)

Unit 3:Consumer Behaviour and Personal Selling

Consumer behaviour – Meaning – Need for studying consumer behaviour – Factors influencing Consumer behaviour – Market segmentation – Customer relations marketing. Personal selling: Concept and features, classification of sales jobs, qualities and functions of a sales person, prospecting, personal selling process; Functions of a sales manager.

Unit 4:Marketing Mix

Marketing mix – Product mix – Meaning of product – Product life cycle – Branding – Labeling – Price mix – Importance – Pricing objectives – Pricing strategies – Personal selling and sales promotion – Advertising –Place mix – Importance of channels of distribution – Functions of middleman – Importance of retailing in today's context.

Unit 5:CRM and Consumer protection

Customer Relationship Management- Definitions of Customer Relationship Management (CRM),Reasons Behind Losing Customers by Organizations, Significance of Customer Relationship Management, Social Actions Affecting Buyer-Seller Relationships,---Marketing and government – Agricultural marketing – Problems – Remedial measures – Bureau of Indian standards – AGMARK – Consumerism – Consumer protection – Rights of consumers..

Note: Question Paper shall cover 100% Theory

Text Books:

1. R.S.N.Pillai and Bhagavathi, Marketing, S.Chand & Co Ltd, 2009 edition & 2011 reprint, New Delhi.
2. Rajan Nair, Marketing, Sultan Chand & Sons, New Delhi 2005 Edition.
3. Dr.L.Natarajan, Margham, Marketing, Publications, Chennai.

Reference Books:

1. K. Sundar, Essentials of Marketing, Vijay Nicole Imprints Pvt Ltd, Chennai-91.
2. J.Jayasankar, Marketing, Margham Publications, Chennai.
3. Sonatakki, Principles of Marketing, Kalyani Publishers, New Delhi.
4. William J Stanton, Fundamentals of Marketing, Mc Graw Hill Publishing Company Ltd, New Delhi.
5. Philip Kotler & Gary Armstrong, Principles of Marketing, 6th Edition, 2012, Prentice Hall of India Pvt. Ltd, New Delhi.

Course outcomes: At the end of the course, students would be able to:

1	define the various concepts and terms related to marketing	K1
2	explain about various marketing functions	K2
3	understand terms of consumer behaviour and examined about different concepts related to consumers.	K2
4	identify the marketing mix and its elements	K1
5	understand different provisions related to trends in emerging markets.	K2
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

	POS					**PSOS**								**Means Score of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	44/13=3.38
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	43/13=3.30
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.90/5=3.38**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COA22	BUSINESS COMMUNICATION	L	T	P	C
ALLIED - II			5	-	-	4

Course Objectives:

The main objectives of this course are :

1. To provide information on effective business communication and techniques to respond tobusiness queries.
2. To provide knowledge about banking correspondence and company secretarial correspondence.

Unit 1: Business Communication Concepts

Business Communication: Meaning – Objectives – Media – Barriers - Importance of Effective Business Communication- Modern Communication Methods - Business Letters: Need - Functions - Kinds - Essentials of Effective Business Letters - Layout-Barriers to Communication, the Importance of Communication in the Workplace.

Unit 2: Business Correspondence

Business Correspondence : Enquiries - Replies - offers and quotations - Orders and their Execution - Credit and Status Enquiries - Meaning - Trade and bank references - Acknowledgment letters.- Sales letters.-Complaints and Adjustments - Collection Letters - How to write effective Collection letters - Sales Letters - Circular Letters.

Unit 3: Banking Correspondence

Banking Correspondence - Introduction - correspondence with customer, Head office – Insurance Correspondence –Life insurance- Fire insurance - Marine insurance - Agency Correspondence. Letters exchanged between two individual banks-Credit, Financial or Status Inquiries

Unit 4: Company Secretarial Correspondence

Company Secretarial Correspondence - With the Directors-With the Shareholders-With the Office Staff -With the Registrar of companies Agenda, Minutes and Report Writing- Types- Characteristics of good Report- Report of individuals.

Unit 5: Methods of Communication

Application for Jobs: Preparation of resume- Interviews- Meaning- types of Interview- Candidates preparing for an interview- guidelines to be observed during an interview- Business Report Presentations. Strategic Importance of E-Communication. Email, Text Messaging, Slide or Visual Presentation - Internet - Video conferencing - Group Discussion – Social Networking.

Note: Question Paper shall cover 100% Theory

Text Books:

1. Rajendra Pal, J.S. Korahilli, Essentials of Business Communication, Sultan Chand & Sons, New Delhi.
2. N.S.Raghunathan & B.Santhanam, Business Communication, Margham Publications,

Chennai.
3. R.S.N.Pillai and Bhagavathi.S, Commercial Correspondence, Chand Publications, New Delhi.

Reference Books:

1. M.S. Ramesh and R.Pattenshetty, Effective Business English and Correspondence, S.Chand & Co, Publishers, New Delhi-2.
2. V.R. Palanivelu & N. Subburaj, Business Communication, Himalaya Publishing Pvt. Ltd, Mumbai.
3. Sathya Swaroop Debasish, Bhagaban Das, Business Communication, PHI Learning Pvt. Ltd., New Delhi, 2010 Edition.
4. Communication conquer: Pushpalatha & Kumar, A Handbook of group discussion and Job Interview, PHI Learning Publisher.
5. Lesikar, R.V. & Flatley, M.E. Basic Business Communication Skills for Empowering Internet Generation, Tata Mc Graw Hill Publishing Company Ltd, New Delhi.

Course outcomes: At the end of the course, students would be able to:

1	Outline the importance of effective business communication	K2
2	Understand the intricacies of responding to business related queries	K2
3	Categorize effective correspondence with banks, insurance and agencies	K3
4	Examine effective response to company secretarial correspondence	K4
5	Analyze new innovative and effective ideas for business communication	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping Outcomes - POs and PSOs

	POS					**PSOS**								**Means Score of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	4	3	4	3	3	4	4	4	48/13=3.69
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.29
CO-3	4	3	4	4	4	3	4	4	4	3	4	4	3	48/13=3.69
CO-4	4	3	4	4	3	4	3	3	3	4	4	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **17.81/5=3.562**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

SEMESTER -III

COURSE CODE	U21COT31	BUSINESS STATISTICS	L	T	P	C
CORE –V			3	2	-	4

Course Objectives:

The main objectives of the course are:

1. To promote the skill of applying statistical techniques in business by enabling the students to apply the statistical tools in analysis and interpretation of data.
2. To understand the various measures of dispersion as Range, Quartile deviation and skewness.
3. To understand the practical knowledge on Correlation and Regression.

Unit 1: Introduction and Measures of Central Tendency

Introduction and Measures of Central Tendency: Introduction – Collection and Tabulation of Statistical data – Frequency Distribution – Measure of Central Tendency – Mean, Median, Mode, Harmonic Mean and Geometric Mean, Combined Mean.

Unit 2: Measures of Dispersion

Measures of Dispersion: Measures of Dispersion – Range – Quartile Deviation – Mean Deviation – Standard Deviation and their Co-efficient. Measure of Skewness – Karl Pearson and Bowley's Co-efficient of skewness.

Unit 3: Correlation and Regression

Correlation and Regression: Correlation – Types of Correlation – Measures of Correlation - Karl Pearson's Co-efficient of Correlation – Spearman Rank Correlation Co-efficient. Simple regression analysis – Regression equation, Fitting of Regression lines – Relationship between Regression Co-efficient and Correlation Co-efficient.

Unit 4: Index Numbers

Index Numbers: Index Number, Definition of Index Numbers, Uses – Problems in the construction of index numbers, Simple and Weighted index numbers. Chain and Fixed base index – Cost of living index numbers.

Unit 5: Analysis of Time Series

Analysis of Time Series: Analysis of Time Series – Definition – Components of Time Series, Uses, Measures of Secular Trend, Measure of Seasonal Variation. Method of simple average only. Indian Statistics – Birth and Death rates – Crude, Correlated and Standardized – Methods of Economic survey, preparation of schedules and questionnaires.

Note: Question Paper shall cover 20% Theory and 80% Problem

Text Books:

1. P.A. Navaneethan, Business Statistics, Jai Publishers, Trichy-21.
2. Wilson. M, Business Statistics, Himalaya Publishing House Pvt Ltd., Mumbai.
3. Pillai, RSN and V. Bagavathi, Statistics, S. Chand & Company Ltd., New Delhi, 2010.

Reference Books:

1. S.P.Gupta, Statistical Methods, Sultan Chand & Sons, New Delhi.
2. S.P. Rajagopalan & Sattanathan, Business Statistics, Vijay Nicole Imprints Pvt. Ltd, Chennai-91.
3. D.C.Sanchati and V.K.Kapoor, Statistics, Sultan Chand & Sons, New Delhi.
4. S.C. Gupta & V.K.Kapoor, Fundamentals of Mathematical Statistics, S.Chand & Sons, New Delhi, 2009.
5. S.P.Gupta & M.P.Gupta, Business Statistics, Sultan Chand & Sons, New Delhi.

Course outcomes: At the end of the course, students would be able to:

1	acquire knowledge about averages to be used in Business Research	K1, K2,K3
2	gain knowledge about Standard Deviation, Skewness.	K1, K2,K3
3	gain knowledge about the application of Correlation and Regression	K1, K2,K3
4	get an in depth knowledge about Index Numbers	K1, K2,K3
5	acquire knowledge in Measures of Trend and its application in Business Research.	K1, K2,K3 , K6

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Mapping- POs and PSOs

	POS						**PSOS**							**Means Score of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	3	4	3	3	3	4	4	3	3	4	4	46/13=3.53
CO-2	4	3	4	4	3	3	4	4	3	3	3	3	4	48/13=3.69
CO-3	4	3	4	4	4	4	4	4	4	3	4	4	3	49/13=3.76
CO-4	4	3	4	4	4	4	3	3	4	4	4	4	4	49/13=3.76
CO-5	4	4	3	3	4	4	4	3	3	4	3	4	3	46/13=3.53 **18.27/5=3.654**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COA33	PRINCIPLES OF INSURANCE	L	T	P	C
ALLIED-III			5	-	-	4

Course Objectives:

The main objectives of this course are :

1. To understand the basic concepts of insurance
2. To familiarize with the concept of working of agency
3. To understand various forms of underwriting
4. To provide knowledge about the formation of insurance companies
5. To acquaint with the basic principles of different types of insurance

Unit1: Insurance an Introduction

Life Insurance Organization : Important Activities, The Indian Context, Internal Organization, The Distribution, System, Appointment of Agent, Functions of Agents, Remuneration of Agents, Trends in Distribution Channels; Plans of Life Insurance : Annuities : Nature of Annuities, Types.- Importance of Insurance to Society, Individuals, Business and Government.

Unit 2: Life Insurance

Life Insurance - Meaning and Features of Life Insurance Contract – Classification of policies – Annuities – Selection of risk – Measurement of risk – Calculation of premium – Investment of funds – Surrender Value - Policy conditions –Life Insurance for the Under Privileged. Plans of Life Insurance : Need Levels, Basic Elements, Some Popular Plans, Limited Payment Plans, Participating Policies, Convertible Plans, Riders, For the Handicapped;

Unit 3: Fire Insurance

Fire Insurance – Meaning, Nature and Use of Fire Insurance- Characteristics of Fire Insurance - Fire Insurance Contract- Kinds of policies – Policy conditions – Payment of claim – Reinsurance – Double insurance- Progress of Fire Insurance-Inclusions under Fire Insurance -Exclusions under Fire Insurance .

nit 4: Marine Insurance

Marine Insurance - Meaning and Nature of Marine Insurance – Classification of policies – Insurance Functions-Eligibility Criteria-Policy conditions – Premium calculation – Marine Losses – Payment of Claims- Progress of Marine Insurance Business in India-Difference between Fire Insurance & Marine Insurance-Inclusions under Marine Insurance -Exclusions under Marine Insurance .

Unit 5: Personal Accident Insurance

Personal Accident Insurance – Motor Insurance – Burglary Insurance – Miscellaneous Forms of Insurance including Social Insurance – Rural Insurance and Prospects of Agriculture Insurance in India – Health Insurance – Liability Insurance - Bancassurance-Inclusions under Personal Accident -Exclusions under Personal Accident.

Note: Question Paper shall cover 100% Theory

Text Books:

1. Mishra. M. N & Mishra. S.B - Insurance - Principles and Practice, S. Chand & Company Ltd. , New Delhi, 22nd Edition, 2016

2. Krishnaswamy. G - A Textbook on Principles and Practice of Life Insurance, Excel Books, New Delhi, First Edition- 2012.
3. Periasamy. P - Principles and Practice of Life Insurance, Himalaya Publishing House, 2017**.**

Reference Books:

1. Bodla B.S., Garg M.C. & Singh K.P., Insurance Fundamentals, Environment and Procedure, Deep & Deep Publications Pvt. Ltd., New Delhi, 2004
2. Ganguly Anand, Insurance Management, New Age International Publishers, New Delhi
3. Hargovind Dayal.,The Fundamentals of Insurance – Theories, Principles and Practices., Notion Press., Chennai., 2017.
4. Taxmann : Insurance Manual, Taxmann Publication Private Limited
5. M. N. Srinivasan : Principles of Insurance Law, Wadhwa & Co.
6. K.C. Mishra and G.E. Thomas, General Insurance - Principles and Practice, Cengage Learning: New Delhi.

Web Resource: https://www.insuranceinstituteofindia.com/

Course outcomes: At the end of the course, students would be able to:

1	Recall the different concepts of insurance and its working	K1
2	Explain the concept of agent and its working system	K2
3	Evaluate the functions of agents and various forms of underwriting	K5
4	Analyze the various actuarial aspects relating to insurance companies	K4
5	List the basic principles of insurance and various types of it.	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping Outcomes - POs and PSOs

	POS					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	4	3	4	3	3	4	4	4	48/13=3.69
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.29
CO-3	4	3	4	4	4	3	4	4	4	3	4	4	3	48/13=3.69
CO-4	4	3	4	4	3	4	3	3	3	4	4	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **17.81/5=3.562**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COE311	CHOICE - I	L	T	P	C
ELECTIVE –I		HUMAN RESOURCE MANAGEMENT	4	-	-	3

Course Objectives:

The objectives of the course are

1.To discuss the role of human resource management in relation to organizational requirements

2.To acquaint students with the techniques and principles to manage human resource of an organization.

3. To understand the various processes of Human Resource Planning

Unit 1: HRM Concept and Functions

Introduction to Human Resource Management HRM Concept and Functions, Role, Status and competencies of HR Manager - HR Policies - Evolution of HRM - HRM vs HRD - Evolution of HRM - Emerging Challenges of Human Resource Management - Workforce diversity; Empowerment - Human Resource Information System.

Unit 2: Human Resource Planning

Acquisition of Human Resource Human Resource Planning- Quantitative and Qualitative Dimensions - job analysis – job description and job specification - Recruitment And Selection – meaning – process of requirement – sources and techniques of Recruitment – Meaning and Process of Selection – Selection Tests And Interviews – placement, induction, socialization and Retention. Retention strategy.

Unit 3: Training and Development

Training and Development Concept and Importance -Training and development methods – Identifying Training and Development Needs - Designing Training Programmes - Role Specific and Competency Based Training - Evaluating Training Effectiveness - Training Process Outsourcing - Management Development - Career Development.

Unit 4: Performance Appraisal

Performance Appraisal Nature, objectives and importance - Modern Methods and techniques of performance appraisal - potential appraisal and employee counselling - job changes - transfers and promotions -Problems in Performance Appraisal – Essentials of Effective Appraisal System – Job Evaluation – Concepts, Process and Objectives – Advantages and Limitations – Methods.

Unit5: Compensation and Maintenance

Compensation and Maintenance Compensation - Concept and policies- wage and Salary administration Methods of wage payments and incentive plans - Fringe benefits - Performance linked compensation - Employee health, welfare and safety social security - Employer-Employee relations- grievance handling and redressal - Grievance handling and redressal.

Note: Question Paper shall cover 100% Theory

Text Books:

1. K. Aswathappa : Human Resource Management Text and Cases: Tata McGraw Hill, New Delhi.
2. George W Bohlander and Scott A Snell: Principles of Human resource Management: Cengage Learning, New Delhi.
3. P.G.Aqinas: Human Resource Management Principles and Practice: Vikas Publishing House Pvt. Ltd., New Delhi

Reference Books:

1. Gary Dessler. A Framework for Human Resource Management. Pearson Education.
2. DeCenzo, D.A. and S.P. Robbins, Personnel/Human Resource Management, Pearson Education.
3. Bohlendar and Snell, Principles of Human Resource Management, Cengage Learning.
4. Ivancevich, John M. Human Resource Management. McGraw Hill.
5. Wreather and Davis. Human Resource Management. Pearson Education.
6. Robert L. Mathis and John H. Jackson. Human Resource Management. Cengage Learning.
7. TN Chhabra, Human Resource Management, Dhanpat Rai & Co., Delhi.
8. Biswajeet Patttanayak, Human Resource Management, PHI Learning.
9. Khurana Ashok, Human Resource Management, V.K. Publications.
10. Sankalp Gaurav, Human Resource Management, Sahitya Bhawan Publications.
11. Human Resource Management by Kalyani Publishers.

Course outcomes: At the end of the course, students would be able to:

1	understand the recent HRM concepts and its challenges	K1, K2,K3
2	know the job analysis for placing the suitable person at the suitable place	K1, K2,K3
3	gain the benefits of training and development to the employees of an organisation with a view to attaining goals of the organization	K1, K2,K3
4	gain basic knowledge of assessing and techniques of performance appraisal	K1, K2,K3
5	understand Compensation and Maintenance of Compensation system	K1, K2,K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Mapping- POs and PSOs

	POS					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	3	4	3	3	3	4	4	3	3	4	4	46/13=3.53
CO-2	4	3	4	4	3	3	4	4	3	3	3	3	4	48/13=3.69
CO-3	4	3	4	4	4	4	4	4	4	3	4	4	3	49/13=3.76
CO-4	4	3	4	4	4	4	3	3	4	4	4	4	4	49/13=3.76
CO-5	4	4	3	3	4	4	4	3	3	4	3	4	3	46/13=3.53 **18.27/5=3.654**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COE312	CHOICE - II	L	T	P	C
ELECTIVE –I		TRAINING AND DEVELOPMENT	4	-	-	3

Course Objectives:

The main objectives are

1.To equip the learners with the concept and practice of Training and Development in the modern organizational setting through the pedagogy of case discussions and recent experiences.

2. To understand the concepts and various types of analysis in Training

3. To understand the various evaluation techniques in Training and Development

Unit 1: Introduction to Training and Development

Introduction Concepts and Rationale of Training and Development; overview of training and development systems; organizing training department; training and development policies; linking training and development to company's strategy; Requisites of Effective Training; Role of External agencies in Training and Development.

Unit 2: **Training Need Analysis**

Training Need Analysis (TNA) Meaning and purpose of TNA, TNA at different levels, Approaches for TNA, output of TNA, methods used in TNA.

Unit 3: **Training and Development Methodologies**

Training and Development Methodologies Overview of Training Methodologies- Skills of an Effective Trainer; Use of Audio-Visual Aids in training; Computer Aided Instructions- Distance Learning, Open Learning, E- Learning; Technologies Convergence and Multimedia Environment. Development Techniques for enhancing decision–making and interpersonal skills, Demonstration and Practice Monitoring; Coaching; Self Diagnostic Skills, Experience Learning, Discovery Learning, Brainstorming, Counselling, Position Rotation, Team Building, and Sensitivity Training.

Unit 4: Designing Training & Development Programme

Designing Training & Development Programme Organization of Training and Development programmes, Training design, kinds of training and development programmes- competence based and role-based training; orientation and socialization; diversity training, choice of training and development methods, Preparation of trainers; developing training materials; E-learning environment; Flexible learning modules; Self development; Training process outsourcing.

Unit 5: Evaluation of Training and Development

Evaluation of Training and Development Reasons for evaluating Training and development programmes, Problems in evaluation; Evaluation planning and data collection, different evaluation frameworks, Problems of Measurement and Evaluation; Costing of training, measuring costs and benefits of training programmes, obtaining feedback of trainees; Methods of evaluating effectiveness of Training Efforts; Kirkpatrick Model of Training Effectiveness; Training issues resulting from the external environment and internal needs of the company.

Note: Question Paper shall cover 100% Theory

Text Books:

1. Sharma, D., & Kaushik, S. (2019). Training & Development. New Delhi: JSR Publishing House.

Reference Books:

1. Blanchard, N. P., & Thacker, J. W. (2012). Effective Training: Systems, Strategies and Practices, 4 th Edition. New York: Pearson Education.
2. Noe, R. A., & Kodwani, A. D. (2018). Employee Training and Development, 7th Edition. New York: McGraw Hill Education.
3. Lynton, R. P., & Pareek, U. (2011). Training for Development. New Delhi: SAGE India.
4. Phillips, J. J., & Phillips, P. P. (2016). Handbook of Training Evaluation and Measurement Methods. Houston: Gulf Publishing Co.
5. Prior, J. (1991). Handbook of Training and Development. Mumbai: Jaico Publishing House.

Course outcomes: At the end of the course, students would be able to:

1	analyse the training strategies adopted by companies in real situations	K1, K2,K3
2	identify training needs of an individual by conducting Training Need Analysis	K1, K2,K3
3	differentiate between the applicability of various training strategies and select a strategy based upon the result of TNA	K1, K2,K3
4	develop a training and development module	K1, K2,K3
5	evaluate and assess the cost and benefits of a training and development programme.	K1, K2,K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Mapping- POs and PSOs

	POS					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	44/13=3.38
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	43/13=3.30
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.90/5=3.38**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

SEMESTER IV

COURSE CODE	U21COT41	COST ACCOUNTING	L	T	P	C
CORE-VI			3	1	-	4

Course Objectives:

The main objectives of this course are :

1. To understand the concept and various components of costing
2. To assist preparation of accounts under process costing
3. To familiarize with the techniques of operating costing

Unit 1: Cost accounting Concept

Meaning, Objectives, Importance and Uses of Cost Accounting, Functions of Cost Accounting Department in an Organization, Difference between Cost Accounting and Financial Accounting; Various Elements of Cost and Classification of Cost; Cost object, Cost unit, Cost driver, Cost reduction and Cost control; Limitations of Cost Accounting; **Cost Sheet:** Meaning and Cost heads in a Cost Sheet, Presentation of Cost Information in Cost Sheet / Statement - Problems on Cost Sheet, Tenders and Quotations

Unit 2: Material Control

Procedure for procurement of materials and documentation involved in procurement of materials – **(**Bill of materials, Material requisition note, Purchase requisition note, Purchase order, Goods received note); Inventory Control: Inventory control techniques and determination of various stock levels – Problems on level setting and computation of EOQ; ABC Analysis, FSN Inventory, VED Inventory, HML Inventory, Physical Control- KANBAN, JIT Inventory Management Technique, Perpetual Inventory system (Concepts only)

Unit 3: Labour Costing

Labour: System of wage payment – Idle time – Control over idle time – Labour turnover. Overhead – classification of overhead – allocation and absorption of overhead. Labour Cost: Meaning, Components, Classification and Importance of Employee (Labour) Cost in Organization; Methods of Remuneration (Payment of Wages and Incentives) Labour Turnover – Meaning, Reasons and Effects of LTO/ETO.

Unit 4: Process costing

Process costing – Features of process costing –Distinction between job costing and process costing - process losses, wastage, scrap, normal process loss – abnormal loss, abnormal gain. (Excluding inter process profits and equivalent production).-Valuation of Work-in-progress

Unit 5: Operating Costing

Operating Costing – Contract costing – Reconciliation of Cost and Financial accounts-Contract Costing: Contract Costing - Definition, Features, Work Certified and Un certified - Incomplete Contact - Escalation Clause - Cost Plus Contract - Contract Account.

Note: Question Paper shall cover 20% Theory and 80% Problem

Text books:

1. S.P. Jain and K.L. Narang, "Cost Accounting", Kalyani publications. New Delhi. Edn. 2011
2. R.S.N. Pillai and V. Bhagavathi, "Cost Accounting", S chand and company ltd., New Delhi. Edn. 2004.
3. T.S. Reddy and Dr. Y. Hari prasad reddy, "Costl Accounting", Margam publications,Chennai – 600 017, 7th Revised Edition 2009.

Reference books:

1. S.P. Iyyangar, "Cost Accounting principles and practice", Sultan chand, New Delhi. 2005 2. V.K.Saxena & C.D. Vashist, "Cost Accounting", Sultan chand, New Delhi 2005
3. M.N. Arora, "Cost Accounting", Sultan chand, New Delhi.2005.
4. B.S. Kanna, I.M. Pandey, G.K. Ahuja, M.N. A rora, Practical costing, sultan chand & sons. Edition 2009.
5. Bhattacharya "Principles and practices of Cost Accounting" PHI Publications, Third Edition – 2010.

Course outcomes: At the end of the course, students would be able to:

1	recall various concepts of costing and costing methods	K1
2	analyze the various elements of costing	K4
3	explain the labour wage payment system	K2
4	outline the cost under process costing system	K2
5	examine about operational costing, contract costing and Reconciliation of Cost and Financial Statements.	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

	POS					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	4	3	4	3	4	43/13=3.30
CO-2	4	3	4	3	3	3	3	4	4	3	3	3	4	44/13=3.38
CO-3	3	3	4	3	3	4	4	4	4	3	4	3	3	46/13=3.53
CO-4	4	3	4	3	4	4	3	4	3	4	3	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	3	3	4	3	4	45/13=3.46 **17.28/5=3.456**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT42	BUSINESS ENVIRONMENT	L	T	P	C
CORE-VII			4	-	-	4

Course Objectives:

The objectives of the course are

1.To provide an overview of Business Environment in India

2.To know the impact of environmental factors on the Business Policies

3.To formulate Decisions and to understand the concept of Corporate Governance, Social Responsibility of Business and Business Ethics.

Unit 1: Introduction to Business Environment

Introduction to Business Environment - Nature and Scope of Business - Concept and Characteristics of Business - Scope of Business - Nature, Objectives and Uses of Study of Business Environment - Types of Business Environment - Micro Environment - Macro Environment - Environmental Analysis - Managing Diversity - Nature and scope of business

Unit 2 : The Constitutional Environment

The Constitutional Environment - Functions and Role of the State - Legal Environment -Functions of state, economic roles of government, government and legal environment. The constitutional environment, rationale and extent of state intervention.

Unit 3:Demographic Environment and Socio-Cultural Environment

Demographic Environment - Culture & Business - Business and Society - Social Responsibilities of Business - Business Ethics & Values - Corporate Governance -Nature and impact of culture on business, culture and globalization, social responsibilities of business, social audit, business ethics and corporate governance, Demographic environment population size, migration and ethnic aspects, birth rate, death rate and age structure

Unit 4 : Economic Systems

Economic Systems - Economic Planning - Economic Parameters - Economic Policies - Consumer Protection Act and Competition Act, 2008 - Liberalization, Privatization and Globalization of Indian Economy.-New industrial policy, FEMA, Monetary and fiscal policies. Consumer Protection Act and Competition Law. Liberalization, Privatization and Globalization of Indian Economy, Trends and Issues

Unit 5: Natural Environment

Natural Environment: Meaning and Components of Natural Environment - Impact of Natural Environment on Business - Guidelines for Development of Natural Resources - Sustainable Development - Green Index. Technological Environment: Meaning, Factors Governed and Impact of Technological Environment - Indicators of Technological Progress - Technology as a Source of Competitive Advantage - Sources of Technological Dynamics - Time Lags in Technology Introduction - Impact of Technology on Globalization.

Note: Question Paper shall cover 100% Theory

Text Books:

1. Gupta C.B., Essentials of Business Environment, Sultan & Chand Publications, New Delhi. First Edition, 2018.
2. Dhanabhakiyam. M & Kavitha. M., Business Environment, Vijay Nicole Imprints Private Ltd., Chennai., 2014. 3. Sankaran, Business Environment, Margham Publications. Chennai

References Books:

1. Cherunilam, F. (2013). Business Environment: Text and cases. New Delhi: Himalaya Publishing House Pvt. Ltd.
2. Sloman, J. & Sutcliffe, M. (2004). Economics for Business (3rd Edition.). New Delhi: Pearson Education.
3. Dhingra, I. C. & Dhingra, N. (2014). Concise Business Environment (1st Ed.). New Delhi: Book Age Publications.
4. Bosch, F. & Man, A. (1994). Government's Impact on the Business Environment and Strategic Management. Journal of General Management, Vol. 19 No. 3
5. Fernando, A. C. (2011). Business Environment. New Delhi, Pearson Education.

Course outcomes: At the end of the course, students would be able to:

1	understand the concept, significance and changing dimensions of Business Environment	K1, K2,K3
2	appreciate the importance and impact of changing laws and regulations on a business firm	K1, K2,K3
3	learn about emerging dimensions in socio-cultural environment and its relevance for a business firm.	K1, K2,K3
4	gain insights on role of economic systems, economic planning, government policies, public sector and development banks, economic reforms, liberalization and its impact on business.	K1, K2,K3
5	gain insights on patent laws, policy on research and development and new technological developments in Business Environment	K1, K2,K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Mapping- POs and PSOs

	POS					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	42/13=3.23
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	44/13=3.38
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.83/5=3.366**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COA44	BUSINESS MATHEMATICS	L	T	P	C
ALLIED - IV			2	2	-	4

Course Objectives:

The main objective of the course is

1.To acquaint students with the familiarity of Business Mathematics and on particular emphasis is laid on the foundation aspects of business mathematics.

2.To understand the theory of sets, Indices and surds

3. To understand the various methods of Depreciation and annuities.

Unit 1: Development of number system

Operations on Numbers – Development of number system – Natural number – Integers – Rational and Irrational numbers – Imaginary numbers – Complex numbers – Greatest Common divisor – Least Common multiple**.**

Unit 2:Theory of Sets

Theory of Sets – Definition – Types – Union, Intersection, Difference and Complement of Sets – De Morgan's Law – Venn Diagram – Simple set applications – Numbers of elements in a finite set.

Unit 3: Indices and Surds

Indices and Surds – Positive indices – Laws of indices – Zero and Unity index – Fractional index – Miscellaneous illustrations – Surds – Definition – Types of Surds – Similar Surds – Conjugate Surds – Rationalizing factors – Properties of Bi-quadratic surds – Square root of a surds – Square root of trinomial quadratic surd.

Unit 4: Depreciation and Annuities

Interest, Depreciation and Annuities – Simple Interest – Compound Interest – Depreciation – Annuities – Types of Annuities – Definite integral – Simple applications – Finding total and average cost function – Producer surplus and consumer surplus.

Unit 5: Probability and Matrices

Probability and Matrices – Terminology – Probability measure – Classical or priori probability – Types of approach and Mathematical expectation – Matrices – definition – Types – Addition, Subtraction, Multiplication of Matrices – Inverse matrix – Solving a system of simultaneous linear equations using matrix inversion technique – rank of a matrix.

Note: Question Paper shall cover 20% Theory and 80% Problem

Text Books:

1. Business Mathematics – V.Sundaresan and S.D.Jeyaseelan.
2. Business Mathematics – M.Manoharan and C.Elango, Palani Paramount Publications.

Reference Books:

1. Business Mathematics – J.K.Singh, Himalaya Publishing House.
2. Business Mathematics – R.S.Soni, Arneet Kaur Soni, Himalaya Publishing House.
3. Business Mathematics – M.L.Bhargara, Dr.Ashok Saini, Dr.Dalip Singh, Jeevansons Publication.

Course outcomes: At the end of the course, students would be able to:

1	understand the number system	K1, K2,K3
2	understand the set theory	K1, K2,K3
3	Know the calculations of indices and surds	K1, K2,K3
4	Understand the calculations of interest , annuities and depreciation	K1, K2,K3
5	Know the applications of probability distributions and matrices	K1, K2,K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Mapping Outcomes - POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	4	3	4	3	4	43/13=3.30
CO-2	4	3	4	3	3	3	3	4	4	3	3	3	4	44/13=3.38
CO-3	3	3	4	3	3	4	4	4	4	3	4	3	3	46/13=3.53
CO-4	4	3	4	3	4	4	3	4	3	4	3	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	3	3	4	3	4	45/13=3.46 **17.28/5=3.456**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COE421	CHOICE -I	L	T	P	C
ELECTIVE –III		ELEMENTS OF E-COMMERCE	3	-	-	3

Course Objectives:
The objectives of the course are
1. To enable the students to gain basic knowledge of Electronic-Commerce in the area of Business and Financing decisions
2. To understand the components of E-Commerce
3. To understand the Client Server Network Security

Unit 1: E-Commerce an Introduction
Electronic Commerce Framework -Traditional vs. Electronic Business Applications - The Anatomy of E-Commerce Applications -Overview of developments in Information Technology and Defining E-Commerce: The scope of E commerce, Electronic Market, Electronic Data Interchange, Internet Commerce, Benefits and limitations of E-Commerce.

Unit 2: E-Commerce Components
Network Infrastructure for E-Commerce Components of the I-way-Global Information Distribution Networks – Public Policy Issues Shaping the I-way. The Internet as a Network Infrastructure. The Business of the Internet Commercialization.-E-Retailing: Traditional retailing and e retailing, Benefits of e retailing, Key success factors.

Unit 3: Client Server Network Security
Models of e retailing, Features of e retailing. E services: Categories of e-services, Web-enabled services, matchmaking services, Information-selling on the web, e entertainment, Auctions and other specialized services. Business to Business Electronic Commerce-Network Security and Firewalls – Client Server Network Security – Firewalls and Network Security – Data and Message Security – Encrypted Documents and Electronic -Mail.

Unit 4: Business to Business Communication
Electronic Commerce and World-Wide-Web, Consumer Oriented E-Commerce, Electronic Payment Systems, Electronic Data Interchange (EDI), EDI Applications in Business, EDI and E-Commerce – EDI Implementation. -Produce a generic framework for E-Commerce, Architectural framework of Electronic Commerce, Web based E Commerce Architecture.

Unit 5: Multimedia and Digital video
Multimedia and Digital video- key multimedia concepts, Digital Video and Electronic Commerce-Desktop Video processing – Desktop Video conferencing-Digital video compression/decompression-Types of desktop video conferencing.
Note: Question Paper shall cover 100% Theory

Text Books:
1. Kalakota, R and Winston, AB 2002 Frontiers of Electronic Commerce, Addison Westey
2. David Kosiur, 2002 Understanding Electronic Commerce, Microsoft Press,

3. Saily Chan & John Wiley 2000Electronic Commerce Management, Tata McGraw Hill, New Delhi.

Reference Books:

1. Parag Diwan& Sunil Sharma 2000 E-Commerce A Managerial guide to EBusiness Deep & Deep Pub.,Delhi

2. Agarwal Kamalesh N & Agarwal Deeksha _2000 Business On the Net – Introduction to the Electronic Commerce, Mc Millan India Pub, New Delhi

3. Soka, From EDI to Electronic Commerce,2002 Tata McGraw Hill, New Delhi.

Course outcomes: At the end of the course, students would be able to:

1	understand basic concepts on e-commerce	K1, K2,K3
2	understand various methods on Architectural aspect of e-Commerce**.**	K1, K2,K3
3	gain essential knowledge on security aspect of e-commerce	K1, K2,K3
4	gain application knowledge on ecommerce in business.	K1, K2,K3
5	gain conceptual knowledge on multimedia in e-commerce	K1, K2,K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Mapping outcomes - POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	44/13=3.38
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	43/13=3.30
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.90/5=3.38**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COE422	CHOICE -II	L	T	P	C
ELLECTIVE - III		DIGITAL MARKETING	3	-	-	3

Learning Objectives:

The objectives of the course are

1.To provide knowledge about the concepts, tools, techniques, and relevance of digital marketing in the present changing scenario.

2. To understand the various components of Digital Marketing Management

3. To understand the various basic concepts on online marketing, Interactive Marketing and Artificial Intelligence in Marketing.

Unit 1:Concept of Digital Marketing

Concept, scope, and importance of digital marketing. Traditional marketing versus digital marketing. Challenges and opportunities for digital marketing. Digital penetration in the Indian market. Benefits to the customer; Digital marketing landscape: an overview. Ethical issues and legal challenges in digital marketing. Regulatory framework for digital marketing in India.

Unit 2: Digital Marketing Management

Digital-marketing mix. Segmentation, Targeting, Differentiation, and Positioning: Concept, levels, and strategies in a digital environment; Digital technology and customer-relationship management. Digital consumers and their buying decision process.

Unit 3:Digital Marketing Presence

Concept and role of Internet in marketing. Online marketing domains. The P.O.E.M framework. Website design and Domain name branding. Search engine optimization: stages, types of traffic, tactics. Online advertising: types, formats, requisites of a good online advertisement. Buying models. Online public relation management. Direct marketing: scope and growth. Email marketing, Facebook marketing, YouTube and Video marketing, Twitter Marketing, Instagram Marketing: types and strategies.

Unit 4:Interactive Marketing

Interactive marketing: concept and options. Social media marketing: concept and tools. Online communities and social networks. Blogging: types and role. Video marketing: tools and techniques. Mobile marketing tools. PPC marketing. Payment options.

Unit 5: Artificial Intelligence in Marketing

Introduction of Artificial Intelligence in Marketing, How does AI Work, Benefit of AI in Marketing Automation, Content creation with AI, AI Tools available for Digital marketing

Note: Question Paper shall cover 100% Theory

Text Books:

1. Gupta, S. (2018). Digital Marketing. Delhi: Tata McGraw Hill Education.

Reference Books:

1.Chaffey, D., Chadwick, F. E., Johnston, K., & Mayer, R. (2008). Internet Marketing: Strategy, Implementation, and Practice. New Jersey: Pearson Hall.

2. Frost, R. D., Fox, A., & Strauss, J. (2018). E- Marketing. Abingdon: Routledge.

3.Kapoor, N. (2018). Fundamentals of E-Marketing. Delhi: Pinnacle India.

4.Kotler, P., Kartajaya, H., & Setiawan, I. (2017). Digital Marketing: 4.0 Moving from Traditional to Digital.

5.New Jersey: John Wiley & Sons. Ryan, D., & Calvin, J. (2016). Understanding Digital

Marketing: Marketing Strategies for engaging the Digital Generation.
6.London: Kogan page. Blanchard, O. A. (2011). Social Media ROI: Managing and Measuring Social Media Efforts in Your Organisation. Indianapolis: Que Publishing.
7. Charlesworth, A. (2018). Digital Marketing: A Practical Approach. Abingdon: Routledge.
8.Gay, R., Charlesworth, A., & Esen, R. (2007). Online Marketing: A Customer-led Approach. Oxford: Oxford University Press.
9. Tasner, M. (2015). Marketing in the Moment: The Digital Marketing Guide to generating more sales and reaching your customer first. London: Pearson.

Note: Learners are advised to use latest edition of text books.

Course outcomes: At the end of the course, students would be able to:

1	identify and assess the impact of digital technology in transforming the business environment and also the customer journey;	K1, K2,K3
2	explain the way marketers think, conceptualize, test continuously to optimize their product search on digital platforms;	K1, K2,K3
3	illustrate the measurement of effectiveness of a digital marketing campaign;	K1, K2,K3
4	demonstrate their skills in digital marketing tools such as SEO, Social media, and Blogging for engaging the digital generation;	K1, K2,K3
5	understand the concept of AI in Digital Marketing;	K1, K2,K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Mapping outcomes - POs and PSOs

COS	POS					PSOS								Mean Scores of COS
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	4	3	4	3	3	4	4	4	48/13=3.69
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.29
CO-3	4	3	4	4	4	3	4	4	4	3	4	4	3	48/13=3.69
CO-4	4	3	4	4	3	4	3	3	3	4	4	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **17.81/5=3.562**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

SEMESTER - V

COURSE CODE	U21COT51	MANAGEMENT ACCOUNTING	L	T	P	C
CORE-VIII			5	-	-	4

Course Objectives:

The main objectives of this course are to:

1. To understand the various components of management accounting and related terms
2. To understand analysis using ratio, working capital management and marginal costing
3. To familiarize with budget preparation and budgetary control tools

Unit 1: Management accounting Concepts

Management accounting – Definition – Objectives – Nature – Scope – Merits and limitations – Differences between management accounting and financial accounting – Financial statement analysis – Comparative statement – Common size statement – Trend percentage – Ratio analysis – Meaning – Classification – Liquidity, solvency, turnover and profitability ratios.

Unit 2: Fund Flow and Cash Flow Statement

Fund flow statement – Meaning – Preparation – Schedule of changes in working capital – Funds from operation – Sources and applications – Cash flow statement – Meaning – Difference between fund flow statement and cash flow statement – Preparation of cash flow statement as per AS3.

Unit 3: Budget and Budgetary control

Budget and Budgetary control – Meaning – importance and its Advantages -Essential Of Successful Budgetary Control – Preparation of Budgets – purchase, Sales Budget – Production Budget – Materials Budget – Cash Budget – Flexible Budget- overhead cost Budget.

Unit 4: Standard Costing

Standard costing – Meaning, Advantages and its Limitations. Variance analysis – Significance - Computation of variances (Material and Labour variance only) - Marginal costing – CVP analysis – Break even analysis – BEP - Managerial applications – Margin of safety – Profit planning.

Unit 5: Capital Budgeting

Capital Budgeting – Meaning – Importance – Appraisal methods – Payback period — Accounting rate of return - Discounted cash flow – Net present value – Profitability index – Internal rate of return.

Note: Question Paper shall cover 20% Theory and 80% Problem

Text Books (Latest revised edition only)

1. Management accounting by S.N.Maheswari – Sultan Chand & sons publications, New Delhi
2. Management accounting by Sharma and Guptha, Kalyani Publishers, Chennai.
3. Management accounting by R.Ramachandran and R.Srinivasan – Sriram publication, Trichy

Reference Books (Latest revised edition only)

1. Management Accounting by R.S.N.Pillai&V.Baghavathi – S.Chand& Co, Mumbai.
2. Management Accounting by E.Gordon, P.Jeyaram, N.Sundaram & R. Jayachandran, Himalaya Publishing House, Mumbai.
3. Management Accounting by Reddy.T.S & Hari Prasath.Y, Margham Publications, Chennai.

4. Management accounting by A. Murthi and S. Gurusamy, Vijay Nicole Publications, Chennai.
5. Management accounting by Hingorani&Ramanthan – S.Chand& Co, New Delhi.

Course outcomes: At the end of the course, students would be able to:

1	outline the various concepts relating to management accounting	K2
2	analyze financial statements using ratio analysis	K4
3	evaluate the working capital management of companies	K5
4	comparing various alternatives using marginal costing and decision making	K2
5	analyze new budget and budgetary control for organizations	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	4	3	4	3	3	4	4	4	48/13=3.69
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.29
CO-3	4	3	4	4	4	3	4	4	4	3	4	4	3	48/13=3.69
CO-4	4	3	4	4	3	4	3	3	3	4	4	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **17.81/5=3.562**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT52	AUDITING	L	T	P	C
CORE-IX			5	-	-	4

Course Objectives:

The main objectives of this course are :

1. To understand the various concepts of auditing and the procedure for the conduct of internalaudit
2. To familiarize with the process of valuing assets and liabilities
3. To understand the process of auditing the joint stock companies and investigation mechanism

Unit 1 :Auditing An Introduction

Introduction – Meaning – Features – Objectives – Advantages of Auditing – Materiality in Auditing – Classifications or various types of Audit – Techniques of Auditing – Audit Evidence – Criteria for Selection of Audit Evidence – Process of gathering Evidence**.**

Unit 2 : Audit Programme

Audit Programme – Audit Note Book – Working Paper – Audit Planning - Engagement of an Auditor for Audit Work – Internal Control – Objectives of Internal Control – Forms of Internal Control – Merits and drawback of Internal Control – Internal Audit – Features – Objectives – Advantages of Internal Audit – Distinction Between Internal Control and Internal audit.

Unit 3: Vouching of Trade Transactions

Meaning – Definition – Objective – Requisites of a Valid Voucher – Types of Vouching – Vouching of Cash Transaction – Vouching of Trade Transactions- Verification – Objects of Verification – Principles of Verification – Verification and Valuation of Assets – Verification of Liabilities.

Unit 4 :Auditors Appointment and Removal

Auditors of a Company – Appointment – Removal – Remuneration – Qualification and Disqualification of Auditor – Rights, Duties and Powers of Auditor, Liabilities of Auditor – Audit Report – Types of Audit Report – Statutory Report – Matters to be included in the Audit Report.

Unit 5: Cost Audit and Management Audit

Cost Audit - Management Audit – Process of Management Audit – Human Resource Audit – Environment Audit – Social Audit - Forensic Audit- Computerised Audit – Benefits – Deficiencies – Role of Auditor in Computerised Environment – Audit of Government Accounts – Features of Government Audit – Functions of Comptroller and Audit General of India – Duties of Accountant General – Various authorities role in auditing.

Note: Question Paper shall cover 100% Theory

Text Books:

1. Tandon B.N 2015 Practical Auditing, S.Chand & Co, New Delhi
2. Sundar K. and Paari, 2016 Auditing Vijay Nicole, Imprints Private Ltd, Chennai, 2015
3. Saxena, R.G. 2016 Principles of Auditing, Himalaya Publishing House, New Delhi.

Reference Books:

1. Natarajan, L. 2013. Auditing Chennai: Margham Publications.Chennai
2. Pagar, D. 2016. Principles and Practice of Auditing (14 ed.).: Sultan Chand & Sons.
3. Tandon, B.N & Sudharsanam, S. 2016. A Handbook of Practical Auditing : S Chand & Company Pvt. Ltd. New Delhi
4. Kamal Gupta, 2015 Contemporary Auditing Tata McGraw Hill, New Delhi.

Course outcomes: At the end of the course, students would be able to:

1	define the important concept and rules relating to auditing	K1
2	outline the techniques and applicability of internal audit	K2
3	analyze the valuation of assets and liabilities in business	K4
4	analyze the accounts and auditing the joint stock companies	K4
5	examine about investigation and auditing of computerized accounts	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	3	4	3	3	3	4	4	3	3	4	4	46/13=3.53
CO-2	4	3	4	4	3	3	4	4	3	3	3	3	4	48/13=3.69
CO-3	4	3	4	4	4	4	4	4	4	3	4	4	3	49/13=3.76
CO-4	4	3	4	4	4	4	3	3	4	4	4	4	4	49/13=3.76
CO-5	4	4	3	3	4	4	4	3	3	4	3	4	3	46/13=3.53 **18.27/5=3.654**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT53	INCOME TAX LAW AND PRACTICE	L	T	P	C
CORE-X			5	-	-	4

Course Objectives:

The main objectives of this course are :

1. To understand the various concepts of income tax and related terminologies
2. To familiarize with calculation if income under different heads
3. To enable the students to know the provisions of the income tax law.
4. To understand the process of set off and carry forward of losses while computing total income

Unit 1: Income tax-Basic concepts

Income tax-Basic concepts – Definition – Previous year – Assessment year – Person – Assessee – Income – Total Income – Casual income – Capital and Revenue – Residential status and incidence of tax incomes exempt under Section – 10

Unit 2: Computation Of Taxable Salary

Salary – Basis of charge – Different forms of salary – allowances – gratuity – pension – perquisites and their valuation – deduction from salary – computation of taxable salary .

Unit 3: Computation Of House Property Income

House property – basis of charge – determination of GAV and NAV – income from let – out property – deductions – computation of House property income**.**

Unit 4: Profits And Gains Of Business And Profession

Profits and gains of business and profession – basis of charge – methods of accounting – deductions – allowable expenses and disallowable expenses – computation of taxable income.Income from Capital Gains – Income from other sources.

Unit 5: Income Of Other Persons Included In Assesses Total Income

Income of other persons included in assesses total income – Aggregation of income; Set – off or carry forward and set off of losses – Deductions from gross total income – Computation of total income and tax payable; Rebates and relief's – Provisions concerning advance tax and tax deducted at source – Provisions for filing of return of income.

Note: Question Paper shall cover 40% Theory and 60% Problem

Text Books :

1. Dr.Vinod K.Singhania, Taxmen's Direct Taxed Law & Practice. Taxman Publications, New Delhi.
2. Dr. A. Murthy, Income Tax Law and Practice - Vijay Nichole Publications, Chennai.
3. Dr. T.S. Reddy & Dr. Hariprasad, Income tax law and practice, Margam publications, Chennai.

Books for Reference:

1.Gaur and Narang, " Income Tax Law and Practice" Kalyani Publishers, New Delhi.
2. Dr. H. C.Mehrotra, " Income Tax Law and Accounts" Sahithya Bhavan publishers, Agra.
3. R. G. Shaha, Income Tax Law and Practice (Direct Tax) Himalaya Publications, Mumbai.
4. Dinkar Pagare, Direct Tax – Sultan Chand publishers, New Delhi.

Course outcomes: At the end of the course, students would be able to:

1	outline the various terminologies related to income tax	K1
2	understand the method of calculating and levying tax	K2
3	apply the various tax laws and available provisions in tax computations	K3
4	evaluate the set off and carry forward of losses while calculating personal income	K5
5	analyze self-assessment of income and tax computation	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	42/13=3.23
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	44/13=3.38
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.83/5=3.366**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT54	ENTREPRENEURIAL DEVELOPMENT	L	T	P	C
CORE-XI			5	-	-	4

Course Objectives:

The main objectives of this course are :

1. To understand the basic concepts of entrepreneurship and related initiatives
2. To provide insights about the setting up of startups
3. To familiarize with the institutional services to entrepreneur
4. To provide knowledge about various financial support available to the entrepreneurs
5. To provide knowledge about various subsidies and incentives available for entrepreneurs

Unit 1: Concept of Entrepreneurship

Entrepreneur - Entrepreneurship – Women Entrepreneurship – Rural Entrepreneurship – Factors affecting Entrepreneurial Growth - Entrepreneurial Motivation - Entrepreneurial Competencies - Entrepreneurial Mobility – Challenges to Entrepreneurship- Ethics and Entrepreneurship – Social Responsibility in Entrepreneurship - Entrepreneurial Development Programmes.

Unit 2: Business Modelling

Opportunity Analysis – Ideation Techniques – Ideation Catalysts and Inhibitors – Idea to Opportunity Maps – Evaluation of Idea to Opportunity Maps – Business Model – Functions of a Business Model - Business Modelling – Benefits of Business Modelling - Business Models to Business Plans**.**

Unit 3: Project Appraisal

Small Enterprises: An Introductory Framework – Project Identification and Selection – Project Formulation – Project Appraisal – Legal, Regulatory and Statutory Body – Clearance Approvals and NOC – Compliance – Financing of Enterprise - Boot Strapping - Ownership Structures.

Unit 4: Institutional Finance

Institutional Finance to Entrepreneurs – Lease Financing and Hire-Purchase – Institutional Support to Entrepreneurs – Taxation Benefits to Small-Scale Industries – Government Policy for Small-Scale Enterprises.

Unit 5: Accounting for Enterprises

Accounting for Enterprises - Break-Even Analysis – Elements of Financial Statements- Growth Strategies – Intellectual Property – Innovation – Knowledge Management – Leadership and Governance – Sickness and Rehabilitation – Application of Electronic Commerce.

Note: Question Paper shall cover 100% Theory

Text Books:

1. Khanka . S.S., Entrepreneurial Development, S.Chand & Co. Ltd., New Delhi. 2017
2. Raj Shankar., Essentials of Entrepreneurship, Vijay Nicole Imprints Private Ltd., Chennai.

2013.
3. Gupta. C.B. & Khanka S.S., Entrepreneurship and Small Business Management, Sultan Chand & Sons, 7th Revised Edition- 2017**.**

Reference Books:

1. Weihrich Heinz, Canice Mark V and Koontz Harold, Management – A Global and Entrepreneurial Perspective, Tata McGraw Hill Education Pvt. Ltd., 3rd Edition, 2011.
2. Desai Vasant, Entrepreneurial Development and Management, Himalaya Publishing House, 2007.
3. Bruce R. Barringer, R. Duane Ireland, Entrepreneurship – Successfully Launching New Ventures, Pearson Education, 2008.
4. Gupta C. B., Srinivasan N P, Entrepreneurial Development, Sultan Chand and Sons.
5. Barringer Bruce R., Ireland R. Duane, Entrepreneurship - Successfully Launching New Ventures, Pearson Education, 2008.

Course outcomes: At the end of the course, students would be able to:

1	recall the importance and role of entrepreneurship as an economic activity	K1
2	explain the various process of setting up a startup	K2
3	outline the various institutional services to entrepreneur	K2
4	analyze the various financial institution available to support entrepreneurs	K4
5	list the various subsidies and incentives available for entrepreneurs	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	4	3	4	3	4	43/13=3.30
CO-2	4	3	4	3	3	3	3	4	4	3	3	3	4	44/13=3.38
CO-3	3	3	4	3	3	4	4	4	4	3	4	3	3	46/13=3.53
CO-4	4	3	4	3	4	4	3	4	3	4	3	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	3	3	4	3	4	45/13=3.46 **17.28/5=3.456**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT55	BANKING THEORY, LAW AND PRACTICE	L	T	P	C
CORE-XII			5	-	-	4

Course Objectives:

The objectives of the course are

1. To gain an insight on the nature of current banking law and to know the practices of banking in India
2. To understand the Banking Regulations
3. To understand the various types of accounts

Unit 1: Banking Legislation

Banking Legislation – Provisions of Banking Regulations – Definition of Banker – Relationship between Banker and Customer – General Relationship between Banker and Customer – Obligations of Banker – Rights of Banker – Right of Appropriation Clay ton's Rule – Pass Book – Legal Implications of Entries in Pass Book.

Unit 2: Types of Bank Accounts

Types of Bank Accounts – Fixed Deposit Account – Savings – Current and Recurring Account – Features – Benefits - Account Opening Formalities - KYC Norms – Fixed Deposit Receipts – Non Residence Deposit Account – Currency (Domestic) Account – Senior Citizen Deposit Account – Flexi Deposit Account. Bank Customer: Bank Customer – Partnership Firm, Club – Joint Stock Company – Joint Hindu Family – Trust – Societies.

Unit 3: Negotiable Instruments

Definition of negotiable instruments – Essential Features – Types – Comparison Between Cheque, Bills and Pro Note – Cheque – Crossing – Types – Endorsement – Types of Endorsement – Holder in due Course Privileges – Holder for Value – Acceptance for Honour - Account – Reasons for Dishonour a Cheque**.**

Unit 4: Collection of Bank

Precaution before Paying a Cheque – Payment in Due Course – Statutory Protection to Paying Banker – Material Alterations - Closing of an Account – Collecting Bank – Statutory Profession to Collecting Banker – Negligence Liability of Collecting Banker – Duties of Collecting Banker.

Unit 5: Management of Finance and Advances

Principles of good Lending – Forms of Unsecured Advances and Secured Advances – Advance Against Securities like Stock Exchange Securities, Document of title to Goods, Trust Receipts , Life Policy, Supply Bills – Fixed Deposit Receipt Mortgage – Types of Mortgage – Hypothecation – Pledge - Non Performing Assets - Causes - Remedial Measures - Management of NPA - Debt Recovery Tribunal.

Note: Question Paper shall cover 100% Theory

Text Books:

1. Gorden Nataraj, 2016 Banking Himalaya Publication, New Delhi
2. Tannan, ML 2015 Banking Law & Practice in India, Indian Law House, New Delhi
3. Panikar, KK 2015 Banking –Theory System, S.Chand & Co., New Delhi.

Reference Books:

1. Radhaswami,M & Basudevan 2015 A Text Book of Banking, S.Chand & Co., New Delhi.
2. Khubchandran, BS 2015 Practice and Law of Banking, MacMillan Pub., New Delhi
3. Dr.S.Subba Rao and P.L Khanna 2015 Principles & Practice of Bank Management, Himalya Publishing House, Mumbai.
4. Gurusamy S 2017 Banking Theory Law & Practice, Tata McGraw Hill, Uttarpradesh
5. Murali S.and Subbakrishna , 2015 Bank and Credit Management, Himalaya Publishing House, New Delhi.

Course outcomes: At the end of the course, students would be able to:

1	understand the banking legislations and relationship between banker and customer.	K1, K2,K3
2	know the various types of bank accounts.	K1, K2,K3
3	gain knowledge of negotiable instruments used in banks.	K1, K2,K3
4	know the statutory provisions of the banker.	K1, K2,K3
5	know the principles and various forms of lending by the banks.	K1, K2,K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Mapping- POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	3	4	3	3	3	4	4	3	3	4	4	46/13=3.53
CO-2	4	3	4	4	3	3	4	4	3	3	3	3	4	48/13=3.69
CO-3	4	3	4	4	4	4	4	4	4	3	4	4	3	49/13=3.76
CO-4	4	3	4	4	4	4	3	3	4	4	4	4	4	49/13=3.76
CO-5	4	4	3	3	4	4	4	3	3	4	3	4	3	46/13=3.53 **18.27/5=3.654**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COE531	CHOICE -I	L	T	P	C
ELECTIVE –III		FUNDAMENTALS OF INVESTMENT	3	-	-	3

Course objectives:

The objectives of the course are

1. To familiarize the students with different investment alternatives introduce them to the framework of their analysis and valuation and highlight the role of investor protection.
2. To understand the various types of fixed income securities and various approaches of equity analysis
3. To understand the different types of portfolio analysis

Unit 1: Investment an Introduction

The investment decision process, Types of Investments – Commodities, Real Estate and Financial Assets, the Indian securities market, the market participants and trading of securities, security market indices, sources of financial information, Concept of return and risk, Impact of Taxes and Inflation on return.

Unit 2: Fixed Income Securities

Overview of Fixed Income Securities -Bond features, types of bonds, estimating bond yields, Bond Valuation types of bond risks, default risk and credit rating-Bond Values and the Passage of Time / Forward Contracts-Forward Rates / Contracts-Risk Measurement-Modeling Credit Risk, including the Merton Model- Illiquidity in Bond Markets

Unit 3: Approaches to Equity Analysis

Introductions to Fundamental Analysis, Technical Analysis -comparative analysis-and Efficient Market Hypothesis, dividend capitalization models, and price-earnings multiple approach to equity valuation.

Unit 4: Portfolio Analysis and Financial Derivatives

Portfolio and Diversification, Portfolio Risk and Return; Mutual Funds; Introduction to Financial Derivatives;- CAPM and the inputs required for applying CAPM and the limitations of this Model- CAPM and the inputs required for applying CAPM and the limitations of this Model- Financial Derivatives Markets in India

Unit 5: Investor Protection

Role of SEBI and stock exchanges in investor protection; Investor grievances and their redressal system, insider trading, investors' awareness and activism-Role of SEBI in investor Protection-Securities Ombudsman-Investors' Awareness-Investors' Activism.

Note: Question Paper shall cover 100% Theory

Text Book:

1. Prasanna Chandra, Investment Analysis and Portfolio Management, McGraw Hill Education

Reference Books:

1. C.P. Jones, Investments Analysis and Management, Wiley, 8th Edition
2. R.P. Rustogi, Fundamentals of Investment, Sultan Chand & Sons, New Delhi.
3. N.D. Vohra and B.R. Bagri, Futures and Options, McGraw Hill Education
4. Mayo, An Introduction to Investment, Cengage Learning.

Course outcomes: At the end of the course, students would be able to:

1	explain the basics of investment environment and different investment avenues available.	K1, K2,K3
2	analyse the types of fixed income securities	K1, K2,K3
3	assess the approaches to equity analysis	K1, K2,K3
4	apply the techniques portfolio analysis and financial derivatives.	K1, K2,K3
5	advise how to protect the investors.	K1, K2,K3

K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create

Mapping- POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	4	3	4	3	3	4	4	4	48/13=3.69
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.29
CO-3	4	3	4	4	4	3	4	4	4	3	4	4	3	48/13=3.69
CO-4	4	3	4	4	3	4	3	3	3	4	4	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **17.81/5=3.562**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COE532	CHOICE -II	L	T	P	C
ELECTIVE –III		ARTIFICIAL INTELLIGENCE FOR BUSINESS	3	-	-	3

Course Objective:

This course aims

1. To equip the learners with the basic ideas and techniques underlying the usage of Artificial Intelligence in Business.

Unit 1: Artificial Intelligence-Concept

Introduction Artificial Intelligence: Concept, benefits, and scope. Differences between AI, Machine Learning (ML) and Deep Learning (DL) - AI applications, capabilities and competitive advantage; Industry drivers; AI strategy for the enterprise - Considerations for an AI strategy, AI & Startups. Internet of Things (IoT), Introduction to mobile computing and Cloud computing.

Unit 2: Strategic Interventions Algorithm

AI led strategic interventions Algorithm: New member in the boardroom, Accelerated decision making with real time analytics, AI in operational models in an organization, AI: future of AI in HR, Talent sciences, Algorithms & Talent Acquisitions (TA), AI & transformation in Finance & Accounting, CFO of tomorrow, Changing role of Chief Information Officer (CIO): Industry 4.0.

Unit 3: Banking & Insurance

AI in Banking & Insurance Redefined banking industry – adoption of Analytics, AI powered financial services, Fraud mitigation in banks with AI, Reorienting customer retention, Risk management with AI, AI driven transformation in Insurance, Digital based insurance model.

Unit 4: **AI interventions in Retail Outlets**

AI in Retail -AI interventions in Retail Outlets. Emergence of smart customers, ad content predictions, Evolution of smart retailers, Omni channel experience, AI in consumer packaged goods, Fluid supply chain transformation with AI. AI-Led marketing transformations, Data to Clusters - Ad content prediction - AI based Ad buy and CPC optimization, AI driven campaign management. AI for Sales: Data to Classes - Insides Sales Rep workflow automation - Improved Lead, Opportunity Ranking and Reminder.

Unit 5: **Exponential Technologies For Business**

Exponential Technologies Beating cyber-attacks with Analytics, AI in automotive industry: driverless cars and drones, IoT Analytics: extracting value and transforming business, Real time streaming analytics, Cryptocurrency Analytics, AI for customer service-data to scores, AI for Portfolio Management, Chatbots, Call center rep automation.

Note: Question Paper shall cover 100% Theory

Text Book:

1. Dhanrajani, S. (2018). AI & Analytics: Accelerating Business Decisions. New Jersey: Wiley.

Reference Books:

1. Russell, S. J., & Norvig, P. (2019). Artificial Intelligence: A Modern Approach, 3rd Edition. New Jersey: Prentice Hall.
2. Akerkar, R. (2018). Artificial Intelligence for Business. Basingstoke: Springer Nature
3. Altemeyer, B. (2019). Making the business case for AI in HR: two case studies. Strategic HR Review, 18(2), 66-70. Retrieved from https://www.emerald.com/insight/content/doi/10.1108/SHR-12-2018-0101/full/html

Note: * Learners are advised to use web sources too.

Course outcomes: At the end of the course, students would be able to:

1	identify how the AI is being leveraged by start-ups as a success tool	K1, K2,K3
2	analyse and interpret the applicability of AI in HR functions	K1, K2,K3
3	explain how algorithms is changing the board room landscape	K1, K2,K3
4	discuss the customer services provided by various banks using AI	K1, K2,K3
5	demonstrate the role of AI in transforming the retail sector	K1, K2,K3

K1- Remembering **K2 –** Understanding **K3 –** Applying

Mapping- POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	3	4	3	3	3	4	4	3	3	4	4	46/13=3.53
CO-2	4	3	4	4	3	3	4	4	3	3	3	3	4	48/13=3.69
CO-3	4	3	4	4	4	4	4	4	4	3	4	4	3	49/13=3.76
CO-4	4	3	4	4	4	4	3	3	4	4	4	4	4	49/13=3.76
CO-5	4	4	3	3	4	4	4	3	3	4	3	4	3	46/13=3.53 **18.27/5=3.654**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COS53	COMPANY LAW	L	T	P	C
SBE I			2	-	-	2

Course Objectives:

The main objectives of this course are to:

1. develop a strong foundation regarding corporate laws and provisions
2. enlighten the students on the Provisions governing the Company Law. (After 2013) and the recent amendments to Companies Act.

Unit 1: Company-Concept

Meaning of joint stock company - Kinds of Companies (Special Provisions with respect to Private Company, Public Company, One Person Company, Small Company, Dormant Company) - Formation - Memorandum of Association - Contents - Restriction on "Other Objects" - Doctrine of Ultra Vires - Articles of Association - Contents - Prospectus - Contents - Types (Statement in Lieu of Prospectus, shelf Prospectus, Red Herring Prospectus) - Underwriting - Book Building Process - Green Shoe Option - E-Filing - Dematerialization.

Unit 2: Kinds of Shares

Shares - Meaning, Types of Shares and Transfer of shares-Share Capital, Meaning, Kinds, Alternation, Reduction and Voting Rights-Debenture - Meaning, Types, Charge-Fixed and Floating, Crytalisation of Floating charge-Borrowing Powers - Effective of unauthorized borrwoings.

Unit 3: Directors In A Company

Appointment, Reappointment, Resignation, Removal and Varying Terms of Appointment/Re-appointment-Payment of Remuneration to Directors-Appointment, Resignation and Removal-Directors - Women Directors - Independent Directors - Director Identification Number - Other Key Managerial Personnel - Related Party Transactions**.**

Unit 4: Statutory Regulations

Meeting - Statutory Meeting - Annual General Meeting - Extraordinary General Meeting - Notice of Meeting - Quorum - Proxy - Board of Directors Meeting - Committee - Types of Committee - Audit Committee - Stake Holders Relationship Committee - Corporate Social Responsibility Committee. Resolutions - Ordinary Resolution - Special Resolution - Resolution requiring special notice**.**

Unit 5: Winding Up Of A Company

Modes of Winding up - Winding up by the Court - Voluntary Winding up - Types – Members. Voluntary Winding up - Creditors Voluntary Winding up. National Company Law Appellate Tribunal-Merger and Demerger of Company-Amalgamation, Compromise and Arrangement-Role of Official Liquidator, Court and National Company Law Tribunal.

Note: Question Paper shall cover 100% Theory

Text Books:
1. Avatar Singh, Company Law, Eastern Book Company
2. Shukla, M.C. & Gulshan, S.S., Principles of Company Law

Reference Books:
1. Badri Alam, S & Saravanavel, Company Law, Himalaya Publications
2. Gogna, P.P.S., Text Book of Company Law, S. Chand & Co.
3. Gaffor & Thothadri, Company Law, Vijay Nicole Imprints Pvt. Ltd. Chennai

E-Resources:
www.mca.gov.in
www.companyliquidator.gov.in
www.companyformationinindia.co.in
www.iepf.gov.in

Course outcomes: At the end of the course, students would be able to:

1.	know the basic concepts of joint stock companies	K1, K2,K3
2.	understand various types of shares of companies	K1, K2,K3
3.	know the provisions applicable to directors of a company	K1, K2,K3
4.	understand the various types of meetings conducted in a company	K1, K2,K3
5.	understand the provisions applicable for winding up of companies	K1, K2,K3

K1- Remembering **K2 –** Understanding **K3 –** Applying

Mapping- POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	44/13=3.38
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	43/13=3.30
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.90/5=3.38**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

SEMESTER VI

COURSE CODE	U21COT61	CORPORATE ACCOUNTING	L	T	P	C
CORE-XIII			6	-	-	4

Course Objectives:

The main objectives of this course are :

1. To provide basic understanding about the accounts relating to shares and debentures
2. To analyze the final accounts of companies
3. To explore various methods for the valuation of goodwill
4. To assist preparation of books of Amalgamation and Absorption.

Unit 1: Accounting Procedure for Shares

Share Capital: Subdivision of Share Capital; Issue of Shares, Pricing of Public Issue – Fixed Price Offer Method, Book-building Method; Journal entries for Issue of Shares - when payable fully on application and when payable in installments - if shares are issued at par, at premium and at discount. Calls-in-arrears and Calls-in-advance. Forfeiture and Re-issue of Shares.

Unit 2: Meaning of Underwriting – SEBI regulations regarding underwriting;

Underwriting commission. Types of underwriting agreement – conditional and firm; Determination of Liability in respect of underwriting contract – when fully underwritten and partially underwritten – with and without firm underwriting.

Unit 3: Valuation of Assets

Valuation of Goodwill: Meaning – Circumstances of Valuation of Goodwill – Factors influencing the value of Goodwill – Methods of Valuation of Goodwill: Average Profit Method, Super Profit Method, Capitalization of average Profit Method, Capitalization of Super Profit Method, and Annuity Method - Problems. Valuation of Shares: Meaning – Need for Valuation – Factors Affecting Valuation – Methods of Valuation: Intrinsic Value Method, Fair Value Method and Yield Method - Problems.

Unit4: Acquisition of Business

Acquisition of business- Profit prior to incorporation –preparation of financial accounts-requirements as per schedule IV part I and II.-Accounting for Group companies – Holding Companies – Definition – Accounts Consolidation – Preparation of Consolidated Balance Sheet – Minority Interest – Pre-acquisition or Capital Profits – Cost of Control or Goodwill – Inter-company Balance – Unrealised Inter-company profits – Revaluation of assets and liabilities – Bonus Shares – Treatment of Dividend.

Unit 5: Amalgamation and Absorption

Purchase Consideration – Methods – Amalgamation in the Nature of Merger and Purchase – Polling-Interest Method-Purchase Method-Lumsum Method-Net Asset and payment Method-Intrinsic Value Method- Absorption – ASI4 – Alteration of Share Capital – Reduction of Share Capital (Scheme of Capital Reduction is Excluded) .

Note: Question Paper shall cover 25% Theory and 75% Problem

Text Book:

1. Advanced accountancy by R.L.Gupta & Radhaswamy, Sultan Chand &sons, Delhi. 13th Edition 2007
2. Corporate Accounting by T.S.Reddy & A.Murthy / Margham Publication, Chennai / 6th revised edition 2007, reprint 2010

Reference Book:

1. Corporate accountancy by R.L.Gupta & Radhaswamy .Sultan Chand &sons , Delhi. 13th Edition 2007
2. Advanced accounting by S.P.Jain & Narang ,Kalyani Publishers 17th Edition 2011./reprint 2005.
3. Corporate Accounting by S.N.Maheswari&S.K.Maheswari / Sultan Publisher/4th edition

Course outcomes: At the end of the course, students would be able to:

1	develop the skill of preparing entries for issue of shares	K1, K2,K3
2	know the accounting entries for underwriting of shares and redemption of preference shares	K1, K2,K3
3	knowledge in calculation and valuation of shares and goodwill of companies	K1, K2,K3
4	understand the provisions of acquisition of the business	K1, K2,K3
5	gain the knowledge in internal and external reconstruction in companies	K1, K2,K3

K1- Remembering **K2 –** Understanding **K3 –** Applying

Mapping- POs and PSOs

COS	**POS**					**PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	42/13=3.23
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	44/13=3.38
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.83/5=3.366**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT62	BUSINESS TAXATION	L	T	P	C
CORE-XVI			6	-	-	4

Course Objectives:

The main objectives of this course are to:

1. understand the applicability of indirect taxes in India
2. familiarize with the calculation and execution of goods and service tax in India
3. understand the working of custom law in India

Unit 1 : Indirect Taxes Concept

Indirect taxes – Meaning and Nature - Special features of Indirect Taxes- Contribution to government revenues - Taxation under the Constitution - Advantages and Disadvantages of Indirect Taxes.

Unit 2: GST In Trade And Commerce

Good and Service Tax Introduction – Meaning - Need for GST - Advantages of GST - Structure of GST in India – Dual concepts - SGST-CGST-IGST-UTGST- Types of Rates under GST – Taxes subsumed under State Goods and Services Tax Act 2017- Taxes subsumed under Central Goods and Services Tax Act 2017. Meaning of important terms: Goods, services, supplier, business, manufacture, casual taxable person, aggregate turnover, input tax and output tax.

Unit 3: Concept of Supply under GST

Levy and Collection under SGST/CGST Acts - Concept of supply - Composite and Mixed supplies - Composition Levy - Time of supply of goods and services - Value of Taxable supply. Input Tax credit - Eligibility and conditions for taking input credit- Reverse charge under the GST- Registration procedure under GST- Concept of e-way Bill - Filing of Returns.

Unit4: Supply of Goods or Services under GST

Levy and Collection under The Integrated Goods and Services Tax Act 2017- Meaning of important terms: Integrated tax, intermediary, location of the recipient and supplier of services, output tax. Levy and Collection of Tax- Determination of nature of Supply- Inter-State supply and Intra- State supply Place of Supply of Goods or Services - zero-rated supply.

Unit 5: Customs Laws in India

Introduction to Customs Laws in India – The Customs Act 1962 - The Customs Tariff Act 1975- Levy and Exemption from Custom duty - Taxable event - Charge of Custom duty- Exemptions from duty – Customs procedures for import and export - Meaning of Classification of goods - Methods of valuation of imported goods - Abatement of duty in damaged or deteriorated goods - Remission on duty on lost, destroyed or abandoned goods - Customs duty draw back.

Note: Question Paper shall cover 100% Theory

Text Book

1. Indirect Taxes- V.S.Datey. Taxmann Publication(p) Ltd.New Delhi
2. Indirect Taxes:GST and Customs Laws - R.Parameswaran and P.Viswanathan -Kavin Publications- Coimbatore

Reference:

1. Glimpse of Goods and service tax -Sathpal Puliana
2. Handbook of GST -Law and practice-Gaurav Gupta
3. GST Law and Practice-SS Gupta 6. Indirect Taxation - V.Balachandran. Sultan Chand & Co. New Delhi

Course outcomes: At the end of the course, students would be able to:

1	recall various concepts relating to Indirect tax regime in India	K1
2	analyze the concept and applicability of GST in businesses	K4
3	compare the GST regime with other indirect tax laws prior to it	K2
4	illustrate GST system in own business and other prototypes	K2
5	examine the custom law and related duties and taxes	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

Course Outcomes COS	**Programme Outcomes POS**					**Programme Specific Outcomes PSOS**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	4	3	4	3	4	43/13=3.30
CO-2	4	3	4	3	3	3	3	4	4	3	3	3	4	44/13=3.38
CO-3	3	3	4	3	3	4	4	4	4	3	4	3	3	46/13=3.53
CO-4	4	3	4	3	4	4	3	4	3	4	3	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	3	3	4	3	4	45/13=3.46 **17.28/5=3.456**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT63	FINANCIAL MARKETS AND INSTITUTIONS	L	T	P	C
CORE-XV			5	-	-	4

Course Objectives:

The main objectives of this course are :

1. To understand the basic concepts of financial market
2. To analyze the working and components of corporate securities market
3. To evaluate the functioning of stock exchanges in India
4. To evaluate the role of banks and intermediaries in financial market
5. To provide insights about the new models and innovative trends in financing

Unit 1: Money Market -Concept

Overview of Financial systems In India – Structure, Regulation Role And Functions Of Financial Systems – Financial Instruments – Financial Markets – Capital Markets & Money Markets – Interlink Between Money Market & Capital Market – Characteristics Of Financial Markets – Introduction To Forex- Treasury Bills Market -Commercial Bills Market - Markets for Commercial paper and Certificates of Deposits - The Discount Market - Market for Financial Guarantee - Government (Gilt-edged) Securities Market.

Unit 2: New Issue Market

New Issue Market – Meaning and Advantages– General Guidelines for New Issue – Problems of New Issues Market – IPO's – Investor protection in primary market – Recent trends in primary market – SEBI measures for primary market-Methods of Floating – Players – Recent Trends-Primary market and Secondary Market – SEBI- IRDA, Financial Conglomerates.

Unit 3: Stock Exchanges and its Functions

Stock Exchanges - Features-Objectives-Functions – Role of Securities and Exchange Board of India – Reforms in Secondary Market – Efficient Market Theory- SEBI guidelines.

Unit 4: **Financial Institutions**

Financial Institutions Depository and non-depository institutions, Commercial banking-introduction, its role in project finance and working capital finance. Development Financial Institutions (DFIs)-An overview and role in Indian economy. Life and non-life insurance companies in India; Mutual Funds- Introduction and their role in capital market development.

Unit 5: Other Financial Institutions

Non-banking financial companies (NBFCs). Regional Rural Banks. Urban Cooperative Banks, Rural Cooperative Credit Institutions, Pension Fund Regulatory and Development Authority.

Note: Question Paper shall cover 100% Theory

Text Books:

1. BholeL.M2016Financial Institutions and Markets, , Tata McGraw Hill Publishing Company Limited, New Delhi.
2. NaliniPravaTripathy2015Financial Instruments and Services, , Prentice Hall of India, New Delhi.
3. Gurusamy S 2015 Financial Markets and Institutions, S. Vijay Nicole Imprints (P) Ltd Chennai.
4. Gordon and Natarajan, 2011 Financial Markets and Services, Himalaya Publishing House. Mumbai.

eference Books:

1. Jeff Madura, 2011 Financial Markets and Institutions, 5th Ed., SouthWestern College Publishing.
2. Khan, M.Y, 2012 Financial Services, Tata McGraw Hill. Publishing Company Limited, New Delhi.
3. Gupta S.P 2012 Statistical Methods, Sultan Chand Publication, New Delhi.
4. Kothari C.R2016 Research Methodology Methods and Techniques, New Age International Publications, New Delhi.

Course outcomes: At the end of the course, students would be able :

1	define the basic concepts of financial market	K1
2	analyze the working and components of corporate securities market	K4
3	explain the functioning of stock exchanges in India	K4
4	explain the role of banks and intermediaries in financial market	K4
5	apply various trends and new modes in financing	K3
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

Course Outcomes (COS)	**Programme Outcomes (POS)**					**Programme Specific Outcomes (PSOS)**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	44/13=3.38
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	43/13=3.30
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.90/5=3.38**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT64	FINANCIAL MANAGEMENT	L	T	P	C
CORE- XVI			4	-	-	4

Course Objectives:

The main objectives of this course are :

1. To understand the various concept relating to finance
2. To familiarize with the basics of financial planning
3. To analyze various sources and forms of finance
4. To understand the various dimensions of capital market and their components
5. To provide knowledge about capitalization and related theories

Unit 1: Financial Management- Concept

Financial Management: Meaning and scope – Objectives: Profit maximization, Wealth maximization – Functions – Financial decisions – Time value of money: Present value and Compound value – Cost of capital – Cost of debt – Cost of preference share capital – Cost of Equity – Cost of retained earnings – Weighted average cost of capital.

Unit 2: Capital structure-Concept

Capital structure – Meaning and features – Factors determining capital structure – EBITEPS relationship – Indifference point of EBIT – Theories of capital structure: Net income approach, Net operating income approach, MM approach and Traditional approach.

Unit 3: Leverage And Dividend Policy

Leverage – Meaning, significance and types – Operating leverage - Financial leverage – Combined leverage – Dividend policy – Determinants of dividend policy – Theories: relevance and irrelevance with value of firm – Forms of dividend – Stock dividend – Bonus issue – Stable dividend.

Unit 4: Working capital management in Business

Working capital management – Determinants of working capital – Forecasting of working capital requirements – Cash management – Motives of holding cash – Stages in cash management: Cash planning, Collection and disbursement of cash, Optimum cash balance – Boumul model – Investment of surplus cash.

Unit 5: Receivables management

Receivables management – Objectives – Factors influencing size of receivables – Credit policy – Credit standard – Credit term – Collection policy – Incremental analysis – Inventory management – Meaning – Types of inventory – Purpose of holding inventory – Excess or inadequate inventory – EOQ – Levels of stock: reorder level, minimum level and maximum level – Techniques – ABC,

VED, FSN and HML analysis.

Note: Question Paper shall cover 25% Theory and 75% Problem

Commented [H1]: Text book?

Course outcomes: At the end of the course, students would be able to:

1	outline various concepts relating to finance	K2
2	list the various techniques of financial planning	K2
3	analyze various sources and forms of finance	K4
4	examine the various dimensions of capital market and their components	K4
5	list the capitalization concept and related theories for decision making	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

Course Outcomes (COS)	**Programme Outcomes (POS)**					**Programme Specific Outcomes (PSOS)**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	42/13=3.23
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	44/13=3.38
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.83/5=3.366**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COT65	FINANCIAL SERVICES	L	T	P	C
CORE- XVII			4	-	-	4

Course Objectives:

The objectives of the course are

1.To understand the nature and types of financial services.
2. To understand the various concepts of Hire Purchase system and Mutual Funds
3. To know the various process of Venture Capital Investment.

Unit :1 Financial services-Concept

Financial services – Meaning – Classification – Financial products and services – Challenges facing the financial service sector – Merchant banking– Meaning – Functions – SEBI Guidelines – Scope of merchant banking in India. NBFCs – RBI guidelines.

Unit 2: Hire purchase System

Hire purchase – Meaning – Features – Process – Hire purchase and credit sales – Hire purchase vs Instalment purchase – Banks and hire purchase business – Hire purchase and transport industry – Leasing – Concept – Steps involved in leasing – Lease vs Hire purchase – Types of lease – Problems and prospects of leasing in India.

Unit 3: Mutual funds and Concept

Mutual funds – Meaning – Types – Functions – Advantages – Institutions involved – UTI, LIC, Commercial banks – Entry of private sector – Growth of mutual funds in India – SEBI Guidelines – Asset Management Companies.

Unit 4: Venture Capital Investment Process

Venture capital – Meaning – Features – Methods of venture capital financing – Modes of venture financing – Venture capital investment process – Factors determining venture investment – Exit mechanism – Advantages of venture capital – Issues of Indian venture capital industry.

Unit 5: Factoring – Concepts

Factoring – Concepts – Significance – Types – Factoring mechanism – Factoring vs bills discounting – Factoring in India – Forfeiting – Meaning – Forfeiting vs Export factoring – Problems of Forfeiting/ factoring.

Text Books

1. Financial markets & services by E.Gordon and K.Natarajan – Himalaya publishing house, New Delhi.
2. Financial services by E.Dharmaraj – S.Chand & Co., New Delhi

Reference Books (Latest revised edition only)

1. Financial Services by S.Mohan and R.Elangovan – Deep and Deep Publications, New Delhi.
2. Financial Services by S. Gurusamy – Vijay Nicole Imprints (P) Ltd, Chennai.
3. Lease Financing and Hire Purchase by Vinod Kothari – Wadhaw and Co., Nagpur.

Mapping- POs and PSOs

Commented [H2]: Course outcome?

Course Outcomes (COS)	Programme Outcomes (POS)					Programme Specific Outcomes (PSOS)								Mean Scores of COS
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	42/13=3.23
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	44/13=3.38
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.83/5=3.366**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COE641	CHOICE - I	L	T	P	C
ELECTIVE - IV		BUSINESS LAW	3	-	-	3

Course Objectives:

The main objectives of this course are :

1. To provide knowledge about basics of business contract
2. To create knowledge about the regulations of agency system
3. To understand the rules of indemnity and guarantee
4. To offer knowledge about the sale and transfer of goods and the applicable laws and regulations.

Unit 1: Contract -Concept

Indian Contract Act - Formation - Nature and Elements of Contract - Classification of Contracts - Contract Vs Agreement. Offer - Definition - Forms of Offer - Requirements of a Valid Offer. Acceptance – Meaning - Legal rules as to a Valid Acceptance.

Unit 2 : Consideration in Business Contract

Consideration - Definition - Types - Essentials. Capacity of Parties - Definition - Persons Competent to contract. Free consent – Coercion - Undue Influence - Fraud - Misrepresentation - Mistake. Legality of object - Void agreements - Unlawful Agreements

Unit 3 : Performance of Contracts

Performance of Contracts - Actual Performance - Attempted Performance - Tender. Quasi Contract - Definition and Essentials. Discharge of Contract - Modes of Discharge - Breach of Contract - Remedies available for Breach of Contract.

Unit 4 : Negotiable Instrument

Negotiable Instrument Act 1881; - Characteristics of negotiable instruments- Kinds of negotiable instruments- Promissory Note, Bill of Exchange and Cheque; Definition and Nature, Parties to a Negotiable instrument, material alterations- Meaning of Holder and Holder in Due Course, Rights and privileges of holder in due course- Transfer of Negotiable Instruments.

Unit 5 : Sale and Contract of Sale

Sale - Contract of Sale - Sale Vs Agreement to Sell - Meaning of Goods - Conditions and Warranty - Caveat Emptor - Exceptions of Caveat Emptor - Buyer and Seller of Goods - Unpaid Seller - Definition - Rights of an Unpaid Seller.

Note: Question Paper shall cover 100% Theory

Text Books:

1. Balachandran. V & Thothadri.S, Business Law, Vijay Nicole Imprints Pvt. Ltd. Chennai
2. Kapoor, N.D. Business Laws, Sultan Chand and Sons.

Reference Books:

1. Sreenivasan, M.R. Business Laws, Margam Publications.
2. Dhandapani, M.V. Business Laws, Sultan Chand and Sons.
3. Badre Alam, S. & Saravanavel, P. Mercantile Law
4. Pillai, R.S.N. & Chand, S, Business Law, S Chand & Co, Delhi
5. Ramaswamy, K.N., Business Law, S Chand & Co, Delhi 8. Shukla, M.C, Business Law, S. Chand & Co.

E-Resources:

www.cramerz.com
www.digitalbusinesslawgroup.com
http://swcu.libguides.com/buslaw
http://libguides.slu.edu/businesslaw

Course outcomes: At the end of the course, students would be able to:

1	assess the various elements related business law and contract	K5
2	interprete different type of contract and its features	K2
3	explain about the agency system related to creation and termination of agency	K5
4	compare between rights and duties of indemnity , guarantee	K5
5	examine the distinct between sale and agreement to sell and its features	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze; **K5** - Evaluate; **K6** - Create		

Mapping- POs and PSOs

Course Outcomes (COS)	Programme Outcomes (POS)					Programme Specific Outcomes (PSOS)								Mean Scores of COS
	1	2	3	4	5	1	2	3	4	5	6	7	8	
CO-1	4	4	4	4	3	3	3	3	4	3	4	3	4	43/13=3.30
CO-2	4	3	4	3	3	3	3	4	4	3	3	3	4	44/13=3.38
CO-3	3	3	4	3	3	4	4	4	4	3	4	3	3	46/13=3.53
CO-4	4	3	4	3	4	4	3	4	3	4	3	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	3	3	4	3	4	45/13=3.46 **17.28/5=3.456**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COE642	CHOICE - II	L	T	P	C
ELLECTIVE - IV		CORPORATE GOVERNANCE	3	-	-	3

Course Objectives

The objectives of the course are

1. To provide knowledge of corporate governance, procedures, and techniques in accordance with current legal requirements and professional standards.
2. To understand the powers and duties of Directors and Shareholders.
3. To understand the framework of Corporate Governance
4. To know the concept of Business Ethics and the Corporate Social Responsibility

Unit 1: **Corporate Governance-Concept**

Introduction Corporate Governance - Meaning, significance and principles, Management and corporate governance; Theories and Models of corporate governance; Agency theory and separation of ownership and contract; ownership structure and firm performance; Whistle blowing, Class Action; Role of Institutional investors. Codes and Standards on Corporate Governance- Sir Adrian Cadbury Committee 1992 (UK), OECD Principles of Corporate Governance, and Sarbanes Oxley (SOX) Act, 2002 (USA).

Unit 2: Directors, Shareholders Powers and Duties

Directors and Shareholders Powers of directors; Duties of directors; Non-executive directors and their duties; Relationship between board and shareholder; Board structure and Independent director, board committees and their functions. Shareholder expectations; Regulatory requirements for shareholder involvement shareholder activism and proxy advisory firms. Role of rating agencies.

Unit 3: Corporate Governance Failures

Major Corporate Governance Failures and International Codes BCCI (UK), Maxwell Communication (UK), Enron (USA), World.Com (USA), Andersen, Worldwide (USA), Vivendi (France), Satyam Computer Services Ltd, Lehman Brothers, Kingfisher Airlines, PNB Heist and IL&FS Group Crisis; Common Governance Problems noticed in various Corporate Failures.

Unit 4: **Corporate Governance Framework**

Corporate Governance Framework in India Initiatives and reforms- Confederation of Indian Industry (CII) (1997), Kumar Mangalam Birla (1999), NR Narayana Murthy Committee (2005) and Uday Kotak Committee (2017). Regulatory framework: Relevant provisions of the Companies Act, 2013, SEBI: Listing Obligations and Disclosure Requirements Regulations (LODR), 2015. Corporate Governance in the public sector, banking, non- banking financial institutions.

Unit 5: **Business Ethics and Corporate Social Responsibility**

Business Ethics and Corporate Social Responsibility (CSR) Business Ethics and Values; Importance of Ethics; Corporate Governance and Ethics; Ethical theories; Code of Ethics and ethics committee. Concept of Corporate Social Responsibility; CSR and Corporate Sustainability, CSR and Business Ethics, CSR and Corporate Governance, CSR and Corporate Philanthropy; Environmental Aspect of CSR, Models and benefits of CSR, Drivers of CSR; CSR in India.

Note: Question Paper shall cover 100% Theory

Text Books

1. Gupta, K., & Arora, A. (2015). Fundamentals of Auditing. New Delhi: Tata Mc-Graw Hill Publishing Co. Ltd.
2. Kumar A., Gupta L., & Arora, R. J. (2016). Auditing and Corporate Governance. Delhi:

Taxmann Pvt. Ltd. Mallin, C. A. (2018). Corporate Governance. New Delhi: Oxford University Press.

Reference Books:

1. Rani, G. D., & Mishra, R. K. (2017). Corporate Governance-Theory and Practice. New Delhi: Excel Books.
2. Sharma, J. P. (2016). Corporate Governance, Business Ethics, and CSR. New Delhi: Ane Books Pvt. Ltd.
3. Tricker, B.(2015). Corporate Governance-Principles, Policies, and Practice (Indian Edition). NewDelhi: Oxford University Press.
4. Institute of Chartered Accountants of India, Auditing and Assurance Standards. New Delhi : ICAI. www.icai.org

Note: Latest edition of readings may be used.

Course outcomes: At the end of the course, students would be able to :

1	explain the concept and importance of corporate governance in a business setup;	K1, K2,K3
2	explain the concept of corporate governance in organisations and its essence for management;	K1, K2,K3
3	analyse the role of board of directors and shareholders in corporate management;	K1, K2,K3
4	assess the problems in corporate governance on the basis of major corporate governance failures;	K1, K2,K3
5	describe corporate governance framework in India;	K1, K2,K3

K1- Remembering **K2 –** Understanding **K3 –** Applying

Mapping- POs and PSOs

Course Outcomes (COS)	**Programme Outcomes (POS)**					**Programme Specific Outcomes (PSOS)**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	3	3	3	3	3	4	3	4	42/13=3.23
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.23
CO-3	3	3	4	3	3	3	4	3	4	3	4	3	3	44/13=3.38
CO-4	4	3	4	3	3	4	3	3	3	4	3	4	4	45/13=3.46
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **16.83/5=3.366**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21COS61	PERSONAL SELLING AND SALESMANSHIP	L	T	P	C
SBE - II			2	-	-	2

Course Objective:

The purpose of this course is to

- familiarize the students with the fundamentals of personal selling and the selling process.

Unit 1: Introduction to Personal Selling

Nature and importance of personal selling, Difference between Personal Selling, Salesmanship and Sales Management, Myths of selling, Relationship Marketing and Role of Personal Selling. Characteristics of a good salesman, Types of selling situations, Types of salespersons; Career opportunities in selling,Measures for making selling an attractive career.

Unit 2: Theories of Selling

Traditional and Modern: AIDAS Model of Selling, Problem Solving Approach, Right Set of Circumstances Theory and Modern Sales Approaches-Sales force objectives-Sales force strategy-Sales force Structure- Sales force size-Sales force compensation.

Unit 3: Buying Motives

Concept of motivation, Maslow's theory of need hierarchy; Right set of circumstances theory-Buying formula theory-Partnering-Team selling-Value added selling-Problem solving approach-Dynamic nature of motivation; Buyingmotives and their uses in personal selling.

Unit 4: Selling Process

Prospecting and qualifying; Pre-approach; Approach; Presentation and demonstration; handling of objections and complaints; Closing the sale; techniques for closing the sale; Customer Relations, Followup and Dealing customer concerns and complaints.

Unit 5: Sales Planning and Control

Recruiting and Training the Sales Force- Sales person personality and Motivation-Territory design and Routing-Sales Communication-Sales Forecasting, Sales Budget, Sales Territories, Sales quota, Ethical aspects of Selling.

Text Book :

1. Spiro, Stanton, and Rich, Management of the Sales force, McGraw Hill.
2. Rusell, F. A. Beach and Richard H. Buskirk, *Selling: Principles and Practices*, McGraw Hill
3. Futrell, Charles, *Sales Management: Behaviour, Practices and Cases*, The Dryden Press.

Reference :

1. Still, Richard R., Edward W. Cundiff and Norman A. P. Govoni, Sales Management: Decision Strategies and Cases, Prentice Hall of India Ltd., New Delhi,
2. Johnson, Kurtz and Schueing, Sales Management, McGraw Hill

3. Pedesson, Charles A. Wright, Milburn d. And Weitz, Barton A., Selling: Principles and Methods, Richard, Irvin.
4. Kapoor Neeru, Advertising and personal Selling, Pinnacle, New Delhi.

Note: Latest edition of text books may be used.
Course outcomes: At the end of the course, students would be able to :

1	explain the fundamental concepts Personal Selling :	K1, K2,K3
2	understand the concepts of theories of selling	K1, K2,K3
3	understand the various Concepts in buying motives	K1, K2,K3
4	have thorough Knowledge in selling process	K1, K2,K3
5	understand the Procedure in sales planning and control	K1, K2,K3

Mapping- POs and PSOs

Course Outcomes (COS)	**Programme Outcomes (POS)**					**Programme Specific Outcomes (PSOS)**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	4	3	4	3	3	4	4	4	48/13=3.69
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.29
CO-3	4	3	4	4	4	3	4	4	4	3	4	4	3	48/13=3.69
CO-4	4	3	4	4	3	4	3	3	3	4	4	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **17.81/5=3.562**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

NON MAJOR ELECTIVE

COURSE CODE	U21CON31	PERSONAL AND FINANCE PLANNING	L	T	P	C
SEMESTER - III			2	-	-	2

Course Objectives:

The course aims to

- familiarize learners with different aspects of financial planning like savings, investment, taxation, insurance, and retirement planning and
- develop the necessary knowledge and skills for effective financial planning.

Unit 1: Introduction to Financial Planning

Financial goals, Time value of money, steps in financial planning, personal finance/loans, education loan, car loan & home loan schemes. Introduction to savings, benefits of savings, management of spending & financial discipline, Net banking and UPI, digital wallets, security and precautions against Ponzi schemes and online frauds such as phishing, credit card cloning, skimming.

Unit 2: Investment Planning

Process and objectives of investment, Concept and measurement of return & risk for various assets class, Measurement of portfolio risk and return, Diversification & Portfolio formation. Gold Bond; Real estate; Investment in Greenfield and brownfield Projects; Investment in fixed income instruments- financial derivatives & Commodity market in India. Mutual fund schemes including SIP; International investment avenues**.**

Unit 3: Personal Tax Planning

Tax Structure in India for personal taxation, Scope of Personal tax planning, Exemptions and deductions available to individuals under different heads of income and gross total income, Special provision u/s 115BAC vis-à-vis General provisions of the Income-tax Act, 1961. Tax avoidance versus tax evasion.

Unit 4: Insurance Planning

Need for Protection planning. Risk of mortality, health, disability and property. Importance of Insurance: life and non-life insurance schemes. Deductions available under the Income-tax Act for premium paid for differentpolicies.

Unit 5: Retirement Benefits Planning

Retirement Planning Goals, Process of retirement planning, Pension plans available in India, Reverse mortgage, New Pension Scheme. Exemption available under the Income-tax Act, 1961 for retirement benefits.

Practical Exercises:

The learners are required to:

1. Perform electronic fund transfer though net-banking and UPI.
2. Identify certain Ponzi schemes in the market during last few selected years.
3. Prepare tax planning of a hypothetical individual.

Suggested Readings:

1.Indian Institute of Banking & Finance. (2017). Introduction to Financial Planning. New Delhi: TaxmannPublication.
2.Pandit, A. (2014). The Only Financial Planning Book that You Will Ever Need. Mumbai: Network 18 PublicationsLtd.
3.Sinha, M. (2008). Financial Planning: A Ready Reckoner. New York: McGraw Hill Education.
4.Halan, M. (2018). Let's Talk Money: You've Worked Hard for It, Now Make It Work for You. New York:HarperCollins Publishers.
5.Tripathi, V. (2017). Fundamentals of Investment. New Delhi: Taxmann Publication.

Note: Latest edition of text books may be used.

Course Outcomes: After completion of this course, learners will be able to:

1	explain the meaning and appreciate the relevance of Financial Planning;	K1, K2,K3
2	familiarize with regard to the concept of Investment Planning and its methods;	K1, K2,K3
3	examine the scope and ways of Personal Tax Planning;	K1, K2,K3
4	analyze Insurance Planning and its relevance;	K1, K2,K3
5	develop an insight in to retirement planning and its relevance.	K1, K2,K3

Mapping- POs and PSOs

Course Outcomes (COS)	**Programme Outcomes (POS)**					**Programme Specific Outcomes (PSOS)**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	3	4	3	3	3	4	4	3	3	4	4	46/13=3.53
CO-2	4	3	4	4	3	3	4	4	3	3	3	3	4	48/13=3.69
CO-3	4	3	4	4	4	4	4	4	4	3	4	4	3	49/13=3.76
CO-4	4	3	4	4	4	4	3	3	4	4	4	4	4	49/13=3.76
CO-5	4	4	3	3	4	4	4	3	3	4	3	4	3	46/13=3.53 **18.27/5=3.654**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

COURSE CODE	U21CON42	COMMERCE (PRACTICAL)	L	T	P	C
SEMESTER – IV			-	-	2	2

Course Objectives

To objectives of the course are

- To Gain knowledge in e-banking transactions
- To Learn the principles of Co-operation for conducting general body meetings
- To Gain knowledge in computer billing and formation of MSME through SHGs

Unit 1 : Banking Practice

E-Banking- Steps in conversion of personal account into online Account- ATM operations -NEFT and RTGS transactions.

Unit 2: Taxation Practice

Income tax and GST- Preparation of E-Statements-E-Filing of Income Tax and GST.

Unit 3: Practice of Online Trading

Technical Analysis – Important Jargons in Online trading

Unit 4: Practice of Computer Application in Business

Computer Billing in a business organization(Recommended Departmental stores- Bakeries-Hotels)Purchasing goods online through any one Apps (Amazon or E-bay or Flipkart)

Unit 5:Entrepreneurial Practices

Formation of an MSME through Self Help Groups within a class-MOCK procedure for borrowings for MSME- Filling up of application for approval from District Industrial Centre for a new startup

Note: 100% practical

Practical Exercises:

Text Book :

1. Subramani, M. Murugesan, D. Anbalagan, V. Ganesan,E-Banking and E-Commerce: Emerging issues in India,978-81-89886-40-0.

Reference

1. Author: Dr. R.K. Jain,Taxation Theory & Practice With GST 25th Revised Edition (Paperback, Dr. R.K. Jain),Publisher: SBPD Publications.
2. Computer Applications in Business (CBCS) by Hem Chand Jain & H.N Tiwari Paperback – 1 January 2017

Course Outcomes: After completion of this course, learners will be able to:

1	explain the fundamental concepts of banking	K1, K2,K3
2	knowledge in taxation practice.	K1, K2,K3
3	knowledge in practice in online trading.	K1, K2,K3
4	practice of computer applications in business.	K1, K2,K3
5	knowledge in entrepreneurial practice.	K1, K2,K3

Mapping- POs and PSOs

Course Outcomes (COS)	**Programme Outcomes (POS)**					**Programme Specific Outcomes (PSOS)**								**Mean Scores of COS**
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO-1	4	4	4	4	3	4	3	4	3	3	4	4	4	48/13=3.69
CO-2	4	3	4	3	3	3	3	4	3	3	3	3	4	42/13=3.29
CO-3	4	3	4	4	4	3	4	4	4	3	4	4	3	48/13=3.69
CO-4	4	3	4	4	3	4	3	3	3	4	4	4	4	47/13=3.61
CO-5	3	4	3	4	3	4	4	3	4	3	4	3	4	46/13=3.53 **17.81/5=3.562**

Mapping Relation

1 – Very Poor 2 – Poor 3 – Moderate 4 – High 5 – Very High

VALUE ADDED COURSE

COURSE CODE	U21CBV51	PROJECT FINANCE	L	T	P	C
Value Added			2	-	-	2

Objectives:

To enable the students to understand concepts of Project Finance by taking them through all stages of a Project Finance transaction, so that they can apply the techniques of Project Finance

Unit I: Project Management and Planning

Introduction_ Project Management- Skill required by a project manager- The Project Cycle_ Project planning, Identifying strategic project variables, Strategy in project management, Planning cycle, Project Feasibility analysis

Unit II: Financing of Projects

Capital Structure –Equity capital - preference capital - internal accruals - Term loans – Debentures – Working Capital Advance – Miscellaneous Sources – Raising Venture capital - Raising capital in International Markets

Unit III Financial Estimate and Projections

Cost of Project, Means of Finance, Estimation of sales and Productions, Cost of Production, Working capital requirement and its financing. Estimation of Fixed capital, Profitability Projections, Projected cash flow statement, projected balance sheet, Multiyear Projections.

Unit IV Risk Analysis

Measures and Perspective of Risk – Single investment: Sensitivity Analysis, Scenario Analysis, Break Even Analysis, Decision Tree Analysis, Project Selection under risk and Risk analysis in Practice

Unit V Project Financing in India

Means of Finance - Norms and Policies of Financial Institutions- SEBI Guidelines - Sample Financing Plans Structure of Financial Institutions in India - Schemes of Assistance - Term loans Procedures – Project appraisal by financial Institutions

Text Books:

1. Prasana Chandra: Projects-Planning Analysis, Selection, Implementation &Review, Tata McGraw Hill, New Delhi
2. M C. Choudhury : Project Management, Tata McGraw Hill, New Delhi – 1995

Reference Books

1. Machiraju, HR Introduction to Project Finance, New Delhi, Vikas Publication-(2009)
2. Vasant Desai Project Management, New Delhi, Himalaya Publishing House. (2008)

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MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL-624102

M.COM (CHOICE BASED CREDIT SYSTEM)

(Full-time)

SYLLABUS, REGULATION AND SCHEME OF EVALUATION

(From 2021-2022 onwards)

PROGRAMME NAME: M.COM (Choice Based Credit System)

1. About theProgramme:

The Two-year Programme in Commerce is intended for students who have completed the first degree Programme at University level, to get specialized knowledge in the areas of commerce and accountancy. The Programme is based on Choice Based Credit System that offers a wide range of Courses for keeping the students abreast with current knowledge in the field and shaping them as holistic personalities. The core and allied courses of study are suitably designed to provide core knowledge in commerce and various specialized accounting systems and also to develop skills in application of computers in business for befitting the learners in better job positions.

2. Programme Educational Objectives (PEOs)

On completion of M.Com. Degree Programme, the students will be able to

PEO-1: become well versed and competent in the core concepts of the Programme.

PEO-2: be recognized for quantitative, qualitative, cognitive and analytical skills to identify, analyze, design and create business opportunities in a dynamic environment on the Global map.

PEO-3: become successful entrepreneurs and finance professionals in the field of Banking, Insurance, Manufacturing, Transport, Telecom, Service, Hospitality, IT and to pursue career in teaching and for advanced studies.

PEO-4:contribute to the creation, transmission and application of knowledge in the field of Commerce and other related fields adapting to a rapidly changing environment through lifelong learning.

PEO-5: become professional with integrity and humanitarian values to fulfill the societal needs at regional, state, national and global levels

3. Eligibility:

A candidate who has passed any one of the following degree Programmesof this University or any other University accepted by the syndicate as equivalent there subject to such conditions as may be prescribed therefore, will be eligible for admission to the M.Com Programme:

B.Com., B.Com. (CA), B.Com. (e-Commerce), B.Com.(Corporate Secretaryship), BCS, B.A. (Corporate Secretaryship), B.B.A., (Bachelor of Business Administration), B.B.M. (Bachelor of Business Management), B.B.M., (Bachelor of Bank Management) B.Com. (Cooperation) and B.A., (Cooperation).

4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	13	25	13	25
External	38	75	38	75

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	A	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	B	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	C	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 90**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance less than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

9. Programme Outcomes(POs)

On completion of the Programme the students will be able to

PO1: acquire in-depth knowledge of Commerce discipline, with wider and global perspectives, with an ability to discriminate, evaluate, analyze and synthesize existing and new knowledge, and integrate the same for enhancement of knowledge. **(Academic result & International / global reach)**

PO2: analyze complex business problems critically; apply independent judgment for synthesizing information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context. **(Research and Innovation)**

PO3: think laterally and originally, conceptualize and solve Business problems, evaluate a wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors in the core areas of expertise at the national and international levels. **(International / global reach)**

PO4: extract information pertinent to unfamiliar industry issues through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct survey, analyze and interpret data, demonstrate higher order skill and view things in a broader perspective, submit a report about the study in commerce. **(Practical managerial analytical skills & Industry interaction)**

PO 5: demonstrate ability to understand Commerce in multifunctional areas like Banking and Finance, Auditing and taxation, Marketing & Entrepreneurship. Also they will be able to demonstrate ability to understand and derive meaningful inferences about organizational performance. **(Functional Specialization)**

PO6:adapt updated technology and appropriate resources required for establishment / expansion of business practice through self-paced and self-directed learning and apply professional ethics and engage with responsibility to the multicultural business stakeholders. (**Technology and Professional Ethics)**

PO 7: communicate ideas, write, and present reports with clarity and execute plans effectively at higher level research, business and professional career and function efficiently as an individual and as a member or leader in assorted teams and multidisciplinary settings. **(Presentation and Preparation of Reports and Execution of functions).**

10. Programme Specific Outcomes(PSOs)

PSOs:

On completion of the Programme the students will be able to

PSO 1: display knowledge and understanding of group dynamics, recognize opportunities and contribute positively to collaborative-multidisciplinary management research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness, themselves as well as others. **(Team Work)**

PSO 2: demonstrate knowledge and understanding of commerce principles and apply the same to one's own work, as a member and leader in a team, manage projects in the work environment efficiently in respective disciplines and multidisciplinary environments after considering the economic and financial factors. **(Industry interaction)**

PSO3: communicate with society at large, regarding complex managerial activities confidently and effectively, such as, being able to comprehend and write effective reports and design

PSO4: document by adhering to appropriate standards, make effective presentations, and give and receive clear instructions. Also they will demonstrate an ability to communicate effectively, both in writing and orally **(Speaking / Writing skills)**.

PSO5: recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously. **(Continuing education awareness)**

PSO6: display commitment towards professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society. **(Values, ethics, professional integrity and contribution to society)**

PSO 7: observe and examine critically the outcomes of one's actions and make corrective measures subsequently, and learn from mistakes without depending on external feedback. **(Independent and Reflective Learning)**

PSO 8: identify a timely opportunity and use business innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large. **(Successful career, immediate employment & entrepreneurship).**

M.Com Programme Structure from the Academic Year 2021-2022 onwards

Sl.No	Course Code	Course Title	Credits	Hours		Continuous Internal Assessment (CIA)	End Semester Exam (ESE)	Total
				T	P			
Semester I								
1	P21COT11	Core I Marketing Management	4	5	-	25	75	100
2	P21COT12	Core II International Trade and Practice	4	5	-	25	75	100
3	P21COT13	Core III Advanced Financial Management	4	6	-	25	75	100
4	P21COT14	Core IV Management Accounting	4	6	-	25	75	100
5	P21COP11	Core V Computerized Accounting with Tally (Practical)	4	-	6	25	75	100
6	P21COS11	Supportive Course I– Employability Skills(Practical)- Soft Skill Development	2	2	-	25	75	100
		Total	**22**	**24**	**6**	**-**	**-**	**600**
Semester II								
7	P21COT21	Core VI Modern Banking and Insurance	4	4	-	25	75	100
8	P21COT22	Core VII Advanced Cost Accounting	4	5	-	25	75	100
9	P21COT23	Core VIII Business Research Methods	4	4	-	25	75	100
10	P21COT24	Core IX Quantitative	4	5	-	25	75	100

		Techniques for Business Decisions						
11	P21COT25	Core X Investment Analysis and Portfolio Management	4	4	-	25	75	100
12		NME-I	4	4	-	25	75	100
13	P21CSS22	Supportive Course II– Computer Skill for Web Designing and Video Editing	2	-	4	25	75	100
		Total	**26**	**26**	**4**	**-**	**-**	**700**
Semester III								
14	P21COT31	Core XI Indirect Taxation	4	5	-	25	75	100
15	P21COT32	Core XII Financial Markets and Services	4	5	-	25	75	100
16	P21COT33	Core XIII Advanced Corporate Accounting	4	5	-	25	75	100
17	P21COT34	Core XIV Strategic Management	4	4	-	25	75	100
18	P21COT35	Core XV Income Tax and Tax Planning	4	5	-	25	75	100
19	P21COT36	Core XVI Business Analytics	4	4	-	25	75	100
20	P21WSS33	Supportive Course III (Women Empowerment)	2	2	-	25	75	100
		Total	**26**	**30**	**-**			**700**
Semester IV								
21	P21COE411/ P21COE412	Elective I: 1.Managerial Economics	4	4		25	75	100

		2.Business Ethics						
22	P21COE421/ P21COE422	Elective II: 1.Business Environment 2.Organisational Behaviour	4	4		25	75	100
23	P21COR41	Project	8	22		25	75	100
		Total	**16**	**30**				**300**
Total			**90**	**120**	**-**			**2300**

Non Major Elective(NME)

1.**NME I - P21CON211**-Fundamentals of Marketing

2. **NMEII- P21CON212**-Fundamentals of Banking

Additional Credit Courses (Two Credit courses)

1. **P21COV11** - Value Added Program I-Two Credits (First Semester)- Excel Skills for Commerce
2. **P21COI21** - Internship/Industrial Training – Two Credits- (End of Second Semester)
3. **P21COO31** - Online Courses (MOOC Courses)-Two Credits- (Third Semester)
4. **P21COV42** - Value Added Program II-Two Credits (Fourth Semester) - Data Analysis Using SPSS: Inferential Analysis
    - Those who have CGPA 9 and want to do the project in industry/institution during 4thsemester, these two papers can be opted in third semester.
    - Students can take one 4 credit course in MOOC as elective or two 2 credit course in MOOC as elective with the approval of Departmental Committee.

Outside Class Hours

- Health, Yoga and Physical fitness.
- Library information access and utilisation
- Employability Training.

SEMESTER -I

COURSE CODE	P21COT11	MARKETING MANAGEMENT	L	T	P	C
CORE I			5	-	-	4

Course Objectives:

The objectives of the course are

- To understand the trends in, Marketing Management and to make aware of regulations of foreign trade practices in the era of globalization.
- To know the elements of Marketing Management
- To assess of buying behavior and consumer behavior.
- The student will understand the overview of Marketing Management

Unit I: Introduction to Marketing Management

Introduction to Marketing Management – nature and scope – Concepts of marketing – Functions and problems of marketing management – Traditional marketing – Modern Marketing – Responsibilities of marketing manager – Role of marketing management in Indian economy.

Unit II: Consumer Behaviour

Buyer behavior – Consumer behavior vs. business buying behavior – Factors affecting consumer behavior – Consumer research – Importance – Consumer research process – Consumer research design – Steps in consumer research.

Unit III: Promotion

Promotion – Tools of promotion – Communication process – Characteristics of promotion- Merits – Demerits – Designing a promotion campaign – Promotion – mix – Determinants – Promotion tools – Advertising – Sales promotion – Public relations.

Unit IV: Marketing organization and control

Marketing organization and control – Emerging trends and issues in marketing – Rural marketing – Social marketing – On – line marketing – Green marketing – network marketing.

Unit V: Customer satisfaction

Customer satisfaction – Difference between consumer and customer – Consumerism – Rights of consumers – Customer expectation – Changing perceptions of customer – Benchmarking – Total quality management.

Text Book

1. R.S.N. Pillai and Bagavathi, Modern Marketing – Principles and Practices, S.Chand& Co, 2010.

Books for Reference

1. V.S. Ramaswamy and S. Namakumari, Marketing Management: Global Perspective, Indian Context, Om Books publisher, 2009.
2. R.L. Varshney and B. Bhattacharya, International Marketing Management – An Indian perspective, Sultan Chand and Sons, 2015.

Note: Question paper shall cover 100% Theory

Course Outcomes

Upon completion of the course, the students will be able to

CO1: Explain the marketing concepts
CO2: Identify the strategies adopted for buyer's behavior.
CO3: Analyse the tools for promotion, sales promotion and Advertising.
CO4: Assess the marketing organization and control.
CO5: Assess Customer Satisfaction, Benchmarking and Quality Management.

Mapping Outcomes COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	3	9	3	9	9	9	87/15=5.8
CO2	9	3	3	3	3	3	9	3	3	3	3	3	3	3	9	63/15=4.2
CO3	9	3	9	9	3	3	9	3	9	9	3	3	9	3	9	93/15=6.2
CO4	9	9	9	9	3	9	9	3	9	3	3	3	3	3	3	87/15=5.8
CO5	9	9	9	9	3	9	9	9	3	9	3	9	3	9	3	105/15=7
Weightage																**29/5=5.8**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT12	INTERNATIONAL TRADE AND PRACTICE	L	T	P	C
CORE II			5	-	-	4

Course Objectives:

The objectives of the course are

- To understand the global trends in business, marketing and trade and to make aware of regulations of foreign trade practices in the era of globalization.
- To get awareness about International Business Environment.
- To know the foreign exchange and Foreign institutions.
- The student will get knowledge on Global Level Business.

Unit-I: International Business and BOP

International Business: Meaning, Nature, Objectives – Strategic decisions in International Business – Special Problems in International business – Reasons for firms for going international – Drivers and Restrainers of Globalization – Types of International Business activities – BOP: Components – Disequilibrium – Correction of Disequilibrium.

Unit-II: International Business Environment

International Business environment: Meaning – Significance – Political Environment – Economic Environment – Cultural Environment – Technological Environment.

Unit-III: International Marketing

International marketing – Introduction – Meaning – Definition – International Marketing Vs Domestic marketing - Problems – International marketing environment - Market Entry Strategies – Information requirements for international marketing – Sources of information – International marketing channels

Unit-IV: International Trade strategies

International trade – Trade strategies – Types of Trade barriers – GATT – WTO – GATS – TRIMs – TRIPs – IPRs – Patents – IMF – World Bank.

Unit-V: India's Trade performance

India's Trade Performance: Determinants of Exports and Imports - Major Exports and Imports - Direction of Trade - Trade in Services - Major Problems of India's Export Sector. Foreign exchange market: Meaning, Nature and Functions – Determination of exchange rates – Exchange Rate system – Foreign exchange risk – FEMA.

Text Book:

1. Francis Cherunilam, International Business, PHI Learning Pvt. Ltd., New Delhi, 2013.

Reference Books:

1. Francis Cherunilam, International Trade and Export Management, Himalaya Publishing house, 2019.
2. Varshney.R.L. and Bhattachariya.B, International Marketing Management- An Indian perspective, Sultan Chand and Sons, 2015.
3. SubbaRao, P, International Business, Himalaya Publishing House, New Delhi, 2014
4. Vershney, R.L. and Bhattacharya, B., International Marketing Management, Sultan Chand & Sons, New Delhi, 2012.
5. B.S.Rathor, B.M.Jani and J.S.Rathor, International Marketing, Himalaya Publishing, Mumbai, 2001

Note: Question paper shall cover 100% Theory

Course Outcomes:

Upon completion of the course, the students will be able to

CO 1: Understand the concepts of international marketing and environment.

CO 2:Analyze the determinants of market selection and market entry methods

CO 3: Evaluate the various determinants of international marketing channels

CO 4: Analyse the Export Procedure and Documentation

CO 5: Examinethe sources of Export Finance and Payment Terms.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	3	9	3	9	9	3	81/15=5.4
CO2	9	3	3	3	3	3	9	9	3	3	3	9	3	3	9	75/15=5
CO3	9	3	9	9	3	3	9	9	9	9	3	3	9	3	3	93/15=6.2
CO4	9	9	9	9	3	9	9	3	9	3	3	9	3	3	3	93/15=6.2
CO5	9	9	9	9	3	9	9	9	3	9	3	3	3	9	3	99/15=6.6
Weightage																**29.4/5=5.88**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's*(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT13	ADVANCED FINANCIAL MANAGEMENT	L	T	P	C
CORE III			6	-	-	4

Course Objectives:

The objectives of the course are

- To gain knowledge on the fundamental concepts on financial management.
- To know the valuation of securities
- To understand the theories of capital structure and working capital management
- The student will able to understand an overview of financial management

Unit-I: Introduction to Financial Management

Financial Management: Meaning, Scope, Objectives, Functions, Relationship with other areas of Management – Functions of Financial Manager – Sources of Finance – Short term and long term finance – Financial decisions – Concepts of valuation: Time value of money – Compounding and Discounting – Risk and Return trade off.

Unit-II: Valuation of Securities

Valuation of Securities: Valuation of Asset – Bond Valuation – Valuation of Preference shares, Equity valuation. Dividend Policy: Meaning, Objectives, Forms of Dividend, Different dividend theories – Factors determining Dividend Policy.

Unit-III: Capital Structure

Capital Structure: Patterns of capital structure – Factors affecting Capital Structure – Optimum Capital Structure - Theories of Capital Structure. Leverages: Meaning, Types – Financial, Operating and Combined.

Unit-IV: Cost of Capital

Cost of Capital: Meaning, Significance, Concepts, Cost of Debt, Equity, Preference and Retained Earnings – Weighted Average Cost of Capital. Capital Budgeting: Concept - Evaluation Techniques: Payback, Accounting Rate of Return, NPV, IRR, Profitability Index, Comparison of DCF Techniques.

Unit-V: Working Capital Management

Working Capital: Concept, Need, Types, Factors affecting Working Capital – Estimation of Working Capital – Components of Working Capital – Management of Working Capital Components – Cash, Inventories, Accounts Receivable and Accounts Payable – Working Capital Financing: Trade Credit, Bank finance & Commercial Papers.

Text Book:

1. S.N.Maheswari, Financial Management Principles and Practice, Sultan Chand & Sons, New Delhi, 2013.

Reference Books:

1. I.M.Pandey, Financial Management, Vikas Publishing House Pvt. ltd, New Delhi, 2016.
2. James C. Van Horne, John M.Wachowicz., Jr, Fundamentals of Financial Management, PHI Pvt. Ltd, New Delhi, 2008.
3. Prasanna Chandra, Financial Management Theory and Practice, Tata McGraw – Hill Publishing Company Ltd, New Delhi, 2017.
4. Preeti Singh, Fundamentals of Financial Management, Ane Books Pvt. Ltd, Bangalore, 2009.
5. P.V. Kulkarni& B.G. Sathyaprasad, Financial Management, Himalaya Publishing House, Mumbai, 2015.

Webliography:

a. http://icmai.in/studentswebsite/studymat.php
b. http://164.100.133.129:81/eCONTENT/Uploads/Advanced_Financial_Management.pdf
c. http://opentuition.com/acca/p4/acca-p4-lectures/
d. http://cma-classes.in/
e. sol.du.ac.in/mod/book/view.php?id=1546&chapterid=1530

Note: Question paper shall cover 40% Theory and 60% Problems

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Explain the various techniques of financial management and financial planning

CO2: Make use of the relevance of capital structure, cost of capital and dividend policy with the value of the firm

CO3: Analyze the financial plan, leverages, capital structure and cost of capital of a company

CO4: Determine the optimal capital structure and value of a firm

CO5: Estimate the cost of capital, optimum dividend and working capital requirements of business firms.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	9	9	9	3	9	3	9	3	3	81/15=5.4
CO2	9	3	9	9	3	3	9	9	3	9	3	9	3	3	9	93/15=6.2
CO3	9	9	9	9	3	9	9	9	9	9	3	3	9	3	3	105/15=7
CO4	9	9	9	9	3	9	3	3	9	3	3	9	3	3	3	87/15=5.8
CO5	9	9	9	9	9	9	9	9	3	9	9	3	3	9	3	111/15=7.4
Weightage																**31.8/5=6.36**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0– No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT14	MANAGEMENT ACCOUNTING	L	T	P	C
CORE IV			6	-	-	4

Course Objectives:

The objectives of the course are

1. Develop an insight of principles and techniques of Management Accounting.
2. Familiarize the utilization of accounting information for planning, and decision-making
3. Effective control of business ventures.
4. The students will get the knowledge to prepare financial statements, other analysis and evaluations themselves.

Unit I: Introduction to Management Accounting

Management Accounting: Nature - Scope - Management accounting Vs Financial accounting. Management reporting system – Designing and installation – Types of reports.

Unit II: Financial Statement Analysis

Analysis of financial statement – Concept of funds – Importance – Preparation of Fund Flow Statement and Cash Flow Statement – Comparison of Fund Flow and Cash Flow Statement

Unit III: Standard Costing

Standard Costing – Introduction - Importance – Limitations- Material, Labour, Overhead, Sales and Profit.

Unit IV: CVP Analysis

Cost-Volume Profit analysis – Techniques – Break Even Analysis – Profit-Volume (P/V) analysis – Role and Limitations of CVP analysis.

Unit V: Capital Budgeting

Nature of Capital Budgeting – Importance of Capital Budgeting – Difficulties – Rationale – Evaluation techniques – Average rate of return – Pay back method – Discounted cash flow techniques – Net present value method - Internal rate of return method.

Text Book:

1. Pillai, R.S.N. and Bagavathi, Management Accounting, S.Chand& Co Ltd., 2010.

Reference Books:

1. Gupta, S.P., Management Accounting, SahityaBhavan Publications. Agra.
2. Khan M.Y. and Jain, P.K. 2007.Management Accounting. 4thEdn. Tata McGraw Hill Publishing Co. Ltd., New Delhi.
3. Maheswari, S.N. 2009. Management Accounting & Financial Control. Sultan Chand & Sons, Delhi.

4. Sharma,R.K. and Sashi,K. Gupta. 2007. Management Accounting. 15th Revised Edn. Kalyani Publishers, Ludhiana.
5. Vinayakam.N and. Sinha, I.B. 2005. Management Accounting – Tools & Techniques – Kalyani Publishers, Ludhiana.

Webliography:

- https://www.cpaaustralia.com.au/documents/study-manual-management-accounting.pdf
- http://management-accountant.com/
- www.learnerstv.com/Free-Management-Video-lectures-ltv638-Page1.htm
- http://www.wiley.com//college/managerialvideos/

Note: Question paper shall cover 20%Theory and 80% Problems

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Define financial statement, cash flow statement, marginal costing, budgetary control and capital budgeting.

CO2: Identify the types of ratios, cash flow activities, budgets, capital expenditure decisions

CO3:Analyse the financial position of a business, cash flow, cost / volume / profit, master budget and investment proposals

CO4: Interpret the results of ratios, cash flow activities, contribution, functional budget and capital budgeting

CO5: Solve the managerial problems by adapting the techniques of management Accounting

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	9	9	9	3	9	3	9	9	3	87/15=5.8
CO2	9	3	9	9	3	3	9	9	3	9	9	9	3	3	9	99/15=6.6
CO3	9	9	9	9	3	9	9	9	9	9	9	3	9	3	3	111/15=7.4
CO4	9	9	9	9	3	9	3	3	9	3	3	9	3	9	3	93/15=6.2
CO5	9	9	9	9	9	9	9	9	3	9	9	3	3	9	9	117/15=7.8
Weightage																**33.8/5=6.76**

Level of Correlation 1 – Low 3 – Medium 9 – High 0– No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COP11	COMPUTERIZED ACCOUNTING WITH TALLY	L	T	P	C
CORE V			-	-	6	4

Course Objectives:

The objectives of the course are

- To provide basic knowledge of computerized accounting to deserving students under self – learning mode.
- To know the preparation of budget and vouchers
- To prepare the final accounts and fund flow statement
- The student will get employment after learning the paper

Unit – I: Introduction to Tally

Introduction – Role of computer in Accounting – Extended enterprise features – Accounting and Inventory control features – sales and purchase order processing. To start tally – menus and options – Accounting with Tally – Pre defined groups of accounts – Golden rules of accounts – Double entry systems – ledger creation.

Unit – II: Groups

Groups: Accounts Information – Primary groups of capital nature – revenue nature – To create groups using single mode – Multiple mode – Types of Budget – type of vouchers – Restart numbering – Foreign Exchange Transactions – stock Group Creation– Inventory information – Single stock group creation – Multiple stock group creation – create stock category using single mode – Multiple mode – Configuration settings for inventory – costing method – FIFO – LIFO – create stock items in multiple mode – Trading Business.

Unit – III: Vouchers

Gateway of Tally – Voucher entry – Type of Voucher – Inventory allocations – Purchase and Sales order vouchers entry – Invoice entry – Optional and Regular Vouchers – Balance Sheet – Profit and Loss Account

Unit – IV: Accounting Statements

Trial Balance – Accounting Books and Statements – Inventory Reports and Statements – Cash Flow / Funds Flow Statement – Gateway of Tally – Multi Accounting Printing – Types of Printing - Configuration Options.

Unit – V: Financial statement analysis

Reconciliation of Bank Accounts and other Miscellaneous option – Stock Summary Ratio Analysis – Import and Export of Data – Backup and Restore of data – loading a company – creating a group company – Reconciliation of Bank accounts – Security control - Types of Security.

Text Book:

1. Implementing Tally ERP 9: A.K Nadhani and K.K Nadhani, BPB Publications, 2018

Reference Books:

1. MamrataAgrawal, Tally 9, Dream Tech Press, New Delhi, 2013
2. Tally Software Package – manual, 2019.
3. GarimaAgarwal, Computerised Accounting, Himalaya publications, 2018
4. A. Murali Krishna, Computerised Accounting, Vaagdevi publications, 2015
5. Dinesh Maidasani, Mastering Tally, Firewal Media, 2010
6. J.S. Arora, Tally ERP 9, Kalyani Publications, 2017

Note: Question paper shall cover 100% Practical

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Possess skills to create a company with accounting and inventory features.

CO2: Work with the well-known procedure for recording the transactions in accounting and inventory vouchers.

CO 3: Prepare Bank reconciliation statement and debtors, creditors management

CO4: Analyze the reports like Day Book, Trial Balance, Profit & Loss A/c, Income and Expenditure Account, Balance Sheet & Printing option

CO 5: Examine the legal aspects of GST and Income Tax calculations.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	3	9	3	9	3	3	75/15=5
CO2	9	3	3	3	3	3	9	9	3	9	3	9	3	3	9	81/15=5.4
CO3	9	3	9	9	3	3	9	9	9	9	3	3	9	3	3	93/15=6.2
CO4	9	9	9	9	3	9	9	3	9	3	3	9	3	3	3	93/15=6.2
CO5	9	9	9	9	3	9	9	9	3	9	9	3	3	9	3	105/15=7
Weightage																**29.8/5=5.96**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0– No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COS11	EMPLOYABILITY SKILLS –SOFT SKILL DEVELOPMENT (PRACTICAL)	L	T	P	C
SUPPORTIVE COURSE I			2	-	-	2

Course Objectives

The objectives of the course are

- To enhance the employability skills.
- To develop interpersonal skills that provides good work environment.
- To effectively prepare and present in a job interview

Unit I: Etiquettes and Manners

Etiquette – Meaning & Importance, Etiquette Vs Manners, Business and Workplace Etiquette, Ways of introducing oneself, Handshakes, Telephone Etiquette, Email Etiquette

Unit II: Interpersonal skills

Understand Self – Different Categories; Diagnosis of Type of Self - Identifying own type of self, Positive character traits, Effect of Interpersonal Behaviour on Interpersonal Relationship, Formal Interpersonal skills, Emotional Intelligence

Unit III: Leadership skills

Leadership – Definition, Role & Functions of a Good Leader; Traits of Leadership, Leadership styles, Developing Leadership skills

Unit IV: Group Discussion

Group Discussion as a Selection process, Kinds of topics for discussion, Structure of GD, Initiation Techniques, Handling Questions, Outcome of GD, Preparation for GD

Unit V: Interview Skills

Types of Interview, Employment Interview, preparing for Face- to face interview, Interview Body language, Questions commonly asked during Interview

Text Books:

1. Alex K, Soft Skills, Sultan Chand Company, 2014
2. Gopalaswamy Ramesh, The Ace of Soft Skills: Attitude, Communication And Etiquette For Success, Pearson Education, First Edition, 2013

Reference Books:

1. K. RavikanthRao, Life Skills Education, Neelkamal, 2016
2. Neera Jain and ShomaMukherji, Effective Business Communication, Tata McGraw Hill Education Pvt. Ltd., 2013
3. M.S. Rao, Soft Skills: Enhancing Employability, I.K. International Publishing House Pvt. Ltd., 2011
4. UrmilaRai and S.M.Rai, Business Communication, Himalaya Publishing House, 2010
5. SarveshGulati, Corporate Soft Skills, Rupa Publications India Pvt. Ltd., 2007

Note: Question paper shall cover 100% Practical

Course Outcomes:

On completion of the course, student will be able to–

CO1: Effectively communicate through verbal/oral communication and improve the listening skills

CO2: Write precise briefs or reports and technical documents.

CO3: Actively participate in group discussion / meetings / interviews and prepare & deliver presentations.

CO4: Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.

CO5: Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								**Mean Score of COs**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	3	9	3	9	3	9	3	9	75/15=5
CO2	9	3	3	3	3	3	9	3	3	9	3	9	3	3	3	69/15=4.6
CO3	9	3	9	9	3	3	9	3	9	9	9	9	9	3	9	105/15=7
CO4	9	9	9	9	3	9	9	9	3	3	3	9	3	3	9	99/15=6.6
CO5	9	9	9	9	3	9	9	9	3	9	9	3	3	9	3	105/15=7
Weightage																**30.2/5=6.04**

Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

SEMESTER – II

COURSE CODE	P21COT21	MODERN BANKING AND INSURANCE	L	T	P	C
COREVI			4	-	-	4

Course Objectives

The objectives of the course are

- To enable the students to obtain knowledge on the important areas that help in Banking and its services
- To know the types of banking, e-banking and its services
- To understand the basic concept of insurance
- The student will able to operate online banking and to know the banking and operations

Unit – I: Modern Banking Services

Banking Services – Traditional Vs Modern – Mobile banking – Facilities in mobile banking — Internet Banking – Tele banking – Home banking – Corporate banking- Electronic Fund Transfer (EFT) – Evolution – Steps in EFT – Need and advantages of EFT – NEFT – Advantages – Electronic Clearing Services (ECS) – Advantages of ECS – Disadvantages – RTGS – Features – Security features of RTGS – Advantages – Disadvantages.

Unit – II: E-Banking

E-Banking – Facets of E-banking– E-banking transactions – Electronic delivery channels– Truncated cheque and electronic cheque – Models for E-banking – M - Cheque product – Electronic cheque - Advantage and constraints in E-banking – Security measures- Overview of Foreign Exchange-CIBIL Score.

Unit – III: Debit and Credit Cards

ATM – Features – Mechanism – Functions- Importance – Procedure for cash withdrawal – Debit cards – Concept – Mechanism – Dangers – Credit cards – Origin and history – Features – Classification – Validity and renewal — Credit card frauds - Benefits of credit card – Drawbacks – Indian Scenario – Future outlook.

Unit – IV: Principles of Insurance

General Insurance in India – Basic Principles of Insurance: Utmost good faith, Insurable Interest- Indemnity, Misrepresentation, Subrogation, Proximate cause -Role of Insurance Companies as financial intermediaries- Insurance schemes – Assessing risk- product pricing - promotion measures - claim valuation methods-Intermediaries in insurance business – agency.

Unit – V: General Insurance

Scope of general insurance covering theft, fire, vehicles, products, transport, travel, building and understanding the underlying conditions thereof- claims for compensation and procedure there of -Regulatory authorities and their functions

Text Book

1. Sundaram and Varshney, Banking Law Theory and Practice, Sultan Chand Co., 2019
2. S. Guruswamy, Banking Theory Law and Practice, 3rd Edition, Vijay Nicholes Imprint Pvt. Ltd., Chennai, 2020.

Reference books:

1. ShelaghHefferman, Modern Banking theory and practices, John wiley and sons, 2012
2. N.C.Majumdar, Fundamentals of modern banking, New central Book Agency, 2015
3. D.P.Gupta and R.K.Gupta, Modern banking in India, Asian Books, 2019
4. Indian Institute of Banking and Finance, Banking and insurance law and practice, Taxmann Publication Private Limited, 2018
5. B. Santhanam, Banking and Financial Systems, Margham Publishers, 2017
6. S.N. Maheswari, Banking Law Theory and Practice, Kalyani Publications, 2018.

Webliography:

1. www.hindustanuniv.ac.in/video_lecture_series
2. www.tcyonline.com/video-lectures
3. www.atozinbanking.com
4. www.higherbanking.com
5. www.rbi.org.in

Note: Question paper shall cover 100% Theory

Course Outcomes

Upon Completion of the course, the students will be able to

CO1: Understand and remember the principles of lending, credit, cash and marketing management aspects of the banking sector

CO2: Identify the procedures for lending & recovery of loan and marketing risks

CO3: Analyse the causes for NPA, norms for credit appraisal and market segmentation

CO4: Assess the management practices of banks

CO5: Adapt the principles of credit, cash and risk management

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	3	9	3	9	3	9	3	3	69/15=4.6
CO2	9	3	3	3	3	3	9	3	3	9	3	9	3	3	9	75/15=5
CO3	9	3	9	9	3	3	9	3	9	9	9	3	9	3	9	99/15=6.6
CO4	9	9	9	9	3	9	9	3	9	9	9	9	3	3	9	111/15=7.4
CO5	9	9	9	9	3	9	9	3	3	9	9	3	3	9	3	99/15=6.6
Weightage																**30.2/5=6.04**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT22	ADVANCED COST ACCOUNTING	L	T	P	C
COREVII			5	-	-	4

Course Objectives

The objectives of the course are

- To enable the students to obtain knowledge on the important areas that help in decision making.
- To understand the basic concepts of cost accounting
- To know the elements of costing and types of costing
- The student will get an idea to prepare cost sheet and various types of costing.

Unit – I: Introduction to Cost Accounting

Cost Accounting – Meaning and Definition – Importance –Cost concept – Differences between Financial Accounting and Cost Accounting – Installation of an Ideal Costing System – Elements of cost – Classification of cost - Preparation of Cost Sheet including Tender.

Unit – II: Material Cost

Material cost control – Fixation of various stock levels – Economic Order Quantity – Purchase procedure – Issue of materials – Pricing of material issues – Inventory control and verification.

Unit – III: Labour Cost

Labour cost control – Time keeping – Wage payment and Incentive schemes – Idle Time and Overtime – Labour turnover.

Unit – IV: Overheads

Overheads – Meaning, Classification according to functions and variability – Apportionment and Reapportionment of Overheads – Absorption of Overheads – Machine hour rate – Reconciliation of cost and financial Profits.

Unit – V: Job costing

Job Costing – Contract Costing – Process Costing – Losses and Gains – Inter Process Transfer Pricing – Equivalent production – Joint and By Products Costing.

Text Book:

1. Maheshwari S.N., Cost Accounting, Sultan Chand & Sons, New Delhi, 2018.

Reference Books:

1. Jain &Narang, Cost Accounting, McGraw Hill, Noida, U.P, 2012.
2. Arora.M.N, Practical Costing, Himalaya Publishing, Mumbai, 2017.
3. Senthilkumar and Maruthamuthu, Advanced Cost Accounting, Vikas Publishing House, New Delhi (Revised Edition), 2018
4. Murthy and Gurusamy, Cost Accounting, Vijay Nicole Publication, Chennai, 2016.

Webliography:

1. icmai.in/studentswebsite/studymat.php
2. http://www.icsi.in/
3. http://www.textbooksfree.org/Managerial%20Accounting%20Videos.htm
4. https://www.vutube.edu.pk/vu-lectures/viewcategory/19/cost-management-accounting-mgt402
   education.svtuition.org/2011/07/cost-accounting-video-lectures.html

Note: Question paper shall cover 20% Theory and 80% Problems

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Explain the concepts of activity based costing, target costing, life cycle costing, standard costing, value chain and value added

CO2: Apply the various cost management techniques

CO3: Analyse the techniques of cost management

CO4: Interpret the results arrived through the cost management techniques

CO5: Adapt the strategic areas of cost management system in a manufacturing concern.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	9	9	9	3	9	3	9	3	3	81/15=5.4
CO2	9	3	9	9	3	3	9	9	3	9	3	9	3	3	9	93/15=6.2
CO3	9	9	9	9	3	9	9	9	9	9	3	3	9	3	3	105/15=7
CO4	9	9	9	9	3	9	3	3	9	3	3	9	3	3	3	87/15=5.8
CO5	9	9	9	9	9	9	9	9	3	9	9	3	3	9	3	111/15=7.4
Weightage																**31.8/5=6.36**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0– No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT23	BUSINESS RESEARCH METHODS	L	T	P	C
COREVIII			4	-	-	4

Course Objectives:

The objectives of the course are

- To enable students to know the concept and process of research and the methods of presenting research report.
- To understand the concepts of various steps and techniques and procedures in Research.
- To enable the student to gain the knowledge of analysis and interpretation.
- The student will get an idea to prepare project report.

Unit – I: Types and Process of Research

Research: Introduction – Characteristics – Objectives – Scope – Importance – Qualities of good researcher – Types of research – Research Process – Identification, Selection and Formulation of research problems.

Unit – II: Research Design

Formulation of hypothesis – Research design – Types – Sampling: Methods and Techniques, Steps – Sample size – Sampling error – Advantages and limitations of sampling.

Unit – III: Data collection

Data collection methods: Techniques of data collection – Primary data and Secondary data– Interview Schedule, Questionnaire and Observation – Pretest – Pilot study – Secondary data sources.

Unit – IV: Data processing

Data processing: Editing – Coding - Classification and Tabulation – Attitude measurement – Scaling technique: L.L.Thurstone, RensisLikert, Emory S. Bogardus - Social distance - Rating and Ranking scales – Data analysis: Statistical tolls used in research – Measure of Central tendency – Standard Deviation – Correlation – regression models – Methods of least square – Multiple regressions. Test of significance – 'T' Test and 'F' test – ANOVA – Chi-Square test

Unit – V: Report writing

Report writing and presentation: Types of report – Contents – Format of report – Steps in drafting report - Presentation of report – Foot note – References – Bibliography - Research Ethics - Plagiarism.

Text Book

1. C.R.Kothari, "Research Methodology", New Age International Publishers, 2020.

Reference Books:

1. Devendra Thakur, Research Methodology in Social Science. Deep & Deep Publications. New Delhi, 2000.

2. Krishnasami, O.R. andRanganathan, M., Methodology of Research in Social Science, 2nd Edn. Himalaya Publishing House, Mumbai, 2014.
3. Michael. V.P., Research Methodology in Management, Kitib Mohan Publications, Alahabad, 2014
4. Ravilochanan, P., Research Methodology. Margham Publications, Chennai, 2007.
5. Saravanavel, P., Research Methodology, KitabMahal, Allahabad, 2008.

Webliography:

1. https://www.bcps.org/offices/lis/researchcourse/statistics_role.html
2. https://www.mheducation.co.uk/openup/chapters/9780335227242.pdf
3. onlinelibrary.wiley.com/doi/10.1002/0471477435.fmatter/pdf
4. www.statisticslectures.com/
5. http://www.textbooksfree.org/Statistics%20Video%20Lectures.html

Note: Question paper shall cover 80% Theory and 20% Problems

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Explain the conceptual framework of research design
CO2: Apply the suitable statistical tools for analyzing the problem and infer the results
CO3: Analyse the primary and secondary data
CO4: Assess the research problems
CO5: Design the research reports.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	3	3	9	9	9	9	9	87/15=5.8
CO2	9	3	3	3	3	3	9	9	3	9	3	9	9	3	9	87/15=5.8
CO3	9	3	9	9	3	3	9	9	9	9	3	3	9	3	9	99/15=6.6
CO4	9	9	9	9	3	9	9	3	9	3	3	9	3	9	3	99/15=6.6
CO5	9	9	9	9	3	9	9	9	3	9	9	3	9	9	3	111/15=7.4
Weightage																**32.2/5=6.44**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT24	QUANTITATIVE TECHNIQUES FOR BUSINESS DECISIONS	L	T	P	C
COREIX			5	-	-	4

Course Objectives:
The objectives of the course are

- To make the students to understand the various concepts in Quantitative techniques,
- To enable the students how various techniques of statistics used in business for taking decisions.
- To provide practical knowledge on quantitative techniques.
- The students will gain sound theory as well as practical knowledge in quantitative techniques.

Unit I: Introduction to Quantitative Techniques

Meaning of Quantitative Techniques – Role of Quantitative Techniques – Advantages and Limitations of Quantitative Techniques – Correlation Analysis – Simple – Partial and Multiple –Regression Analysis – Time Series.

Unit II: Probability

Probability – Problems applying Additional and Multiplication Theorem – Mathematical Expectations – Theoretical Distributions – Binomial – Poisson – Normal Distribution.

Unit III: Significance Tests

Significance Tests in Small Samples (t test) – Testing the significance of the mean of a random sample – Testing difference between means of two samples (Independent and Dependent Samples) – Chi-square test- Analysis of Variance (One way and two way classification).

Unit IV: LPP, Transportation and Assignment Problems

Linear Programming – Graphical Method – Simplex Method – Transportation Problems – Initial Basic Feasible Solution - Modi Method – Assignment Problems.

Unit V: Interpolation and Extrapolation

Interpolation and Extrapolation – Methods of Interpolation – Binomial Expansion Method – Newton's Method – Lagrange's Method – Parabolic Curve Method – Extrapolation – Vital Statistics – Life Tables

Text Books

1. C.R. Kothari, Quantitative Technique, Vikas Publishing House, 2015
2. S.P. Gupta, Business Statistics & Operation Research - Sultan Chand & Sons, 2012

Reference Books:

1. S.C. Gupta, Statistical Methods, Sultan Chand & Sons, 2014
2. S.P. Gupta, Statistical Methods, Sultan Chand & Sons, 2011
3. Richart I. Levin, and Rubin, Statistics for Management, Prentice Hall of India, 2017

4. PA. Navanitham, Business Statistics & Operation Research, Jai Publications, Trichy, 2016.
5. S.P. Rajagopalan& R. Sattanathan, Business Statistics & Operation Research, Vijay Nicole Publications, Chennai, 2011

Note: Question paper shall cover 20% Theory and 80% Problems

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Draw inferences from sample data regarding the relevant population.

CO2: Apply mathematical techniques to problem solving

CO3: Calculate and interpret the nature of correlation between variables

CO4: Apply appropriate mathematical tools to financial data including discounting and investment appraisal

CO5: Explain probability and be able to use a range of techniques to calculate probabilities

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	9	3	9	9	9	3	9	9	9	93/15=6.2
CO2	9	3	9	9	3	3	9	3	3	9	3	9	3	3	9	87/15=5.8
CO3	9	9	9	9	3	9	9	9	9	9	3	3	9	3	9	111/15=7.4
CO4	9	9	9	9	3	9	3	3	9	3	3	9	3	9	3	93/15=6.2
CO5	9	9	9	9	9	9	9	9	3	9	9	3	3	9	3	111/15=7.4
Weightage																**33/5=6.6**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT25	INVESTMENT ANALYSIS AND PORTFOLIO MANAGEMENT	L	T	P	C
CORE X			4	-	-	4

Course Objectives

To provide knowledge about various investment avenues, methods of analyzing securities and portfolio management.

Unit – I: Investment Analysis

Investment Analysis: Nature – Scope – Elements of Investment – Risk and return – Objective of investment – Approaches to investment analysis – Securities – Types – Features – Bond Market.

Unit – II: Investment Alternatives

Investment alternative and strategies – Financial investment – Non financial investment – Valuation of fixed income securities and variable income securities (excluding Derivatives)

Unit – III: Fundamental Analysis

Fundamental analysis: Economic, Industry and Company analysis – Sources of information for analysis

Unit – IV: Technical Analysis

Technical Analysis – Types of charts – Dow Theory, Elliott wave theory, Odd-lot theory, Breadth of market, Relative strength analysis – Moving Average analysis – Efficient Market Hypothesis

Unit – V: Portfolio analysis and Management

Portfolio analysis and Management: Portfolio risk and return – Markovitz model – Sharpe model: Single Index Model – CAPM – Arbitrage Pricing Theory

Text Book

1. PunithavathyPandian, “Security Analysis and Portfolio Management”, Vikas Publishing House Pvt. Ltd, 2011

Books for References:

1. Avadhani.V.A, “Security Analysis and Portfolio Management”, Himalaya Publishing House Pvt. Ltd, 2010
2. Kevin.S, “Security Analysis and Portfolio Management”, PHI Learning Pvt. Ltd, 2015
3. Donald E. Fischer and Ronald J. Jordan, “Security Analysis and Portfolio Management”, Prentice Hall of India, 2018.
4. Prasanna Chandra, “Investment Analysis and Portfolio Management”, Tata McGraw Hill International, 2019

Webliography :

1. https://irfanullah.co/cfa-1-free-2011-video-lectures/
2. www.bcci.bg/projects/latvia/pdf/8_IAPM_final.pdf
3. www.ctre.iastate.edu/gasb34/intropart1.pdf
4. https://www.garp.org/#!/frm/study-materials

Note: Question paper shall cover 75% Theory and 25% Problems

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Illustrate the various investment avenues, theories of security, derivatives and risk management and portfolio management

CO2: Apply the theories of securities analysis and portfolio management

CO3: Analyse the various investment alternatives and derivatives

CO4: Appraise the techniques of derivatives in minimizing the risk

CO5: Choose the best portfolio combination and derivatives

Mapping Outcomes COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	3	9	3	9	9	9	87/15=5.8
CO2	9	3	3	3	3	3	9	9	3	9	3	9	3	3	9	81/15=5.4
CO3	9	3	9	9	3	3	9	9	9	9	3	3	9	9	3	99/15=6.6
CO4	9	9	9	9	3	9	9	3	9	3	3	9	3	3	9	99/15=6.6
CO5	9	9	9	9	3	9	9	9	3	9	9	3	3	9	3	105/15=7
Weightage																**31.4/5=6.28**

Level of Correlation between CO's and PO's 1 – Low 3 – Medium 9 – High 0 – No Correlation *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

SEMESTER –III

COURSE CODE	P21COT31	INDIRECT TAXATION	L	T	P	C
CORE XI			5	-	-	4

Course Objectives

The objectives of the course are

- To make the students gain knowledge on indirect taxes and legal provisions
- To enable the students to understand theapplications of indirect taxes and its importance.
- To make the students to understand about Goods and Services Tax.
- The student will gain the knowledge about all types of indirect taxes which are levied by government.

Unit- I: Indirect Taxes

Indirect Taxes - Introduction - Features - Objectives of Taxation- Types of taxes- Direct and Indirect taxes - Indirect Tax structure - Merits and Demerits of Indirect Taxes - Recent Developments in Indirect Tax structure - Goods and Services Tax Act 2016 - Introduction – Features – Benefits of Goods and Service Tax.

Unit II: GST

Goods and Service Tax - Important Definitions - Taxable persons – Time of supply of goods and services – Administrative set up – Classes of officers under Central and State Goods and Services Tax Act - Appointment of officers – Powers of officers – Levy and Collection of GST – Powers to grant exemption from GST.

Unit III: Registration Procedures

Registration – Procedure for registration under Schedule III – Special provisions relating to casual taxable person and non-resident taxable person – Amendment of registration – Cancellation of registration – Revocation of cancellation of registration.

Unit IV: GST Assessment

Assessment of GST- Self-assessment – Provisional assessment – Scrutiny of returns – Assessment of non-filers of returns – Assessment of unregistered persons – Assessment in certain special cases – Tax Invoice – Credit and Debit Notes – Input Tax Credit-Payment of Tax – Tax Deducted at Source - Collection of Tax at source.

Unit V: Customs Duty

Customs Act 1962 – Important Definitions – Basics – Importance of Customs Duty – Constitutional authority for levy of Customs Duty – Types of Customs Duty – Prohibition of Importation and Exportation of goods – Valuation of goods for Customs Duty – Transaction Value – Assessable Value – Computation of Assessable Value and Customs Duty.

Text Books

1. National Academy Of Customs Excise and Narcotics, Background Material for Goods and Service Tax. July, 2016.
2. Mehrotra and Goyal. Indirect Taxes, 13th Edn. SahityaBhavan Publications, Agra, 2015.

Reference Books

1. Radhakrishnan, P., Indirect Taxation, 3rd Edn. Kalyani Publishers, New Delhi, 2011.
2. Balachandran, V., Indirect Taxation, 17th Edn. Sultan Chand & Sons, New Delhi, 2016.

Webliography:

1. http://idtc.icai.org/gst-topic-wise-study-material-list.html
2. https://www.gstindia.com/gst-in-india-the-basic-study/
3. http://news.taxindiahindi.in/updated-study-material-on-model-gst-released-by-icai/
4. https://cleartax.in/s/gst-law-goods-and-services-tax
5. www.cbec.gov.in
6. www.gst.gov.in.

Note: Question paper shall cover 100% Theory

Course Outcomes

Upon completion of the course, the students will be able to

CO1: Explain the concepts of Goods and Services Tax Act and Customs Act

CO2: Apply the GSTN Portal in business

CO3: Categorize the transactions under CGST, SGST, IGST and UTGST

CO4: Appraise the mechanism of Goods and Services Tax System

CO5: Prepare the tax planning and tax management for payment of tax and filling of tax returns.

Mapping Outcomes COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	9	9	3	9	3	3	81/15=5.4
CO2	9	3	3	3	3	3	9	9	3	9	3	9	3	3	3	75/15=5
CO3	9	3	9	9	3	3	9	9	9	9	9	3	9	9	3	105/15=7
CO4	9	9	9	9	3	9	9	3	9	3	9	9	3	3	3	99/15=6.6
CO5	9	9	9	9	3	9	9	9	3	9	9	3	3	9	3	105/15=7
Weightage																**31/5=6.2**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT32	FINANCIAL MARKETS AND SERVICES	L	T	P	C
CORE XII			5	-	-	4

Course Objectives:

The objectives of the course are

- To enable the students to understand the concepts of Indian financial system.
- To provide knowledge on various financial services and financial markets.
- To familiarize the various functions of financial Markets.
- The students will gain thorough knowledge about financial markets and financial services.

Unit – I: Indian Financial System

Indian Financial System: Structure, Functions, Financial System and Economic Development – Financial Market: Meaning, Classification – Financial Services: Meaning, Significance, Features, Challenges in financial service sectors – Financial Products and Services – Emerging Scenario.

Unit – II: Money Market

Money Market – Call Money Market – Treasury Bills Market – Discount Market – Govt. Securities Market – Market for Commercial Paper and Certificates of Deposits.

Unit – III: Stock Market

Stock Market – Stock Exchange – Organization and Functions – Listing of Securities – Trading in Stock Exchanges – On-line Trading of Shares – E-Shares – New Issues Market – Types of New Issues – Problems of New Issue Market.

Unit – IV: Merchant Banking, Mutual funds and Venture capital

Merchant Banking – Meaning, Functions, Services – Guidelines of RBI and SEBI.Mutual Funds – Meaning, Types, Importance, Guidelines of RBI and SEBI.Venture Capital – Meaning, Features, Importance, Guidelines.

Unit – V: Factoring, Forfeiting and Depository system

Factoring - Meaning, Importance – Factoring in India –Factoring Vs. Discounting – Forfeiting – Meaning, Advantages and Limitations, Factoring Vs Forfeiting – Securitization of Debts – Securitization Vs Factoring, Depository System – Meaning, Functions – Advantages and Disadvantages, Depository Participants in India-Credit Rating Agency.

Text Book:

1. Gordon and Natarajan, Financial Markets and Services, Himalaya Publishing House, 2001.

Reference Books:

1. S. Gurusamy, Financial Markets and Institutions, recent edition.
2. Khan, M.Y. Financial Services, Tata McGraw Hill, 1998.
3. Sontomero and babble, Financial Markets, Instruments and Institutions, McGraw Hill, 1998.
4. Vasant Desai, The Indian Financial System, Himalaya Publishing House, 2010.
5. Varsheney, P.N., Indian Financial System, Sultan Chand & Sons, 2000.

Note: Question paper shall cover 100% Theory

Course Outcomes

Upon completion of the course, the students will be able to

CO1: Understand the role and function of the financial system in reference to the macro economy.

CO2: Demonstrate an awareness of the current structure and regulation of the Indian financial services sector.

CO3: Evaluate and create strategies to promote financial products and services.

CO4: Make an informed judgement about whether or to what extent a financial market satisfies the conditions of an efficient market

CO5: Identify the main factors that could detract from that efficiency.

Mapping Outcomes COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	9	9	9	3	9	3	9	3	3	81/15=5.4
CO2	9	3	9	9	3	3	9	9	3	9	3	9	3	3	9	93/15=6.2
CO3	9	9	9	9	3	9	9	9	9	9	3	3	9	3	3	105/15=7
CO4	9	9	9	9	3	9	3	3	9	3	3	9	3	3	3	87/15=5.8
CO5	9	9	9	9	9	9	9	9	3	9	9	3	3	9	3	111/15=7.4
Weightage																**31.8/5=6.36**

Level of Correlation between CO's and PO's 1 – Low 3 – Medium 9 – High 0– No Correlation *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT33	ADVANCED CORPORATE ACCOUNTING	L	T	P	C
CORE XIII			5	-	-	4

Course Objectives

The objectives of the course are

- To impart knowledge on accounting methods
- To enable the students to understand the procedures of accounting.
- To enable them to develop skills in the preparation of accounting statements and their analysis.
- To gain the knowledge about Accounting standards and companies' accounts.

Unit – I: Holding Companies

Holding Companies (except inter-company holdings and chain holding).

Unit – II: Banking Companies

Banking Company Accounts – Schedules and Preparation of Balance Sheet.

Unit – III: Insurance Companies

Insurance Company Accounts – Life and Non-life - Schedules and Preparation of Final Accounts.

Unit – IV: Double Account System

Double Account System – Nature – Features – Receipts and Expenditure on Capital Accounts – General Balance Sheet – Revenue Account – Net Revenue Account - Accounts of Electricity Companies and Railways - Replacement and Renewals.

Unit – V: Accounting Standards

Accounting Standards – Indian and International Accounting Standards – Accounting Standards 1,3,6,10,14,21 and 29 - Application – Scope – Formulation – Advantages – Disadvantages – Challenges - Inflation Accounting (Theory only).

Text Book:

1. Reddy, T.S. and Murthy, A., Corporate Accounting. Revised Edn. Margham Publications, Chennai, 2015.

Reference Books:

1. Arulanandam, M.A. and Raman, K.S., Advanced Accounting. 6thEdn. Himalaya Publishing House, Mumbai, 2009.

2. Gupta R.L. and Radhaswamy, Advanced Accountancy. 13th Revised Edn. Sultan Chand & Sons, New Delhi, 2009.
3. Jain, S.P. and Narang, K.L., Advanced Accountancy. 20thEdn. Kalyani Publishers, Ludhiana, 2014
4. Pillai, R.S.N. andBagavthi, Advanced Accountancy. 5thEdn. Chand, S. & Co Ltd., New Delhi, 2012.
5. Rajasekaran, V. andLalitha, R., Advanced Accounts. 1stEdn. Pearson. New Delhi, 2011.

Webliography :

1. http://www.learnerstv.com/video/Free-video-Lecture-22744-Management.htm
2. http://www.businessbookmall.com/Accounting%20Videos.htm
3. http://www.freebookkeepinghelp.com/accounting-lectures.html

Note: Question paper shall cover 20% Theory and 80% Problems

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Outline the basic concepts of corporate accounting

CO2: Identify the accounting procedures of various forms of companies

CO3: Analyse the internal and external reconstruction, performing asset and non-performing asset

CO4: Determine the purchase consideration, capital and revenue profits and profit / loss of bank, insurance and electricity companies

CO5:Prepare financial statements for various companies.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	9	9	9	3	9	3	9	3	9	87/15=5.8
CO2	9	3	9	9	3	3	9	9	3	9	3	9	3	3	9	93/15=6.2
CO3	9	9	9	9	3	9	9	9	9	9	3	3	9	3	9	111/15=7.4
CO4	9	9	9	9	3	9	3	9	9	3	3	9	3	3	9	99/15=6.6
CO5	9	9	9	9	9	9	9	9	3	9	9	3	3	9	9	117/15=7.8
Weightage																**33.8/5=6.76**

Level of Correlation between CO's and PO's 1 – Low 3 – Medium 9 – High 0– No Correlation *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT34	STRATEGIC MANAGEMENT	L	T	P	C
CORE XIV			4	-	-	4

Course Objectives:

The objectives of the course are

- To make the students well aware about the concepts of strategic management.
- To help the students to understand the analysis and formulation of management strategies.
- To enable the students to know the procedures for implementation and evaluation of management strategies.
- The student will get the knowledge to identify the strengths and weakness of the firm.

Unit – I: Introduction to Strategic Management

Strategic Management – Definition – Scope – Benefits – Risks – Approaches – Models – Strategic change – Strategic Leadership and Decision making.

Unit –II: Situation Analysis

Situation Analysis – SWOT Analysis - Environmental Scanning and Industry analysis – Forecasting – Internal Scanning - Mission – objectives – Stakeholder Theory – Cyert and March's Behavioural Theory – Objectives of Non-Profit Organizations – Social Responsibility and Business Ethics.

Unit – III: Strategy Formulation

Strategy Formulation – Business Strategy – Corporate Strategy – Divertional Strategy – Portfolio Analysis – BCG Growth /Share matrix – Strategic choice – Development of policies – Strategic Alliances.

Unit – IV: Strategy Implementation

Strategy Implementation – Organization for action – Staffing – Leading – MBO –Total Quality Management – Functional Strategies – Growth Strategies – Diversification, Acquisition and Joint Venture – Recovery – Recession and Divestment Strategies – Management Buyout.

Unit – V: Strategic Control and Evaluation

Strategic Control and Evaluation – Establishing Strategic control – premise control – Implementation control – Strategic Surveillance – Special Alert Control – Evaluation Techniques – Managing change – Strategic issues in Managing Technology and Innovation – Strategic Effectiveness.

Text Book

1. R. M. Srivastava and ShubhraVerma, Strategic Management: Concepts, Skills and Practices, PHI Learning Pvt. Ltd., 2012

Books for References:

1. John A.Pearce II, Richard B.Robinson Jr., Strategic Management – Strategy Formulation and Implementation, A.I.T.B.S. Publishers, 2015.
2. John L.Thompson, Strategic Management – Awareness and change, Cheapman& Hall, 2014
3. J.David Hunger and Thomas L.Wheelen, Strategic Management, Pearson Publications, 2018.
4. Gregory G.Dess and Alex Miller, Strategic Management, Mcgraw-Hill Publications, 2020.
5. W.L.Charles and John Gareth, Strategic Management – An Integrated Approach, Cengage India, 2012
6. John H.Barnett and William D., Strategic Management, Atlantic Publishers and Distributors, New Delhi, 2018.
7. V.S.Ramaswamy and S.Nanakumari, Strategic Planning for Corporate Success, Macmillan Publications, 1994.

Note: Question paper shall cover 100% Theory

Course Outcomes

Upon the completion of the course, the students will be able to understand

CO1: The students will, by means of a large project report written in groups, obtain training in analysing the strategic situation of a real technology based company, and in developing suggestions for change and development of the company's strategy. Thereby, the students will also acquire experience with working in groups as well as with writing reports for a company.

CO2: The students will, by means of lectures and a written exam, be encouraged to reflect on and combine key perspectives and frameworks within the field of strategic management.

CO3: The student will analyse a company strategic situation, with particular emphasis on strategic analyses on the business level, the corporate level, and the network level

CO4: The student will develop suggestions for change and development of a company's strategy.

CO5: The student will understand specific knowledge of perspectives, frameworks and concepts within strategy formation, strategic change, and strategic innovation.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	9	9	9	3	9	3	9	3	3	81/15=5.4
CO2	9	3	9	9	3	3	9	9	3	9	3	9	3	9	3	93/15=6.2
CO3	9	9	9	9	3	9	9	9	9	9	3	3	9	9	3	111/15=7.4
CO4	9	9	9	9	3	9	3	3	9	3	3	9	3	9	3	93/15=6.2
CO5	9	9	9	9	9	9	9	9	3	9	9	3	3	9	3	111/15=7.4
Weightage																**32.6/5=6.52**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0– No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT35	INCOME TAX AND TAX PLANNING	L	T	P	C
CORE XV			5	-	-	4

Course Objectives:

The objectives of the course are

- To provide understanding on Income Tax including Rules pertaining various aspects.
- To make understand the students about the procedures followed by the income tax authorities in concern with income tax.
- To enable the students to know the procedure of file Income Tax returns.
- The students will gain the knowledge on procedures of income tax, payment of tax, and tax planning.

Unit – I: Income Tax Authorities

Income Tax Authorities – Appointment and control – Powers of the Central Board of Direct Taxes – Assessing officer. Deduction of Tax at source – Meaning – Provisions related to TDS from salaries, Income from other sources – Computation of Tax payable and Tax deductible at source.

Unit - II: Advance Tax

Advance payment of Tax – Meaning – Liability for payment of advance tax – condition – Computation of Advance tax. Assessment procedure - Permanent Account Number – Assessment – Forms used for filing the return of income – Voluntary Return of income, Compulsory return, steps for e-filing of Income tax return.

Unit – III: Recovery and Refund of Tax

Recovery and Refund of Tax – Meaning – Modes of Recovery – Refund of Tax. Appeals and Revision – Procedure in appeal – Revision by the Principal Commissioner or Commissioner.

Unit – IV: Penalties

Penalties – Penalties imposable – General principles – Items of penalties – Power of principal Commissioner or Commissioner to waive penalty.

Unit – V: Tax planning

Tax planning for individuals – Tax Evasion – Tax planning – Objectives – Characteristics – Importance – Tax planning under Salaries, House property, Profits and Gains of Business or Profession, Capital gains, Income from other sources and Clubbing of income.

Text Book:

1. Reddy, T.S. and Hari Prasad Reddy, Y. Income Tax Theory. 11th Edn. Margham Publishers, Chennai. - Current year.

Reference Books:

1. Gaur, V.P. and Narang, D.B. Income tax Law and Practice. Kalyani Publishers, New Delhi. - Current year.
2. Murthy, A. Income tax Law and Practice. Vijay Nicole Imprints Private Limited, Chennai. – Current year.
3. Mehrotra, H.C. and Goyal, S.P. Income Tax Law & Accounts. SahityaBhawan Publications, Agra. - Current year.
4. Saha, R.G., Usha Devi, N. Income Tax (Direct Tax). Himalaya Publishing House, New Delhi – Current year.
5. Vinod, K. and Singania. Students Guide to Income Tax. Taxmann Publications, New Delhi. - Current year.

Note: Question paper shall cover 80% Theory and 20% Problems

Course Outcomes

Upon completion of the course, the students will be able to

CO1: Understand the basic concepts of Income Tax Act

CO2: Identify the exempted incomes from all heads of incomes

CO3: Analyse the procedures for computing taxable incomes from five heads.

CO4: Determine the taxable income of different heads of income

CO5: Prepare the statement of tax liability of an individual

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	9	9	9	3	9	3	9	3	3	81/15=5.4
CO2	9	3	9	9	3	3	9	9	3	9	3	9	3	3	9	93/15=6.2
CO3	9	9	9	9	3	9	9	9	9	9	3	3	9	3	3	105/15=7
CO4	9	9	9	9	3	9	3	3	9	3	3	9	3	3	3	87/15=5.8
CO5	9	9	9	9	9	9	9	9	3	9	9	3	3	9	3	111/15=7.4
Weightage																**31.8/5=6.36**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0– No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COT36	BUSINESS ANALYTICS	L	T	P	C
CORE XVI			4	-	-	4

Course Objectives:

The objectives of the course are

- To enable the students to gain basic knowledge of Electronic-Commerce in the area of Business and Financing decisions
- To provide knowledge about the concepts, tools, techniques, and relevance of digital marketing in the present changing scenario.
- To familiarize the applications and tools of Industry4.0

Unit I: Electronic Commerce

Electronic Commerce: Traditional vs. Electronic Business Applications - The Anatomy of E-Commerce Applications - Classification of Electronic Commerce – Applications of Electronic Commerce Technologies- Business Models- Architectural Framework.

Unit II: Digital Marketing

Digital Marketing: Introduction, Concept, scope, and importance - Traditional marketing versus digital marketing - Challenges and opportunities for digital marketing - Digital penetration in the Indian market - Benefits to the customer; Digital marketing landscape: an overview - Ethical issues and legal challenges in digital marketing - Regulatory framework for digital marketing in India - Digital technology and customer-relationship management.

Unit III: Online Marketing

Digital Marketing Presence: Concept and role of Internet in marketing - Online marketing domains - The P.O.E.M framework - Website design and Domain name branding - Search engine optimization: stages, types of traffic, tactics - Online advertising: types, formats, requisites of a good online advertisement - Buying models - Online public relation management - Direct marketing: scope and growth. Email marketing, Facebook marketing, YouTube and Video marketing, Twitter Marketing, Instagram Marketing: types and strategies.

Unit IV: Interactive Marketing

Interactive marketing: concept and options - Social media marketing: concept and tools - Online communities and social networks - Blogging: types and role - Video marketing: tools and techniques - Mobile marketing tools - PPC marketing - Payment options.

Unit V: Application of AI in Industry 4.0

Industrial Revolution: Industrial Revolution 1.0 to 4.0- meaning- Goals and Design Principles - Technologies of Industry 4.0 - Big Data – Artificial Intelligence (AI) – Industrial Internet of Things - Cyber Security – Cloud – Augmented Reality.

Artificial Intelligence in Marketing: Introduction of Artificial Intelligence in Marketing How does AI Work, Benefit of AI in Marketing Automation, Content creation with AI, AI Tools available for Digital marketing

Text Books:

1. Pineet Singh Bhatia, Fundamentals of Digital Marketing", Pearson Publishers, 2019.
2. Bharat Bhasker, "Electronic Commerce: Framework, Technologies and Applications", Tata McGraw Hill Publishing Company Limited, Noida, UP, 2016
3. C.A.Rayudu, "E-Commerce & E-Business", Himalaya Publishing House, Mumbai, 2013
4. P. Kaliraj, T. Devi, "Higher Education for Industry 4.0 and Transformation to Education 5.0, 2020.
5. Gilchrist Alasdair, Industry 4.0, A Press Publishing Company, New york, 2016

Reference Books:

1. Deiss, R&Henneberry, R, Digital marketing for dummies. John Wiley & Sons, 2020 - 21
2. Amir Manzoor, "E-Commerce", Amir Manzoor Publisher, 2014
3. Suresh T.Viswanathan, "The Indian Cyber Law", Bharat Law House, New Delhi, 2015
4. Ustundag Alp," Industry 4.0: Managing The Digital Transformation", Springer International Publishing, Newyork, 2009

Note: Question paper shall cover 100% Theory

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: To gain introductory and application knowledge on ecommerce

CO2: Identify and assess the impact of digital technology in transforming the business environment and also the customer journey.

CO3: Explain the way marketers think, conceptualize, test continuously to optimize their product search on digital platforms.

CO4: Demonstrate their skills in digital marketing tools such as Social media, and Blogging for engaging the digital generation.

CO5: Introduction of AI in Digital Marketing

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	3	3	9	3	9	9	9	81/15=5.4
CO2	9	3	3	3	3	3	9	3	3	9	3	9	3	9	9	81/15=5.4
CO3	9	3	9	9	3	3	9	3	9	9	3	3	9	3	3	87/15=5.8
CO4	9	9	9	9	3	9	9	3	9	3	3	9	9	9	9	111/15=7.4
CO5	9	9	9	9	3	9	9	9	3	9	9	3	3	9	3	105/15=7
Weightage																**31/5=6.2**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

SEMESTER IV

COURSE CODE	P21COE411	MANAGERIAL ECONOMICS	L	T	P	C
ELECTIVE - I			4	-	-	4

Course Objectives

The objectives of the course are

- To develop managerial perspective to economic principle as an aid for decision making under given environmental constraints.
- To understand the concepts of demand analysis and cost of production analysis
- To know the types of competition, pricing decisions and profit management
- The student will understand the concepts of managerial economics

Unit – I: Managerial Economics

Managerial Economics: Nature and Scope, In relation with other disciplines - Role and Responsibilities of Managerial Economist - Goals of Corporate Enterprises: Maximization of profit – Value of enterprises.

Unit – II: Demand Analysis

Demand analysis: Demand determinations - Demand distinctions – Types of Elasticity of demand – Demand forecasting: For industrial goods – Consumer goods – Factors determining demand forecasting – Methods of demand forecasting.

Unit – III: Cost and production analysis

Cost and production analysis: Cost concepts, Classifications and Determinants – Cost and output relationship – Short run and Long run – Cost functions – Economics scale of production – Cost control – Cost reduction - Production functions – Break-even analysis

.

Unit – IV: Price and Output analysis

Pricing and output decisions indifferent market situations: Perfect competition – Monopoly and Monopsony – Monopolistic competition – Oligopoly and Oligopsony – Pricing policies – Pricing methods – Pricing forecasting.

Unit – V: Profit management

Profit management: Nature, Measurement – Profit policies – Profit planning and forecasting - Business cycles and Business policies – Economic forecasting – Input Output analysis - National income.

Text Book:

1. R.L. Varsheny ,C.L.Maheshwari, "Managerial Economics", Sultan Chand & Sons, New Delhi, 2002

Reference Books:

1. Cauvery, SudhaNayak and Others - Managerial Economics - S. Chand and Sons, New Delhi, 2009.
2. Dwivedi D.N. - Managerial Economics - Vikas Publishing House P. Ltd, New Delhi, 2010.
3. Gupta G.S. – Managerial Economics – Tata McGraw Hill, New Delhi, 2014.
4. Mehta P.L. – Managerial Economics – Sultan Chand and Sons, New Delhi, 2015.
5. Mithani D.M. – Managerial Economics – Himalaya Publishing House, Mumbai, 2011.

Note: Question paper shall cover 100% Theory

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Understand the roles of managers in firms

CO2: Understand the internal and external decisions to be made by managers

CO3: Analyze the demand and supply conditions and assess the position of a company

CO4: Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets.

CO5: Analyze real-world business problems with a systematic theoretical framework.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	3	9	3	9	3	3	75/15=5
CO2	9	3	3	3	3	3	9	9	3	9	3	9	3	3	9	81/15=5.4
CO3	9	3	9	9	3	3	9	9	9	9	3	3	9	9	3	99/15=6.6
CO4	9	9	9	9	3	9	9	3	9	3	3	9	3	9	9	105/15=7
CO5	9	9	9	9	3	9	9	9	3	9	9	3	3	9	3	105/15=7
Weightage																**31/5=6.2**

Level of Correlation 1 – Low 3 – Medium 9 – High 0– No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix*

COURSE CODE	P21COE412	BUSINESS ETHICS	L	T	P	C
ELECTIVE - I			4	-	-	4

Course Objectives:

The objectives of the course are

- Promote understanding of the importance, for business and the community, of ethical conduct;
- Provide the skills with which to recognize and resolve ethical issues in business;
- Enhance awareness and critical self-examination of one's own values, and to appreciate the relevance of personal values in the business/workplace setting; and
- Encourage reflection on the ethical dimension of your own decision-making in workplace and other settings.

Unit –I: Business Ethics

Business Ethics – Meaning and definition – Importance – Nature and factors influencing business ethics – Scope and Objectives – Characteristics of Business ethics.

Unit –II: Ethical performance

Ethical performance – Ethics and Business – Types of Ethics – Need for Business Ethics.

Unit –III: Beliefs and Values

Values – Norms – Beliefs – Moral Standards – Beliefs and their role – Moral Standards Vs Standard Morality – Ethical codes.

Unit – IV: Corporate Governance

Corporate Governance – Meaning – Importance and Features and Corporate Social Responsibility.

Unit –V: Environmental ethics

Environmental Ethics – Workplace Ethics - Ethics in Marketing and Consumer protection.

Text Book

1. Murthy, G.S.V., Business Ethics. 1st Edn. Himalaya Publishing House, Mumbai, 2016.

Reference Books

1. Badi, R.V. and Badi, N.V., Business Ethics. 2nd Edn. Vrinda Publication (P) Ltd., Delhi, 2005.

2. Gene Burton. Manab Thakur. Management today – Principles and Practice. 9th Reprint. Tata McGraw Hill Publishing Company Ltd., Delhi, 2006
3. Jain V.K. and Omprakashbiyani. Business Ethics & Communication. 2nd Revised Edn. S.Chand& Co Ltd., New Delhi, 2008.

Note: Question paper shall cover 100% Theory

Course Outcomes

Upon successful completion of the requirements for this course, students will be able to:

CO1: Re-examine their knowledge of business and economic concepts from an ethical perspective;

CO2: Explain and illustrate the importance, for business and the community, of ethical conduct;

CO3: Recognise and resolve ethical issues in business;

CO4: Reflect on and critically examine their own values and the importance of the ethical dimension in business and workplace decision making; and,

CO5: Confidently apply systematic ethical reasoning to business dilemmas and communicate effectively in oral and written forms these, using the concepts, logic and rhetorical conventions of business ethics.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	9	9	9	3	9	3	9	3	9	87/15=5.8
CO2	9	3	9	9	3	3	9	9	3	9	3	9	9	3	9	99/15=6.6
CO3	9	9	9	9	3	9	9	9	9	9	3	3	9	3	9	111/15=7.4
CO4	9	9	9	9	3	9	3	3	9	3	3	9	9	3	9	99/15=6.6
CO5	9	9	9	9	9	9	9	9	3	9	9	3	9	9	3	117/15=7.8
Weightage																**34.2/5=6.84**

Level of Correlation 1 – Low 3 – Medium 9 – High 0– No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COE421	BUSINESS ENVIRONMENT	L	T	P	C
ELECTIVE - II			4	-	-	4

Course Objectives

The objectives of the course are

- To take business decisions in the situations of organizations which keep changing from time to time the Managers are expected to know about that he/she guess the situation and takes the wise Managerial decisions.
- To enable students to know the concept of Business Environment.
- To enable the student to understand the importance and significance of Business Environment.
- To equip knowledge about business environment at National and International level.

Unit I: Concept of Business Environment

Theoretical Framework of Business Environment: Concept, significance and nature of business environment; Elements of environment – internal and external; Changing dimensions of business environment; Techniques of environmental scanning and monitoring.

Unit II: Economic Environment

Economic Environment of Business: Significance and elements of economic environment; Economic systems and business environment; Economic planning in India; Government policies – industrial policy, fiscal policy, monetary policy, EXIM policy; Public Sector and economic development; Development banks and their relevance to Indian business; Economic reforms, liberalisation and structural adjustment programmes.

Unit III: Political and Legal Environment

Political and Legal Environment of Business: Critical elements of political environment; Government and business; Changing dimensions of legal environment in India, Competition Act, FEMA and licensing policy.

Unit IV: Socio-Cultural Environment

Socio-Cultural Environment: Critical elements of socio-cultural environment; social institutions and systems; Social values and attitudes; Social groups; Middle class; Dualism in Indian society and problems of uneven income distribution; Emerging rural sector in India; Indian business system; Social responsibility of business; consumerism in India, Consumer Protection Act.

Unit V: International and Technological Environment

International and Technological Environment: Multinational corporations; Foreign collaborations and Indian business; Non – resident Indians and corporate sector; International economic institutions – WTO, World Bank; IMF and their importance to India; Foreign trade policies; Impact of Rupee devaluation; Technological environment in India; Policy on research and development; Patent laws; Technology transfer.

Text Books

1. Francis Cherunilam: Business Environment Himalaya Publishing House, Bombay, 2018.
2. Raj Agrawal and ParagDiwan, Business Environment: Excel Books, New Delhi, 2010

Reference Books:

1. Adhikary, M: Economic Environment of Business, Sultan Chand & Sons, Delhi, 2016.
2. Ahluwalia. I.J: Industrial Growth in India, Oxford University Press, Delhi, 2016.
3. Alagh, Yoginder K: Indian Development Planning and Policy, Vikas Publication, New Delhi, 2013
4. Aswathappa, K. Legal Environment of Business, Himalaya Publication, New Delhi, 2016.
5. Chakravarty, S: Development Planning, Oxford University Press, Delhi, 2014.
6. Ghosh, Biswanath: Economic Environment of Business, Vikas Publication New Delhi Govt of India : Survey, Various issues.
7. Ramaswamy, V.S. and NamaKumari: Strategic Planning for Corporate Success, Macmillian, New Delhi, 2009.
8. Sengupta, N.K: Government and Business in India, Vikas Publication, New Delhi, 2008.

Note: Question paper shall cover 100% Theory

Course Outcomes

Upon completion of the course, the students will be able to
CO1: Understand the concepts of business, legal, cultural and global environments.
CO2: Make use of the provisions of business legislations
CO3: Analyse the internal, external, micro and macro business environments.
CO4: Assess the business competitions
CO5: Solve and manage the business related problems.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	3	9	3	9	3	3	75/15=5
CO2	9	3	3	3	3	3	9	9	3	9	3	9	3	3	9	81/15=5.4
CO3	9	3	9	9	3	3	9	9	9	9	3	3	9	3	3	93/15=6.2
CO4	9	9	9	9	3	9	9	3	9	3	3	9	3	3	3	93/15=6.2
CO5	9	9	9	9	3	9	9	9	3	9	9	3	3	9	3	105/15=7
Weightage																**29.8/5=5.96**

Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COE422	ORGANIZATIONAL BEHAVIOUR	L	T	P	C
ELECTIVE - II			4	-	-	4

Course Objectives

The Course objectives are

1. To enable the students to understand an organization and its behavior.
2. To enable the students to know the needs and ways of human beings at work.
3. To enable the students to understand the importance of organizational behavior and conflict and relationship management.
4. The students will gain the knowledge to survive in the changing organizational environment.

Unit I: Organizational Behavior

Organizational Behaviour (O.B) - Definition – Key elements – Nature and scope – Need for studying Organizational Behaviour – Disciplines contributing to organizational behavior - Organizational behavior process - Applying O.B. knowledge to Management Practices. Hawthorne experiments – O.B. Models.

Unit II: Personality, perception and learning

Individual perspective – Foundation of individual behavior – Personality – Concept – Types- Determinants - Theories – Perception - Perceptual process - Factors affecting perception – Perception and its applications in organizational behavior – Learning – Determinants- Principles – Theories - Learning and behavior.

Unit III: Group Dynamics

Meaning and origin of group dynamics – Concept of group – Types of groups – Formal and Informal groups – Theories of group formation – Group behavior – Group decision making.

Unit IV: Conflict

Concept of conflict – Conflict process – Inter-group conflict- Intra – Individual conflict – interpersonal conflict – Organizational conflicts – Conflict management – Negotiation – Resolution techniques. Organizational culture – Types – Functions of culture – Creating and sustaining and changing a culture – Learning and measuring culture – Communicating culture.

Unit V: Organizational Change

Goal of organizational change – Nature and factors in organizational change – Approaches to organizational change – Perspectives on change – Planned changes for development – Process of planned change – Response to change – Resistance to change – Overcoming resistance to change – Role of change agents.

Text Book

1. Prasad, L.M., Organisational Behaviour. 5th Revised Edn. Sultan Chand and Sons, New Delhi, 2014.

Reference Books

1. Aswathapa, K., OrganizationalBehaviour - Text and Cases. 12thEdn. Himalaya Publishing House, New Delhi, 2008.
2. Chandran, Jit.S.,OrganisationalBehaviour. 3rdEdn.Vikas Publishing House Pvt Ltd., New Delhi, 2008.
3. GvegoryMoorheed and Ricky W. Griftin, OrganisationalBehaviour, Jai Co Publishing House, Mumbai, 2005.
4. Khanka, S.S., OrganisationalBehaviour. 4thEdn. S.Chand& Co. Ltd., New Delhi, 2004.
5. Mishra, M.N., OrganisationalBehaviour. 1stEdn.Vikas Publishing House Pvt Ltd., New Delhi, 2005.

Note: Question paper shall cover 100% Theory

Course Outcomes

On completion of this course, the students will be able to

CO1: Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.

CO2: Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.

CO3: Analyze the complexities associated with management of the group behavior in the organization.

CO4: Demonstrate how the organizational behavior can integrate in understanding the motivation(why) behind behavior of people in the organization.

CO5: Synthesize related information and evaluate options for the most logical and optimal solution such that they would be able to predict and control human behavior and improve results.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	3	3	9	9	9	3	9	81/15=5.4
CO2	9	3	3	3	3	3	9	3	3	3	3	9	9	3	9	75/15=5
CO3	9	3	9	9	3	3	9	9	9	3	3	3	9	3	9	93/15=6.2
CO4	9	9	9	9	3	9	9	9	9	3	3	9	9	3	9	111/15=7.4
CO5	9	9	9	9	3	9	9	9	3	3	3	3	3	9	3	93/15=6.2
Weightage																**30.2/5=6.04**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

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COURSE CODE	P21COR41	PROJECT	L	T	P	C
CORE-XVII			22	-	-	8

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Understand and identify the real life problem which needs the solution

CO2: Make the survey for the collection of the data required for the study

CO3: Test the hypothesis by applying the appropriate statistical tools, infer the results drawn and report the suggestions

CO4: Emerge as a leader by suggesting suitable solutions to the problems

CO5: Co-ordinate and execute research related work as a member of research team and apply ICT tools for research independently.

Mapping Outcomes- COs, POs and PSOs

	PO							PSO								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	9	3	3	9	3	9	9	9	9	3	9	3	93/15=6.2
CO2	9	9	9	9	3	9	9	9	3	9	3	9	3	9	9	111/15=7.4
CO3	9	9	9	9	3	9	9	3	9	9	3	3	9	9	9	111/15=7.4
CO4	9	9	9	9	9	9	9	3	9	3	3	9	3	9	3	105/15=7
CO5	9	9	9	9	9	9	9	9	3	9	9	3	3	9	9	117/15=7.8
Weightage																**35.8/5=7.16**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

RULES GOVERNING THE EVALUATION OF PROJECT REPORT AND VIVA VOCE EXAM

1. **Selection of Topic:**
   a. Each student shall select a topic for her project in consultation with her Guide and the Head of the Department.
   b. The project report should contain a minimum of 40 pages in A4 format excluding bibliography and appendices.
2. Each student should submit four copies of her project report for evaluation.
3. **Last date for the submission of Project Report:**

The project report should be submitted to the Controller of Examinations (P.G. Courses) through the Guide and the Head of the Department **on or before the last working day** for the students of the University/Collegefor the academic year. If a student fails to submit the project report on or before the last working day, she will not be eligible for getting rank.

4. The project report will be valued for 80 marks by two Examiners, of whom, one will be the Guide and the other will be an External Examiner. The project report will be valued for 40 marks by each Examiner. The sum of marks awarded by both the examiners will be considered to be the final marks. For a pass in the project report, the student should secure a minimum of 50 marks. If a student fails to secure 50 marks in the evaluation of project report, she may be permitted to resubmit her project report once again after incorporating the necessary corrections, if any, as suggested by the Examiners within a period of three months from the date of publication of the results of the Examinations.
5. A student who has secured 40 marks or above in the evaluation of project report would be permitted to appear for the *viva voce*. The *viva voce* carries a maximum of 20 marks and will be conducted jointly by the External Examiner and the Guide. The student should secure a minimum of 10 marks in the *viva voce.* The student who fails to attend the *viva voce* or fails to secure 10 marks in the *viva voce* should reappear for the same after a month but within a period of three months from the date of publication of results. In any case, no student will be permitted to appear for the *viva voce* more than twice. If a student fails during her second appearance also in *viva voce,*she has to choose a new topic for her project and resubmit the Project report within three months after the publication of the results of the second*viva voce* Examination.
6. For resubmission of the project report or reappearance in the *viva voce*, the student has to pay a fee as prescribed by the University.
7. Any other unforeseen problems / situations, not mentioned above if arise regarding the project report and *viva voce*, will be placed in the Academic Committee of the University and suitably resolved.

COURSE CODE	P21CON211	FUNDAMENTAL OF MARKETING	L	T	P	C
(NME)			4	-	-	4

Course Objectives:

The objectives of the course are to understand

- Marketing and its related concepts
- Knowing the position of customer in the merchandising of a product
- Modern marketing concepts, theories on marketing research
- The concepts of marketing management
- Learn about marketing process for different types of products and services

Unit I: Marketing

Marketing: Introduction, Definition of and fundamental principles of marketing, importance of marketing, Marketing and Selling, Marketing and Distribution, Role of marketing in the organization, Marketing in the economic development

Unit II: Marketing Mix

Marketing Mix: Marketing Mix-The Traditional 4Ps, The Modern Components of the Mix- The Additional 3Ps, Developing an Effective Marketing Mix, Marketing Planning, Marketing Implementation and Control, Marketing system, Marketing process, Marketing Functions, Modern Marketing concept: factors, benefits, Social Marketing

Unit III: Customer Relationships

Customer Relationships: Customer needs, wants & demands, Products, services & experiences, Customer value & satisfaction, Target customer, Value proposition, Customer loyalty & retention, Market share & customer equity

Unit IV: Digital Marketing and Marketing ethics

Digital marketing, Marketing Ethics, Brief Overview of B to B marketing. Market Segmentation Marketing Strategies, A More in Depth Look at Targeting and Positioning, Competitive Advantage.

Unit V: Marketing Research

Marketing Research: Meaning, Types, users of marketing research. Advantages and limitations, marketing research process

Text Book:

1. R.S.N. Pillai and Bagavathi, Modern Marketing – Principles and Practices, S.Chand& Co, 2010.

Reference Books:

1. V.S. Ramaswamy and S. Namakumari, Marketing Management: Global Perspective, Indian Context, Om Books publisher, 2009.
2. R.L. Varshney and B. Bhattacharya, International Marketing Management – An Indian perspective, Sultan Chand and Sons, 2015.

Note: Question paper shall cover 100% Theory

Course Outcomes

CO1: Demonstrate understanding of marketing terminology and concepts.
CO2: Identify wants and environmental factors that shape marketing activities for certain target markets.
CO3: Demonstrate knowledge of the individual components of a marketing mix.
CO4: Demonstrate knowledge of key business communication strategies within the marketing field.
CO5: Identify the organizational processes involved in the planning, implementation and control of marketing activities.

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	9	9	3	9	9	3	87/15=5.8
CO2	9	3	3	3	3	3	9	3	3	9	3	9	3	9	9	81/15=5.4
CO3	9	3	9	9	3	3	9	9	3	9	3	3	9	3	9	93/15=6.2
CO4	9	9	9	9	3	9	9	3	9	3	3	9	9	3	9	105/15=7
CO5	9	9	9	9	3	9	9	9	3	9	9	3	9	9	3	111/15=7.4
Weightage																**31.8/5=6.36**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21CON212	FUNDAMENTALS OF BANKING	L	T	P	C
(NME)			4	-	-	4

Course Objectives:

To enable the students to

- Know the relationship between banker and customer
- Tell the instruments used for banking transactions, need for crossing
- Be familiar with the rules on loans and advances

Unit I: Banker and Customer

Meaning and Definitions of Banker and Customer – Types of Customers – General Relationship and Special Relationship between Banker and Customer – KYC Norms

Unit II: Banking Systems

Unit Banking, Branch Banking, Investment Banking – Innovations in banking – E-banking – Online and Offshore Banking, Internet Banking – Anywhere Banking – ATMs – RTGS

Unit III: Deposits

Deposits: Rules for opening accounts - Types of Bank Accounts – Fixed Deposit Account – Savings – Current and Recurring Account – Features – Benefits -Insurance linked savings bank deposits –Non Residence Deposit Account– Senior Citizen Deposit Account – Flexi Deposit Account - Loans and Advances- principles of sound lending, secured and unsecured advances

Unit III: Cheques

Definition of negotiable instruments – Essential Features – Types – Comparison Between Cheque and Bill of Exchange, Cheque Vs draft, Banker's Cheque – Cheque – meaning – definition – essentials.

Unit IV: Crossing of Cheques

Crossing- types, who can cross, endorsement- kinds, regularity of endorsement– Holder in due Course Privileges – Holder for Value – Acceptance for Honour - Account – Reasons for Dishonour a Cheque

TextBook:

1. Sundaram and Varshney, Banking Theory, Law & Practice, Sultan Chand Company, New Delhi, 2012

Reference Books

1. S.M. Sundaram, Banking Theory, Law & Practice, Sri Meenaksi Publications, Karaikudi, 2015
2. M.Kumar and Srinivasa, Banking, New Central Book Agency, 2010
3. M.S. Ramasamy, Banking Law & Practice in India, Sultan Chand Company, New Delhi, 2010.
4. E. Gorden and N. Natarajan, Banking Theory, Law & Practice, Himalaya Publication, 2020.
5. B.Santhanam, Banking Theory, Law &Practice, Margham Publications, Chennai, 2014

Note: Question paper shall cover 100% Theory

Course Outcomes:

C01 -Evaluate the performance of the banking industry.
C02 -Discuss bank lending policies and procedures.
C03 -To elucidate the broad functions of banks
C04 - To grasp the conduct of monetary policy and its effect on the interest rate, credit availability, prices, and the inflation rate
C05- To express opinions about banking in written and oral form, based on the basic knowledge and skills acquired

Mapping Outcomes- COs, POs and PSOs

	PO							**PSO**								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	9	9	3	9	9	3	87/15=5.8
CO2	9	3	3	3	3	3	9	9	3	9	3	9	3	3	9	81/15=5.4
CO3	9	3	9	9	3	3	9	3	9	3	9	3	9	9	3	93/15=6.2
CO4	9	9	9	9	3	9	9	3	9	9	3	9	3	9	9	111/15=7.4
CO5	9	9	9	9	3	9	9	9	3	9	9	3	3	9	3	105/15=7
Weightage																**31.8/5=6.36**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's*(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

COURSE CODE	P21COV11	EXCEL SKILLS FOR COMMERCE	L	T	P	C
VAP-I				-	30	2

Course Objectives:

After completing this Course, the student will

- Be able to enhance their MS Excel skills through exercise and gaining hands-on experience in various techniques & Tools
- Learn financial modeling and the best utilization of Statistical tools in the areas of research and analysis
- Gain Excel Proficiency like Calculations, Functions, Formulas, Optimization and Statistical Tools and Excel Best Practices in Financial Modeling

Course Description:

Microsoft Excel is a spreadsheet application which the students can use to store, manipulate and present data. This course is taught through a mixture of demonstration and hands-on practice. This course is for experienced Microsoft Excel users and assumes the students already have a good working knowledge of Excel. Also it provides working of Excel for doing financial analysis and building financial models. It will help them to assist in their daily reporting and analysis functions in their job. The students of this course will gear up for campus placements and jobs.

Course Requirements

- Having basic knowledge of operating computer
- Having knowledge on finance formulas

Course Content

- Financial Functions and Applications Related to Excel
- Present and Future Values (PMT,PV, FV, RATE)
- Rate of Return (IRR, MIRR, XIRR)
- Net Present Value(NPV, XNPV)
- Depreciation of Asset
- Payment of a Loan (EMI)
- Coupons
- Price of Security
- Treasury Bills
- Cash Flow Identities (Cash flow Analysis from Financial Statements)
- Univariate Analysis
- Difference of Means and ANOVA
- Correlation and Regression (Multiple Regression - finding out parameters)

- FIND, SEARCH, REPLACE, SUBSTITUTE, CHAR, EXACT
- Introduction to array / CSE formulae
- How to enter an array formulae
- Basic array formulae – INDIRECT and TRANSPOSE

Learning Outcomes

After studying this course, students should be able to:

- Know the basics of Excel 2016
- Work with Cells and Sheets
- Know and use the Formulas and Functions
- Work with finance Data

COURSE CODE	P21COI21	INTERNSHIP TRAINING *(For those admitted in June 2021 and later)*	L	T	P	C
INT-I			-	-	30	2

Course Outcomes

Upon the completion of the course, the students will be able to

CO1: Extend knowledge in the field of commerce and business

CO2: Experiment practically with the operations of the business

CO3: Examine the policies, procedures and practices of the business

CO4: Adapt to the environment of the business / services and work together to achieve the common goal

CO5: Develop skills of team work, co-operation and knowledge of ICT on business through self-packed strategies.

Mapping Outcomes- COs, POs and PSOs

	PO							PSO								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	9	3	3	9	9	9	3	9	3	9	3	3	87/15=5.8
CO2	9	9	9	9	3	9	9	9	9	9	3	9	9	9	9	123/15=8.2
CO3	9	9	9	9	3	9	9	9	9	9	3	3	9	3	3	105/15=7
CO4	9	9	9	9	9	9	9	3	9	3	3	9	3	9	9	111/15=7.4
CO5	9	9	9	9	9	9	9	9	3	9	9	3	9	9	3	117/15=7.8
Weightage																**36.2/5=7.24**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

Rules governing Internship Training

1. Each student should undergo 15 days practical training during the Second semester vacation. If a student fails to undergo the training programme on medical grounds / due to lack of attendance during the stipulated period, she should undergo the same during the third semester summer vacation, after getting prior permission from the Head of the Department. In such cases, the training report should be submitted within a month after the completion of the 'Internship Training' programme.

2. The students shall undergo the above mentioned 'Internship Training' in such of the Institutions approved by the Department. The list of institutions meant for 'Internship Training' will be prepared by the faculty covering entities such as Research Institutes, Organizations, Banks, Insurance Companies, Co-operative Organisations, Limited Companies, Commercial Outlets and such other organizations found to be worth for imparting training.

3. Each student has to submit TWO copies of the Internship Training report in not less than 20 typewritten pages in A4 format within a month of reopening of the college/University in the third semester, for the training undergone during the Second semester vacation. The training report should not have been submitted elsewhere for any other certificate, diploma or degree course.

4. In case of failure to submit the report within the above stipulated period, the date of submission shall be extended by another 15 days with a fine as prescribed by the /Head of the Department of the University/Principal.
5. If any student fails to submit the report within the stipulated time / within the extension period of 15 days (or) fails in the Internship Training she has to resubmit the report one week prior to the commencement of the ensuing even semester examinations after the completion of the course.

6. The training report will be valued for a maximum of 100 marks of which 40 marks will be awarded by the Internal Examiner or Guide and remaining 60 Marks will be awarded by the entity which host the student for the Internship Training and the student should secure a minimum of 50% marks put together to get a pass.

7. If any student indulges in malpractice while attending the training programme or fails to secure a minimum pass mark she has to undergo 'Inservice Training' programme once again for a period of 20 days at the end of the third semester and resubmit the training report within a period of one month after the completion of the training programme.

COURSE CODE	P21COV42	DATA ANALYSIS USING SPSS: INFERENTIAL ANALYSIS	L	T	P	C
VAP- II			-	-	30	2

Course Objectives:

In this course, student will

- gain proficiency in how to analyze a number of statistical procedures in SPSS
- learn how to interpret the output of a number of different statistical tests
- Learn how to write the results of statistical analyses

Mapping Outcomes- COs, POs and PSOs

	PO							PSO								Mean Score of COs
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
CO1	9	3	3	3	3	3	3	9	9	3	9	3	9	3	3	75/15=5
CO2	9	3	3	3	3	3	9	9	3	9	3	9	3	3	9	81/15=5.4
CO3	9	3	9	9	3	3	9	9	9	9	3	3	9	3	3	93/15=6.2
CO4	9	9	9	9	3	9	9	3	9	3	3	9	3	3	3	93/15=6.2
CO5	9	9	9	9	3	9	9	9	3	9	9	3	3	9	3	105/15=7
Weightage																**29.8/5=5.96**

- Level of Correlation 1 – Low 3 – Medium 9 – High 0 – No Correlation between CO's and PO's *(Suggested by UGC as per Six Sigma Tool – Cause and Effect Matrix)*

Course Description:

This course provides an application-oriented introduction to the statistical component of IBM SPSS Statistics. Students will review several statistical techniques and discuss situations in which they would use each technique, how to set up the analysis, as well as how to interpret the results. This includes a broad range of techniques for exploring and summarizing data, as well as investigating and testing relationships. Students will gain an understanding of when and why to use these various techniques as well as how to apply them with confidence, interpret their output, and graphically display the results.

This introductory course is for Final Year students who do project and perform statistical analysis using SPSS software. The focus is to give widen understanding of basic concepts of statistics used in social science research and to develop competency in proper selection of statistical techniques while analyzing the data in social sciences research. The course will also develop competency in the use of SPSS for data analysis and develop skills in proper interpretation of the output of SPSS Software.

The course will cover t tests, ANOVA, correlations and linear regression, Factor analysis

Course Requirements

- Familiarity with basic concepts in statistics, such as measurement levels, mean, and standard deviation.
- Familiarity with the windows in IBM SPSS Statistics either by experience with SPSS Statistics (version 18 or later) or completion of the SPSS Statistics Essentials (V25) course

Course Content

- ❖ Data input and output
- ❖ Percentage Analysis
- ❖ One sample t test
- ❖ Independent sample t Test
- ❖ Dependent sample t test
- ❖ ANOVA
- ❖ Correlation and Regression
- ❖ Chi square
- ❖ Factor analysis

Learning Outcomes

After studying this course, students should be able to:

- ❖ understand how to start SPSS
- ❖ enter basic data into SPSS
- ❖ Introduction to statistical analysis
- ❖ Examine individual variables
- ❖ Test hypotheses about individual variables
- ❖ Test the relationship between categorical variables
- ❖ Test on the difference between two group means
- ❖ Test on differences between more than two group means
- ❖ Test the relationship between scale variables
- ❖ Predict a scale variable: Regression
- ❖ Introduction to Bayesian statistics
- ❖ Overview of multivariate procedures

Evaluation Pattern **10X10=100**

1. Creating a data file in the Data Editor
2. Running the Frequencies Procedure in the Data Editor
3. Creating New Variables, Transforming Variables & Adding Verbal Labels
4. Examining the relationship between Gender & dependent - Crosstabs

5. Correlations among variables
6. Using the t-test to Examine Gender Differences
7. Using Paired-Sample t-test
8. Using One-Way ANOVA:
9. Using Two-Way ANOVA
10. Using Two-Way Mixed-Model ANOVA

Department of Physics

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

DEPARTMENT OF PHYSICS

B.Sc. PHYSICS

SYLLABUS TO BE IMPLEMENTED FROM THE ACADEMIC YEAR 2021-2022

(CHOICE BASED CREDIT SYSTEM)

Mother Teresa Women's University, Kodaikanal
Department of Physics
Choice Based Credit System (CBCS)
(2021-2022 onwards)
B.ScPhysics

1. AbouttheProgramme

B.Sc.Physicsisathree-yearundergraduateprogramcomprisingoftheoryandexperimentalcoursesmainlyfromPhysicsandfewinterdisciplinarycoursesfromMathematics,Chemistryand ComputerScience. The program emphasises on the fundamentals of Physics while introducing modern concepts such as Quantum Mechanics and Relativity proceeding over to Classical Mechanics, Electrodynamics taking forward the courses like Electricity and Magnetism, Optics and Waves similarly Statistical Mechanics and Thermodynamics.

The undergraduate degree programme paves a solid ground for students to further acquire mastery in Physics concentration areas. The programme trains graduate to establish entry-level careers in the government and private sectors.

2. Programme Educational Outcomes (PEO)

The Programme has been designed to enable the learners to

PSEO1	pursue their Higher Studies in Leading Institutes
PSEO2	attain significant position in Academics with proficiency
PSEO3	cultivate their research acumen for resolving challenging research issues, and secure a position in Research Organization.
PSEO4	create inclusive society with gender equality.
PSEO5	work in Defence Organization with shrewdness, courage, and confidence.
PSEO6	imbibe communicative skills and value system and work ethically in a multidisciplinary environment.

3. Eligibility

A strong foundation in Physics with Mathematics subject at the HSC level passed students

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	10	25	10	25
External	30	75	30	75

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

9. Programme Outcomes (POs):

PO1	To get a thorough understanding of the nature, principles, methods, approaches, and goals of the core subjects
PO2	Solve the problem and get to a logical conclusion by thinking carefully and independently.
PO3	To improve students' problem-solving skills so that they can compete in national level competitive examination.
PO4	To comprehend the connections between physics and other disciplines, as well as societal challenges
PO5	Students will be taught how to improve their employability and entrepreneurship abilities.
PO6	To instills a scientific mindset among students and others outside of the scientific community.

10. Program Specific Outcomes:

PSO1	Demonstrate, solve, and comprehend major topics in all physics fields.
PSO2	Students will show mastery of mathematics and the mathematical principles required for a thorough grasp of physics.
PSO3	Design, carry out, record, and analyse the outcomes of Physics experiments using critical thinking and scientific knowledge.
PSO4	Provide essential foundations, as well as a thorough understanding of underlying principles and contemporary advances.
PSO5	Ability to plan and carry out their own creative ideas in the form of projects, product development, and design.

B.Sc.PHYSICS

S. No.	Course Code	CourseTitle	Credits	Hours		CIA	ESE	Total
				L	P			
	SemesterI							
1	U21LTA11	Part I– Tamil–I	3	6	0	25	75	100
2	U21LEN11	PartII– English –I	3	6	0	25	75	100
3	U21PHT11	CoreI-Properties ofMatterand Sound	4	5	0	25	75	100
4	U21PHP11	CoreII- PracticalI	4	0	6	25	75	100
5	U21MAA11	AlliedMathematicsI(Theory)	4	5	0	25	75	100
6	U21EVS11	EnvironmentStudies	2	2	0	25	75	100
7	U21PEPS11	ProfessionalEnglishI	4	6	0	25	75	100
		Total	**24**	**36**				**700**
	SemesterII							
8	U21LTA22	Part I– Tamil–II	3	6	0	25	75	100
9	U21LEN22	PartII– English –II	3	6	0	25	75	100
10	U21PHT21	CoreIII- Mechanics	4	5	0	25	75	100
11	U21PHT22	CoreIV- HeatandThermodynamics	4	5	0	25	75	100
12	U21MAA22	AlliedMathematicsII(Theory)	4	5	0	25	75	100
13	U21VAE21	Value Education	3	3	0	25	75	100
14	U21PEPS22	ProfessionalEnglishII	4	6	0	25	75	100
		Total	**25**	**36**				**700**
	SemesterIII							
15	U21LTA33	PartI– Tamil–III	3	6	0	25	75	100
16	U21LEN33	PartII– English –III	3	6	0	25	75	100
17	U21PHT31	CoreV- Optics and Spectroscopy	4	5	0	25	75	100
18	U21CHA33	AlliedChemistry	4	5	0	25	75	100
19	U21PHE311/ U21PHE312	Elective I-EnergyPhysics/ Waves andOscillations	3	4	0	25	75	100
20	U21MSS31	SBE I-Managerial Skills	2	2	0	25	75	100
21		NME-I	2	2	0	25	75	100
22	U21PEPS33	ProfessionalEnglishIII	4	6	0	25	75	100
		Total	**25**	**36**				**800**
	SemesterIV							
23	U21LTA44	PartI– Tamil–IV	3	6	0	25	75	100
24	U21LEN44	PartII–English–IV	3	6	0	25	75	100
25	U21PHT41	Core VI - Electricity andElectromagnetism	4	4	0	25	75	100
26	U21PHP42	CoreVII-Practical II	4	0	4	25	75	100
27	U21CHA44	AlliedChemistryPractical	4	0	4	25	75	100
28	U21PHE431/ U21PHE432	Elective II-Medical Physics/MaterialsScience	3	3	0	25	75	100
29	U21CSS42	SBE II-ComputerSkillsforOffice Management	2	0	2	25	75	100

30		NME-II	2	2	0	25	75	100
31	U21PEPS44	ProfessionalEnglishIII	4	6	0	25	75	100
		Total	**29**	**37**				**900**
	SemesterV							
30	U21PHT51	CoreVIII-AtomicandNuclearPhysics	4	5	0	25	75	100
31	U21PHT52	Core IX- Classical andStatisticalMechanics	4	5	0	25	75	100
32	U21PHT53	Core X - Basics of DataCommunicationand ProgramminginC	4	5	0	25	75	100
33	U21PHT54	CoreXI-BasicElectronicsand Communication	4	5	0	25	75	100
34	U21PHP53	CoreXII- Practical III	4	0	5	25	75	100
35	U21PHE531/ U21PHE532	Elective III-Numerical methods/ BasicInstrumentation	3	3	0	25	75	100
36	U21PHS531/ U21PHS532	SBE III-MicroprocessorFundamentals/Television TransmissionandReceiver	2	2	0	25	75	100
		Total	**25**	**30**				**700**
	SemesterVI							
37	U21PHT61	Core XIII – Relativity andQuantumMechanics	4	5	0	25	75	100
38	U21PHT62	CoreXIV-SolidStatePhysics	4	5	0	25	75	100
39	U21PHT63	Core XV-MathematicalPhysics	4	5	0	25	75	100
40	U21PHT64	CoreXVI-Nanophysics	4	5	0	25	75	100
41	U21PHP64	CoreXVII-PracticalIV	4	0	5	25	75	100
42	U21PHE641/ U21PHE642	ElectiveIV-Astrophysics/AtmosphericPhysics	3	3	0	25	75	100
43	U21PHS641/ U21PHS642	SBEIV- ProblemsSolvingSkills inPhysics/WeatherForecasting	2	2	0	25	75	100
44	U21EAS61	Extension Activities(NSS/NCC/RRC/YRC/Physical Education)	3	-	-	100	-	100
		Total	**28**	**30**				**800**
		Grand Total	**156**	**205**		***Grand Total***		**4600**

NonMajorElective

Thecandidates,whohavejoinedtheUGProgramme,canalsoundergoNonMajorElectiveoffered byother Departments.

NonMajor Elective offered byDepartment of Physics

U21PHN311	NME-IHouseHoldAppliance
U21PHN312	NME-IHowThingsWork
U21PHN421	NME-IIDigitalPhotography
U21PHN422	NME-IIPhysicsin Musical Instrument

Additional CreditCourses (Two Creditcourses)

1. **U21PHO31 - Onlinecourse3rd Semester**
2. **U21PHI41 - Internship 4thSemester**
3. **U21PHV51 - Valueadded course5thSemester (SolarEnergyTechnology)**

SEMESTER-I

COURSE CODE	U21PHT11	PROPERTIESOFMATTER ANDSOUND	L	T	P	C
CORE -I			5	-	-	4

Objective:
To exposestudents tothefundamentalpropertiesofmatterand sound.

Unit I: Elasticity
Elasticity – Hooke's law – Elastic moduli – Poisson's ratio – Beams – bending of beams – Expressionforbendingmoment–Cantilever-Theoryofuniformandnon–uniformbending
- Determination of Young's modulus -Koenig's method –Torsion of a body – Expression forcouple per unit twist – Work done in twisting a wire – Torsional oscillations of a body – Rigiditymodulusbydynamictorsionmethod(Torsionalpendulum)andstatictorsionmethod.

Unit II: SurfaceTension
Surface tension – definition – Molecular forces – Explanation of surface tension on kinetictheory – Surface energy – work done in increasing the area of as surface – Excess pressureinside a curved liquid surface – Excess pressure inside a spherical and cylindrical drops andbubbles-drop weight method-variation of surface tension with temperature-experimentaldetermination-Jaegar'smethod.

Unit III: Viscosity
Viscosity–Coefficient of viscosity–Streamlined and turbulent motion–critical velocity–Rateof flow of liquid in a capillary tube – Poiseuille's formula–viscosity of highly viscousliquid-terminalvelocity-Stoke'smethod-OstwaldViscometer – viscosityofgas-Mayer'sformula-Rankine 'smethod

Unit IV: Sound
Simple Harmonic Motion –Composition of two S.H.M in a straight line-at right angles -Lissajous'sfigures-Free,Damped,ForcedVibrations-Resonance-Fouriertheorem-application.

UnitV:UltrasonicsandAcoustics
Ultrasonics–Production–Piezoelectriccrystalmethod–Magnetostrictionmethod–Propertiesand Applications. Acoustics of building – Reverberation- Sabine's Reverberation formula(No derivation)-Factors affecting acoustics of building-Sound distribution in an auditorium-Requisite for goodacoustics.

Text Books:
1. D.S.Mathur,Elementsof Properties ofMatter,S.Chand&Co., 2010.
2. R.Murugesan,Properties of Matter,S.Chand&Co., 2004.
3. Brijlaland Subramanian,PropertiesofMatter,S.Chand&Co., 2006.
4. D.R.Khanna and R.S.Bedi, Textbook ofSound,Atmaram and Sons,1971.
5. N.SubrahmanyamandBrijlal,ATextBookofSound,VikasPublishingHo use-Second Edition, 2018.

BooksforReference:

1. H.R.Gulati, Fundamentals of General Properties of Matter,S.Chand&Co., 1982.
2. D.Halliday,Resnickand JWalker,FundamentalofPhysics,6th Edition,Wiley,2001.

CourseOutcomes(CO):

CO	Learningoutcome	Remarks
CO1	Evaluatemodulusofdifferentmaterials	K3
CO2	Acquireknowledgeon propertiesofliquids	K2
CO3	Understandthe physicsof soundand its applications	K2
CO4	Learn about differentmethods of producingUltrasonicwaves and its applications	K1
CO5	Applythetheoriesinbuildingacoustics	K3

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	2	3	3	3	3	2
CO2	3	3	3	3	2	2	3	3	3	3	2
CO3	3	3	3	3	2	2	3	3	3	3	2
CO4	3	3	3	3	2	2	3	3	3	3	2
CO5	3	3	3	3	2	2	3	3	3	3	2

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHP11	PRACTICAL-I	L	T	P	C
CORE -II			-	-	6	4

Objective:
Itisaimedatexposingtheundergraduatestudentsofthephysicsdepartmenttothetechniquesof handlingequipment's, makingerror freemeasurements and error analysis.

ANYFOURTEEN

1. EstimationofErrors
2. Young'smodulus- Uniformbendingpin and Microscope Method.
3. Young'smodulus- Non uniformbendingpinand Microscope Method.
4. Young'smodulus-UniformbendingopticalleverMethod.
5. Young'smodulus-NonuniformbendingopticalleverMethod.
6. Compound Pendulum-gandk.
7. Spectrometer–Angleof prism.
8. Potentiometer–LowrangeVoltmeter Calibration.
9. Potentiometer–LowrangeAmmeterCalibration.
10. Sonometer–Law'sverification.
11. Melde's-Frequencyof the Vibrator.
12. Determination of coefficient of Viscosity– Stoke'sMethod.
13. Potentiometer–AmmeterCalibration.
14. Torsionaloscillationsn,I
15. Thermal conductivityofa bad conductor -Lee's disk Method.
16. Newton'slawof cooling.
17. FocalLengthofaConvexlens.
18. FocalLengthofConcavelens.
19. Comparison ofViscositiesbyCapillaryFlowMethod.
20. Comparison ofRadiibyCapillaryFlowMethod.
21. SpecificheatcapacitybyJoule'sCalorimeter.

TEXT BOOKS:

1. C.C.Ouseph, G.Rangarajan, A Text Book of PracticalPhysics,S.ViswanathanPublisher – PartI, 1990.
2. C.COuseph,G.Rangarajan,R.Balakrishnan,ATextBookofPracticalPhysics,S.ViswanathanPublisher-PartII, 1996.
3. S.L.Gupta andV.Kumar, PracticalPhysics,Pragati Prakashan,25th Edition,2002.

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	AbletoEstimateErrors	K3
CO2	Calculatethechange indimension of bar	K4
CO3	Determinefocallength ofdifferentlenses	K4
CO4	Determine co-efficient ofviscosityof liquids	K3
CO5	Compareand measurethepotentialdifference ofEMF	K4

K1-RememberK2- UnderstandK3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

SEMESTER-II

COURSE CODE	U21PHT21	MECHANICS	L	T	P	C
CORE -III			5	-	-	4

Objective:

Togivethestudentsfundamentalideasonconservationlaws,rotationalandvibrationalmotion ofrigid bodies,gravitationalfields and someideaabout fluid mechanics

UnitI: LawsofMotion

Laws of conservation of energy, linear momentum and angular momentum -work energytheorem - work done by gravitational force - work done by spring force - potential energy -conservative and non-conservative forces – potential energy curve–Collision – Elastic andinelastic collision – (Fundamental laws of impact) –Newton's law of impact – coefficient ofrestitution–Impactofa smoothsphereonafixed plane –Direct impactbetweentwosmoothspheres–Obliqueimpactbetweentwosmoothspheres– Calculationoffinalvelocitiesof the spheres –Loss of K.E duetoimpact.

Unit II: Dynamics ofRigid body

Momentofinertia–Theoremsofperpendicularandparallelaxes– M.Iofacircularring,disc,solidsphere,hollowsphereandcylinderaboutallaxes– Compoundpendulum–theory
– equivalent simple pendulum – reversibility of centers of oscillation and suspension– determinationofgand k

UnitIII:Gravitation

Newton's law of gravitation – Kepler's laws of planetary motion – G by Boy's method – Mass and density of earth – Acceleration due to gravity – Variation of g with altitude, depthand rotation of earth-Value of G at poles and equator.Gravitational field – Gravitationalpotential – Gravitational potential due to spherical shell–Gravitational potential due toasolidsphere (inside and outside)

UnitIV:CentralForceMotion

Angularvelocity,angularmomentumandK.Eofrotation–Torqueandangularacceleration
– Relation between them – Expression for acceleration of a body rolling down an inclinedplane without slipping. Center of mass –velocity and acceleration of Centre of mass –determination of motion of individual particle – system of variable mass. Rocket motion-Satellite

UnitV:Staticsand Hydrodynamics

Friction-laws of friction-angle of friction-cone of friction-Centre of gravity-solid and hollowtetrahedron-solid and hollow hemisphere –Centre of pressure –vertical rectangular lamina–vertical triangular lamina. Hydrodynamics- Equation of continuity–Pitot's tube and Venturimeter–Euler's equation of unidirectional flow – Torricelli's theorem – Bernoulli's theoremand its applications.

Text Books:

1. NarayanaMoorthy, Mechanics – Part I and II, National Publishing Company,1990.
2. D.S.Mathur,Mechanics,S.Chand&Co.,2nd Edition,2001.
3. P.Duraipandian, LaxmiDuraipandi, Jayapragasam, Mechanics, S.Chand &Co., NewDelhi, 1988.
4. R.Murugesan,Propertiesof Matter,S.Chand&Co.,NewDelhi,2001.

BooksforReference:

1. Halliday, Resnick and J.Walker, Fundamentals of Physics 6th edition, Wiley,NY,2001.
2. David Kleppner, Robert Kolenkow, Introduction to Mechanics, McGrawHillEducation; 1st edition (2017)

CourseOutcomes(CO):

CO	Learningoutcome	Remarks
CO1	Learnabout lawsinvolved inmechanics	K1
CO2	Understandtheforcesimposedonadynamicrigidbody	K2
CO3	Determinegravitationalfieldandpotentialvalue	K3
CO4	Applyconservationlawsincollisionexperiments.	K3
CO5	Understandthe conceptsofstaticandhydrodynamics	K2

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	2	3	3	3	3	2
CO2	3	3	3	3	2	2	3	3	3	3	2
CO3	3	3	3	3	2	2	3	3	3	3	2
CO4	3	3	3	3	2	2	3	3	3	3	2
CO5	3	3	3	3	2	2	3	3	3	3	2

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHT22	HEATANDTHERMODYNAMICS	L	T	P	C
CORE -IV			5	-	-	4

Objective:
To understand the phenomena connected with various units of measurement of temperature,knowing the concept of specific heat capacities of matter, transmission of heat, concept of flowingthe temperature, liquefying gases and process of making heat to do mechanicalwork.

UnitI:ThermometryandCalorimetry
Specificheatcapacity ofsolids–Regnault'smethod of mixtures (solid)–specific heat capacity of liquids–Callendar and Barnes method –Specific heat capacity of gases – C_p and C_v – Meyer's relation – C_v by Joly's differentialsteam calorimeter method – C_p byRegnault's method.

Unit II: Kinetic Theory of Gases
Kinetic Theory of gases- assumptions – Molecularcollisions–meanfreepath–expressionformeanfreepath–Transportphenomenon – Brownianmotionanditsfeatures-expressionforviscosity,Diffusionandthermalconductivityofgas.Experimentalverification-VanderWallsequationofstate–Determination of Vander Walls constant- Relation between Vander Wall's constant andcriticalconstants.

UnitIII:LowTemperaturePhysics
Joule-KelvinEffect-LiquefactionofAir-Linde'sProcess – liquefaction of hydrogen - liquefaction of helium-Kamerlingh - Onne's method -Helium I and II-Lambda point-production of low temperatures-adiabatic demagnetization -practical applications of low temperature - refrigerators and air-conditioning machines-superfluidity-applicationof superfluidity.

UnitIV:TransmissionofHeat
Conduction–coefficientofthermalconductivity–Rectilinear flow of heat along a bar – convection – lapse rate – Stability of the atmosphere –Newton's law of cooling – determination of specific heat capacity of liquid - Radiation -blackbody – Kirchhoff's law – Stefan – Boltzmann law - energy distribution in blackbodyspectrum - Wien's law – Rayleigh Jean's law–Planck's law –solar constant–water flowpyrheliometer.

UnitV:Thermodynamics
Zerothandfirstlawofthermodynamics–reversibleandirreversible processes –isothermal process-adiabatic process-gas equation during adiabaticprocess –work done Entropy–change of entropy in reversible an irreversible processes–temperature – entropy diagrams – physical significance of entropy - change of entropy wheniceconvertedintosteam-thirdlawofthermodynamics–ExtensiveandIntensivethermodynamicvariables–distinctionbetweenthem–Maxwellthermodynamicalrelations–derivationandapplication - Clausius–Clapeyronequation andspecificheatrelation.

Text Books:

1. Brijlal and Subramanyam, Heat and Thermodynamics,S.Chand& Co,16th Edition,NewDelhi, 2005.
2. D.S.Mathur, Heat and Thermodynamics, S.Chand&Sons, 5th Edition, New Delhi, 2014.
3. R. Murugesan and KiruthigaSivaprasath, Thermal Physics, S.Chand& Co, IIEdition,New Delhi, 2008

Booksfor Reference:

1. J.B.Rajan,Heat&Thermodynamics,SC Publisher,NewDelhi,1985.
2. H.C.Varma,ConceptsofPhysics–VolumeIandII,BharatiBhawanPublishers,NewDelhi, 2015
3. M.NarayanaMoorthyandN.Nagarathinam,Heat,NationalpublishingCo,Chennai,Eight Edition,1987.

CourseOutcomes(CO):

CO	Learningoutcome	Remarks
CO1	Understand the basics of thermodynamics and their applications	K2
CO2	Learn the basics of low temperature and how to construct a successful experiment using low temperature.	K2
CO3	Learn experimental Methods To Determine The transmission of heat.	K2
CO4	Understand the kinetic theory of gas	K2
CO5	Analyze the laws of thermodynamics and maxwell's Thermodynamical relations	K4

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	3	3	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	3	2	3	3	3	3	3	3
CO4	3	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3	2	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

SEMESTER-III

COURSE CODE	U21PHT31	OPTICSANDSPECTROSCOPY	L	T	P	C
CORE -V			5	-	-	4

Objective:
To understand the basics of Spectroscopy, interference, Michelson's Interferometer andphenomenon like interference, diffraction, polarization through wave nature of light and itsapplicationsand to gainknowledgeinspectroscopy.

UnitI: GeometricalOptics
Lens–Spherical aberration in lenses–Methods of minimizing spherical aberration – conditionfor achromatism of two thin lenses (in and out of contact) –Aplanatic lens – Dispersion –Angular and Chromatic dispersion – combination of prisms to produce i) dispersion withoutdeviation ii) deviation without dispersion–Direct vision spectroscope– Eyepieces–Ramsden'sandHuygens'seyepieces–simplemicroscope(magnifyingglass)– compoundmicroscope.

UnitII: Interference
Conditions for interference – Theory of interference fringes – interference due to reflectedlight (thin films) -colors of thin films –wedge shaped thin film –theory – determination ofdiameter of a thin wire by Air wedge – test for optical flatness – Newton's rings by reflectedlight– Determination of wavelength of light - Michelson's Interferometer – theory and itsApplication (Measurement of wavelength) – Jamin's interferometers – determination ofrefractiveindex ofgases.

UnitIII:Diffraction

Fresnel's diffraction –Rectilinear propagation of light – zone plate –action of zone plate - diffraction at circular aperture – opaque circular disc – Fraunhofer diffraction at single slit– Double slit–Plane diffraction grating– theory of plane transmission grating- experiment todetermine wavelength (Normal incidence method)–resolving power–Rayleigh's criterion forresolution–resolving power of a telescope – resolving power of a microscope – resolvingpowerofa prism-resolvingpowerofgrating.

UnitIV:Polarization

Double refraction Nicol Prism Nicol Prism as polarizer and analyzer Huygens's explanationof double refraction in uniaxial crystals–Plane, elliptically and circularly polarized light–Quarter wave plates andHalfwave plates – Production and detection of plane, circularlyand elliptically polarized light-Optical activity–Fresnel's explanation of optical activity–Specific rotator power–Lorentzhalf shade polarimeter.

UnitV:Spectroscopy

Infrared spectroscopy–sources anddetector–uses–ultraviolet spectroscopy–sources– quartzspectrograph-applications-RamanSpectroscopy–QuantumtheoryofRamaneffect– applications–Nuclear magnetic resonance – Nuclear quadrupole resonance–Electron spinresonancespectroscopies-(Qualitative study)

Text Books:

1. SubramanyamandBrijlal,AtextbookofOptics,S.Chandandco.,25thEdition, New Delhi 2004.

2. R.Murugeshan,OpticsandSpectroscopy,S.ChandandCo.,6thEdition, NewDelhi, 2008.
3. S.L.Gupta,V.KumarandR.C.Sharma,ElementsofSpectroscopy,PragatiPrakashan, 13th Edition,Meerut,1997.
4. G.Aruldhass,MolecularStructureandSpectroscopy,PHIPvtLtd,IIEdition, NewDelhi, 2007.

BooksforReference:

1. Sathyaprakash,RatanPrakashanMandhir,Optics, VIIEdition,NewDelhi,1990.
2. C.N.Banewell,IntroductiontoMolecularSpectroscopy,TMHpublishingco.IVEdition,New Delhi,2006.
3. AjoyGhatak, Optics, (TMH), NewDelhi, Fourthedition,2009.
4. Singh&Agarwal,OpticsandAtomicPhysics,PragatiPrakashanMeerut,Ninethedition, 2002.
5. Halliday,R.ResnickandJ.Walker,FundamentalsofPhysics,Wiley,6th Edition,NewYork, 2001.

CourseOutcomes(CO):

CO	Learningoutcome	Remarks
CO1	Learnaboutvarious lens andits aberrations	K1
CO2	Acquireknowledgeabout interferenceand interferometers	K2
CO3	Understandabout thediffractionphenomenonandresolving powerinopticalinstruments	K3
CO4	Studyabout polarization	K2
CO5	Applydifferentspectroscopictechniquetoobtain informationaboutthemolecule	K2

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	3	3	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	3	2	3	3	3	3	3	3
CO4	3	3	3	3	2	3	3	3	3	3	3
CO5	3	3	3	3	2	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHE311	CHOICE I	L	T	P	C
ELECTIVE-I		ENERGYPHYSICS	4	-	-	3

Objective:
Toprovideanunderstandingofthepresentenergycrisisandvariousavailableenergysources.

UNITI:Introduction toEnergySources
World's reserve of Commercial energy sources and their availability -India's productionandreserves-Conventionalandnon-conventionalsourcesofenergy,comparison– Coal-Oiland naturalgas –applications –meritsand demerits.

UNITII:SolarThermalEnergy
Solar constant -Solar Spectrum-Solarradiationsoutside earth's atmosphere–atthe earthsurface- on tilted surfaces -Solar Radiation Geometry-Basic Principles of Liquid flat platecollector -Materials for flat plate collector -Construction and working- Solar distillation -Solar disinfection - Solar drying-Solar cooker (box type)- Solar water heating systems – Swimmingpool heating.

UNITIII:Photovoltaic Systems
Introduction-Photovoltaic Principle-Basic Silicon Solar cell- Power output and conversionefficiency-Limitationtophotovoltaicefficiency-
Basicphotovoltaicsystemforpowergeneration – Advantagesanddisadvantages – Typesofsolarcells-Applicationofsolarphotovoltaic systems - PV Powered fan – PV powered area - lighting system - A HybridSystem.

UNITIV:BiomassEnergy
Introduction-Biomass classification- Biomass conversion technologies-Bio-gas generation-Factorsaffecting bio-digestion-Working of biogasplant- floatingandfixeddome typeplant
-advantages and disadvantage of -Bio-gas from plant wastes-Methods for obtaining energyfrom biomass- Thermal gasification of biomass-Working of downdraft gasifier-Advantagesanddisadvantages of biological conversion ofsolar energy.

UNITV:Wind Energy and otherEnergy Sources
Wind Energy Conversion-Classification and description of wind machines, wind energycollectors- Energy storage - Energy from Oceans and Chemical energy resources-Oceanthermalenergyconversion-
tidalpower,advantagesandlimitationsoftidalpowergeneration-Energy and power from waves-wave energy conversion devices- Fuel cells- andapplication of fuel cells- batteries advantages ofbattery for bulkenergy storage- Hydrogenasalternativefuelfor motor vehicles.

Text Books:

1. Kothari D.P., K.C. Singal and RakeshRanjan, Renewable energy sources and emergingTechnologies,Prentice Hall ofIndia, 2008.
2. S.P.Sukhame, Solar Energy, Principles of thermal collection and storage TATA, McGraw, Hill publishingcompanyltd. 1984

BooksforReferences:

1. ChetanSingh Solanki, Solar Photovoltaics Fundamentals, Technologies andApplications,2nd Edition,PHILearningPrivateLimited, 2011.
2. Rai G. D, Non-conventional Energysources, 4th Edition, KhannaPublishers,2010.
3. JeffreyM. Gordon, SolarEnergy: The State ofthe Art,Earthscan, 2013.
4. KalogirouS.A.,SolarEnergyEngineering:ProcessesandSystems,2ndEdition,Academic Press,2013.
5. Zobaa A.F. and Ramesh Bansal, Handbook of Renewable Energy Technology, WorldScientific, 2011.

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	Know about conventional and non-conventional sourcesofenergy	K1
CO2	Understandaboutsolarenergyandits appliances	K3
CO3	KnowaboutPhotovoltaicSystemsandPointoutthe typesofsolarcellsanditsapplications	K2
CO4	UnderstandaboutBiomass	K2
CO5	Examine thedifferent windenergysources	K3

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	3	3	3	2	3	3	3
CO2	3	2	2	3	3	3	3	2	3	3	3
CO3	3	2	2	3	3	3	3	2	3	3	3
CO4	3	2	2	3	3	3	3	2	3	3	3
CO5	3	2	2	3	3	3	3	2	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHE312	CHOICE II	L	T	P	C
ELECTIVE-I		WAVES AND OSCILLATIONS	4	-	-	3

Objectives:

To impart knowledge about waves and oscillations and sound. To make themunderstandtheprinciplesand methods of findingthe properties.

UNIT I: **Simple Harmonic Motion**

Characteristics of S.H.M., Differential equation ofS.H.M.,K.E.,P.E.andTotalEnergyofavibratingparticle,EnergyofVibration,Oscillationswith one degreeof freedom,Linearity andsuperpositionprinciple,Simplependulum, Compound pendulum, Bar pendulum, Composition of two SHM(s) of frequencyratio2:1,

UNIT II: Free, Forced and Resonant Vibrations

Free Vibrations, Undamped Vibrations,Damped Vibrations, Damped S.H.M. in an electrical circuit, Forced Vibrations, Resonanceand Sharpness of Resonance, Phase of Resonance, Quality Factor, Examples of Forced andResonantVibrations.

UNITIII:Wavemotion

Characteristicsofwavemotion,Transversewave,motion,Longitudinal wave motion, Differential equation of wave motion, Particle velocity, Wavevelocity, Principle of superposition, Interference of Sound waves, Beats, Decibel, Dopplereffect,Applications.

UNIT IV: Reflection of Sound

Reflection of a plane wave at plane surface, Experimentaldetermination of reflection of sound, Echo, Refraction of plane wavefront at plane surface,Diffraction of sound, Fresnel's Assumptions, Intensity of sound at a point due to planewavefront,Doppler effect, Applications.

UNITV: Ultrasonics

ProductionofUltrasonicsby magnetostrictionandpiezoelectricmethods,detectionofUltrasonic waves,Acousticgrating,ApplicationsofUltrasonicwaves.

Text Book:

1. Brijlal&Subramanyam"Waves &Oscillations", S.Chand&Co., 1974,Unit1-V

BooksforReference:

1. M. Narayanamurti, N. Gosakan and T. Rajagopalan, Sound, The National Publishing Co,Madras,First Edition, 1978.
2. D. R. Khanna and R.S.Bedi, A Textbook of Sound with Theory of Oscillation andWaves, Atma Ram &Sons, Delhi, 1984

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	UnderstandtheconceptofSHM	K2
CO2	Analyzethedifferent typesofvibration	K4
CO3	Acquirethe knowledgeof wave motion	K3
CO4	Know theproperties ofsound	K3
CO5	Applytheknowledgetoultrasonic waves	K3

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	1	1	3	3	3	2	2
CO2	3	3	3	3	1	1	3	3	3	2	2
CO3	3	3	3	3	1	1	3	3	3	2	2
CO4	3	3	3	3	1	1	3	3	3	2	2
CO5	3	3	3	3	1	1	3	3	3	2	2

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weaklycorrelating(W)	1
No correlating (N)	0

SEMESTER- IV

COURSE CODE	U21PHT41	ELECTRICITY ANDELECTROMAGNETISM	L	T	P	C
CORE - VI			4	-	-	4

Objectives:

- Toprovidecomprehensiveknowledgeandunderstandingofthebasicsof ElectricityandMagnetism.
- To exposethe studentsto theapplications ofElectricityandMagnetism.

UNITI:MagneticEffectof Electric current

Magnetic flux and magnetic induction- BiotSavart law-magnetic induction at a point due toa straight conductor carrying current - magnetic induction at a point on the axis of a circularcoil carrying current- amperes circuital law-magnetic field inside a long solenoid – toroid-Lorentz force on a moving charge-direction of force-torque on a current loop in a uniformmagneticfield–MovingcoilBallisticgalvanometer-theory-experimenttofindchargesensitivityand absolute capacityof acapacitor-De-Sauty's bridge

UNIT II: Capacitance

Capacitance-Principleofcapacitor-Expressionsforthecapacitanceofi)spherical capacitor ii) Cylindricalcapacitorandiii)parallelplatecapacitorwithandwithoutpartlyfilleddielectrics-Energy of a capacitor- Loss of energy when two charged conductors share thecharges-Types of capacitors- fixed capacitor, variable capacitor, and electrolytic capacitor andslidingcapacitor.

UNIT III: ElectromagneticInduction

Faraday's laws of electromagnetic induction -self-induction –self-inductance of a longsolenoid –toroidal solenoid-determination ofL by Anderson's and Rayleigh's methods-Owen'sbridge – mutualinduction – mutualinductancebetweentwoco-axialsolenoids-experimental determination of mutual inductance –co-efficient of coupling- energy stored ina coil-eddycurrents-uses.

UNIT IV: ACandDCCircuits

Growth and decay of current in LC,LR and CR circuits with DC voltages –determination ofhigh resistance by leakage–growth and decay of charge in LCR circuit-conditions for thedischargeto be oscillatory–frequencyof oscillation.

AlternatingCurrent-joperatormethod–useofoperatorinthestudyofACcircuits-Resistance in an AC circuit-Inductance in an AC circuit-Capacitance in an AC circuit-ACthrough an inductance and resistance in series-capacitance and resistance in series – LCRseries resonance circuit-sharpness of resonance-parallel resonance circuit-power in an ACcircuit-powerfactor.

UNITV:Maxwell'sEquation &ElectromagneticWaves

Introduction-Maxwell's equations—Displacement current-Poynting Vector-Electromagneticwaves in free space-Hertz experiment for production and detection of EM waves- WaveequationsforElectricfieldandMagneticfield-monochromaticplanewaves-EMwavesina

Matter-ReflectionandTransmissionatnormalincidenceandobliqueincidence–Polarization byreflection.

Text Books:

1. R.Murugesan,ElectricityandMagnetism, SChand &Co,2008.
2. BrijLal&Subramanyam, Electricity and Magnetism, RatanPrakashanMandirPublishers,2005.
3. M.Narayanamurthy&N.Nagarathnam, Electricity & Magnetism, NPC pub., Revisededition, 1992.

BooksforReference:

1. D.N.Vasudeva,Electricityand Magnetism,S.Chand&Co, 2011
2. K.K.Tewari,Electricityand Magnetism, S.Chand&Co,2002.
3. E.M.Pourcel, Electricity and Magnetism- Berkley Physics Course,Vol.2 McGrawHill Education; 2nd edition 2017.
4. D.C. Tayal, Electricity and Magnetism, Himalaya Publishing Co., Fourth Edition2019.
5. D. Halliday, R.Resnick and J.Walker, Fundamentals of Physics–Electricity andMagnetism(2011), Wiley India,PvtLtd
6. David Griffith, Introduction to Electrodynamics, Pearson Education India LearningPrivateLimited; 4th edition 2012.

CourseOutcomes (CO):

CO	Learningoutcome	Remarks
CO1	Studyabout magnetic field producedinelectriccircuits	K1
CO2	Learnaboutcapacitor anditstype	K1
CO3	Acquireknowledgeabout electromagnetic induction	K2
CO4	Analysesandsolveselectricalcircuitswithdcandacsource	K4
CO5	Gainknowledge aboutMaxwell Equation	K2

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHP42	PRACTICAL-II	L	T	P	C
CORE - VII			-	-	4	4

Objective:
It is aimed at exposing the under graduate students to the technique of handling simplemeasuringinstrumentsandalsomakethemmeasurecertainmechanicalandopticalpropertie sofmatter.

ANYFOURTEEN
1. Spectrometer–GratingMinimumDeviation
2. Spectrometer-Dispersive Power,ResolvingofPrismGrating.
3. Spectrometer–DiffractionGrating-NormalIncidence
4. Newton'sRing.
5. Airwedge.
6. LCR –ResonanceparallelandSeries.
7. LCR.
8. Potentiometer–E.M.F.
9. Meterbridge.
10. DeMorgan'stheoremusingIntegratedChips.
11. VerifyBasicgatesusingIC's.
12. Characteristicsof a Junction Diode.
13. CharacteristicsofaZenerDiode.
14. NANDasauniversalgate.
15. NOR asauniversalgate.
16. Basicgates usingdiscreteComponents.
17. RS,D,JK,flip flop.
18. Figureofmerit-galvanometer

TEXT BOOKS:
1. C.C.Ouseph,G.Rangarajan–ATextBookofPracticalPhysics-S.Viswanathanpublisher–partI, 1990.
2. C.C.Ouseph,G.Rangarajan,R.Balakrishnan–ATextBookofPracticalPhysics-S.Viswanathan publisher-partII1996.
3. S.L.GuptaandV.Kumar–PracticalPhysics–PragatiPrakashan–25th,Edition, 2002.

CourseOutcomes (CO):

CO	Learning outcome	Remarks
CO1	Abletocharacterize diodes	K3
CO2	Determine dispersiveandresolvingpowerof prism	K4
CO3	Determinewavelengthof Sodiumvaporlight	K4
CO4	Analyzeworkingof differentflipflop	K3
CO5	VerifybridgesandLCRconnections	K4

K1-RememberK2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Correlating	**Marks**
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHE431	CHOICE -I	L	T	P	C
ELECTIVE-II		MEDICALPHYSICS	3	-	-	3

Objective:
Tounderstandthebasicsaboutthebiologicalsystemsinourbody,theirbehaviorandthediagnosticd evices.

Unit 1: Basic Anatomical Terminology
Standard anatomical position, Planes, Familiaritywith terms like – Superior, Inferior, Anterior, Posterior, Medial, Lateral, Proximal, Distal.Forces on and in the Body – Physics of the Skeleton – Heat and Cold in Medicine- EnergyworkandPower oftheBody.

Unit 2: Pressure system of the body
Physics of Cardiovascular system- Electricity withinthe Body – Applications of Electricity and Magnetism in Medicine. Sound in medicine-PhysicsoftheEarandHearing-Lightinmedicine- Physicsofeyes and vision.

Unit 3: Transducers
performance of characteristics of transducer- static and dynamicactivetransducers-(a)magneticinductiontype(b)piezoelectrictype(c)photovoltaictype(d)thermoelectrictype.Passi vetransducer-(a)resistivetype-effectandsensitivityofthebridge(b) capacitivetransducer (c)linearvariabledifferentialtransducer (LVDT).

Unit 4: X-rays
Production of X-rays- X-ray spectra- continues spectra and characteristicspectra-Coolidgetube-ElectroCardioGraph(ECG)-Blockdiagram-ECGLeads-Unipolarand bipolar-ECG recordingset up.

Unit 5: Electro Encephalography (EEG)
Origin- Block diagram- Electromyography(EMG) – Block diagram- EMG recorder-Computer Tomography (CT) principle Blockdiagramof CT scanner.

Text Books:
1. John R.Cameron andJamesG.Skofronick, Medical Physics, John Willy&Sons,1978,
2. Dr.M. Arumugam,Biomedicalinstrumentation,EDII,AnuradhaAgencies1997.

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	Understands Basic AnatomicalTerminology	K2
CO2	Appliesmedicalphysicstoknowthedifferentaspects ofthebody	K3
CO3	Analyzetheperformanceoftransducer	K4
CO4	LearnaboutElectroCardioGraph(ECG)andits application	K3
CO5	Studyabout EEGand EMGand itsapplication	K3

K1-Remember K2- Understand K3-Apply K4- Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	3	3	3	3	3	3	3
CO2	3	2	2	3	3	3	3	3	3	3	3
CO3	3	2	2	3	3	3	3	3	3	3	3
CO4	3	2	2	3	3	3	3	3	3	3	3
CO5	3	2	2	3	3	3	3	3	3	3	3

Correlating	**Marks**
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHE432	CHOICE -II	L	T	P	C
ELECTIVE-II		MATERIALS SCIENCE	3	-	-	3

Objective: The objective of this course is to predict and control material properties throughanunderstandingof atomic,molecular,crystalline,andmicroscopic structuresof materials

UNIT–I:Materials Science

Classificationofmaterials–PropertiesofEngineeringmaterials – Materials Structure – Types ofBonds – Bonds Formation–Ionic Bond –Covalent Bond – MetallicBond – Comparison of Bonds – SecondaryBonds.

UNIT – II: Phase diagram and transformation

Basic terms – Solid Solution – Hume –Rothery's rule – Intermediate Phase – Phase Diagrams – Gibb's Phase Rule – Time –Temperaturecoolingcurves– ConstructionofPhaseDiagrams–TheLeverRule–EquilibriumBinarySystem – Eutectic System – Mechanismof Phase Transformation.

UNIT – III: Vacuum and oxidation

History of vacuum technology – units of Vacuum –KineticaspectsofGases– ApplicationofVacuum–Gasflowinvacuumsystems–production of vacuum – Measurement of vacuum – Thermal conductivity gauges – PenningGauge– Oxidation – Oxidation Resistant Materials.

UNIT–IV:Non-destructivetesting

(NDT)NDTanditsadvantages–Defectsinmaterials – Selection of the NDT Method –Liquid Penetration Testing – Physical Principle –Magnetic Particle Testing (MPT) – Principle of MPT – Sensitivity – Limitation – EddyCurrentTesting(ECT)–Principle–Instrumentfor ECT– Applications –Limitations.

UNIT – V: Electrical and magnetic properties of materials

Dielectrics – Polarization –Temperatureandfrequencyeffects–ElectricBreakdown– Ferroelectricmaterials–Electrostriction–Piezoelectricity–UsesofDielectrics– MagneticProperties–Classification– Magnetostriction – Soft and HardMagnetic Materials.

Text Books:

1. G.K.Narula,K.S.Narula,V.K.Gupta,MaterialsScience,TataMcGrawHill Publishing, 1994.
2. V.Raghavan,MaterialsScienceand EngineeringPrenticeHallofIndia, 2004.

Booksforreference:

1. Baldevraj,T. Jayakumar, M. Thanvasimuthu, Practical Non-Destructive Testing,NarosaPublishingHouse,Chennai, 2002.
2. A.V.K. Suryanarayana, Testing of Metallic Materials, B.S. Publications, Giriraj lane,SultanBazar, Hyderabad– 95, 2003.

CourseOutcomes (CO):

CO	Learning outcome	Remarks
CO1	Classifythe materials basedon their bonding	K2
CO2	Learnphasediagramtounderstandmaterialphasetra nsformation	K2
CO3	Understandtheconducting, semiconducting,superconducting, dielectric, ferro-electric and piezoelectricbehaviorof material	K2
CO4	Gain knowledge on vacuum technology for application inmaterialsynthesis	K3
CO5	Characterize materials usingnondestructive testing	K4

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weaklycorrelating(W)	1
No correlating (N)	0

SEMESTER-V

COURSE CODE	U21PHT51	ATOMIC ANDNUCLEARPHYSICS	L	T	P	C
CORE - VIII			5	-	-	4

Objective:

- To providean introductoryaccountabout theatomic structure
- Toacquireknowledgeonstaticpropertiesofnucleianditsstability.
- To know about different modes of decay and interaction of nuclearradiations withmatter

UNIT I: Positive Rays:

Discovery-properties- analysis – Thomson's parabola method – Aston's massspectrograph – Bainbridge's mass spectrograph – Dempster's massspectrograph – Dunnington's method ofdetermininge/m.

UNIT II: Atomic Structure

Early atomic spectra-Thomson model-Alpha particle scattering-Rutherford 'snuclear model-drawbacks-Bohr atom model –Bohr's interpretation of theHydrogen spectrum-correction fornuclearmotion-evidencesinfavorofBohr'stheory-Ritzcombinationprinciple-correspondence principle-Sommerfeld'srelativistic atom model-drawbacks- the vector atommodel – Quantum numbersassociated with the vector atom model — the Pauli's exclusionprinciple–periodicclassification ofelements

UNITIII: Fine Structure of Spectral Lines

Coupling schemes-L-S Coupling-j-j Coupling- Hund rules- magnetic dipolemoment due toorbital motion of the electron- due to spin of the electron -Stern and Gerlach experiment-spin-orbit coupling-optical spectra-spectralterms-spectral notation- selection rules-intensityrules- interval rule- finestructure of sodium D line- hyperfine structure- Normal Zeemaneffect-theoryandexperiment-quantummechanicalexplanation-Larmor'stheorem-AnomalousZeemaneffect- Paschen –Bacheffect-Starkeffect.

UNITIV: Properties and Structure of Nuclei

Generalpropertiesofnucleus-bindingenergy–BE/Acurve-significance-protonelectrontheory-protonneutrontheory-Nuclearforces–characteristics–Mesontheory ofnuclearforces– Yukava Potential- Nuclearmodels –Liquid drop model-Shell model.

UNIT V: Radio Activity & Nuclear Reactions

Fundamental laws of radio activity –theory of α ,β and ϒ decay- properties ofalpha, beta andgammarays-Kinematicsofnuclearreaction-Nuclearfission–Nuclearfusion–Nuclearreactor-uses - atom bomb - hydrogen bomb-fusion reactor –plasmaconfinement – artificialtransmutation-Qvalueof nuclearreaction-typesofnuclearreaction

Text Books:

1. ModernPhysics,R.Murugeshan,KiruthigaSivaprasath,S.Chand&Co.,New Delhi(2008).

2. ModernPhysics,D.L.Sehgal,K.L.ChopraandN.K.Sehgal.SultanChand&SonsPublication,7th Edition,New Delhi (1991).
3. AtomicPhysics,J.B. Rajam,S. Chand&Co.,20th Edition,New Delhi(2004).
4. AtomicandNuclearPhysics,N.SubrahmanyamandBrijLal,S.Chand&Co.5th Edition, New Delhi (2000).
5. NuclearPhysics, Tayal D.C., HimalayaPublishingHouse,Mumbai (2006).
6. NuclearPhysics, R.C.Sharma,K.Nath&Co.,Meerut (2000)
7. NuclearPhysics,IrvingKaplan, Narosa Publishinghouse,New Delhi.

BooksforReference:

1. ModernPhysics, J.H.Hamilton and Yang,McGraw-Hill Publication(1996).
2. Conceptsof ModernPhysics, A. Beiser,TataMcGraw-Hill, NewDelhi (1997).
3. Fundamentals of Physics, D.Halliday, R.Resnick and J. Walker, Wiley,6th Edition, NewYork(2001).
4. ModernPhysics,Kenneth S.Krane, John Willey&sons, Canada (1998).
5. Nuclear Physics, R.R.Roy and B.P.Nigam, New Age International (P)Ltd.,NewDelhi(1997).

CourseOutcomes(CO):

CO	Learningoutcome	Remarks
CO1	Acquireknowledgeon the fundamental principles governingthe structure of theatom	K1
CO2	Gainknowledge in atomicphysics tofollow courses atthe Advancedlevel.	K2
CO3	Obtainknowledge aboutfinestructureof spectrallines	K2
CO4	Understandingon the basics ofnuclear physicsthat treats atomicnucleiasself-bound many-bodyquantumsystems	K2
CO5	Learn about nuclearreactionand radioactivity	K1

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHT52	CLASSICAL AND STATISTICALMECHANICS	L	T	P	C
CORE - IX			5	-	-	4

Objective:

- Tounderstand the mechanics ofsystems of particlesand their equations ofmotion
- To studytheconcept ofstatisticsofmolecules.

UNITI: MechanicsofaSystemof Particles

External and internal forces, Centre of mass-Conservation of linear momentum-Conservationof angular momentum-Conservation of energy-work-energytheorem-Conservative forces-examples-Constraints-Typesofconstraints-Examples-Degreeoffreedom – Generalizedcoordinates(transformationequations) – Generalizedvelocities-GeneralizedMomentum.

UNITII:Lagrangian Formulations

Principleofvirtualwork,D'Alembert'sprinciple,Lagrange'sequationofmotionforconservative and non-conservative systems-Simple applications-simplependulum-Atwood'smachine-compound pendulum- Hamilton's Principle-Deduction of Lagrange's equation ofmotion from Hamilton's Principle-Deduction of Hamilton's principle from D'Alembert'sprinciple.

UNITIII:HamiltonianFormulations

Phase space-The Hamiltonian function H -Hamilton's Canonical equation ofmotion-PhysicalsignificanceofH-DeductionofCanonicalequationfromavariationalprinciple-Applications-HarmonicOscillator-PlanetaryMotion-Compound pendulum

UNIT IV: Classical Statistics

Microandmacro states-Thermo-spaceandgammaspace – fundamentalpostulatesofstatisticalmechanics – Ensembles – differenttypes– Thermodynamicalprobability –entropyandprobability-Boltzmann'stheorem – Maxwell – Boltzmannstatistics – Maxwell – Boltzmannenergydistributivelaw – Maxwell-Boltzmann velocitydistributivelaw.

UNIT V:QuantumStatistics

Development of Quantum statistics- Bose - Einstein and Fermi –Diracstatistics – Derivationof Planck's radiation formula from Bose – Einsteinstatistics - Free electrons in metal- Fermigas – Differencebetween classicalandquantum statistics.

Text books:

1. J.C.Upadhyaya,ClassicalMechanics,PublishedbyHimalyaPublishingHouse,Mumbai(2005).
2. Brijlal&Subramaniam, Heat&Thermodynamics, S.Chand&CompanyLtd (1998).
3. Agarwal,'Statistical Physics'S.Chand& CoNewDelhi(1996).

BooksforReference:

1. GuptaB.D.,Satyaprakash,ClassicalMechanics,9th ed.,KadernathRamnathPubl.,Meerut(1991)
2. Gupta,Kumar,Sharma,ClassicalMechanics,PragatiPrakashanPubl.,Meerut(2005).

3. MurrayR.Spiegal,TheoreticalMechanics,Schaum'soutlineseries,McGrawHillPubl.Co., NewDelhi (1981).

CourseOutcomes(CO):

CO	Learningoutcome	Remarks
CO1	Knowledge about mechanics oftheparticles	K1
CO2	DifferentiateLagrangianequationofsystemsfor conservative andnon-conservativesystems	K3
CO3	ApplyHamiltonianfunction forvariousapplication	K3
CO4	Understandaboutclassicalandquantumstatistics	K1
CO5	Acquire knowledge to apply the principles of statisticalmechanicstoselectedproblems.	K2

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	1	1	3	3	2	2	2
CO2	3	3	3	3	1	1	3	3	2	2	2
CO3	3	3	3	3	1	1	3	3	2	2	2
CO4	3	3	3	3	1	1	3	3	2	2	2
CO5	3	3	3	3	1	1	3	3	2	2	2

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHT53	BASICS OF DATA COMMUNICATIONANDPROGRAMMINGIN C	L	T	P	C
CORE - X			5	-	-	4

Objective:
Tointroduceto datacommunicationand Programmingin C

UnitI: DataCommunication
IntroductiontoDataCommunication-Network,protocolsandstandardsstandardorganizations – lineconfiguration -topology-transmission mode–classification ofnetwork.

Unit II: Multiplexing
Parallelandserialtransmission – Interfacestandards–modems – guidedmedia-typesoferror -multiplexing-Typesofmultiplexing-multiplexingapplication-Telephonesystem–Ethernet.

UnitIII:Network
Analoganddigitalnetwork:AccesstoISDN-broadbandISDN-X.25Layers-Atm-Repeaters–Bridges–Routers–Gateway-TCP/IPNetwork-World WideWeb.

UnitIV:IntroductiontoProgramminginC
BasicstructureofCProgram–characterset–identifiersandkeywords –constantsandvariables - data types – operators and expressions – Relational, Logical and Assignmentoperators–incrementand decrement operators–Arithmeticexpressions–Mathematicalfunctions.

UnitV:Input andOutputfunctions
Data input and output – getchar, putchar, scan f, print f, gets, puts functions – Decisionmaking – branching and looping – if, if-else, else if ladder, switch, break, continue, go to–while,dowhile–for,nestedloops–Arrays(onedimensionalandtwodimensional)–declaration–initialization–simpleprograms.

Textbook:
1. Balagurusamy.E,ProgramminginANSIC,SecondEdition,TataMcGrawHill,2008.
2. BrijendraSingh, Data Communications andComputerNetworks, 4thEdition, 2014

BooksforReferences:
1. KamthaneAshok.N,“ProgramminginC”,2nd Edition,PearsonEducation.2013.
2. YashvantP.Kanetkar,“LetusC”, 8thEdition, InfinitySciencePress-2008.

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	Gainsknowledgeaboutnetworkandtransmission mode	K1
CO2	Understandaboutseriesandparalleltransmission	K2
CO3	Differentiateanaloganddigitalnetwork	K4
CO4	Studyaboutbasic structureof C Programming	K2
CO5	UnderstandaboutstatementandcommandsusedinC programming	K2

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	3	2	3	2	3	3	3
CO2	3	3	2	2	3	2	3	2	3	3	3
CO3	3	3	2	2	3	2	3	2	3	3	3
CO4	3	3	2	2	3	2	3	2	3	3	3
CO5	3	3	2	2	3	2	3	2	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHT54	BASIC ELECTRONICS ANDCOMMUNICATION	L	T	P	C
CORE - XI			5	-	-	4

Objectives:

1. Toenablethestudentstounderstandtheaspectsofanalogelectronicsin a lucid andcomprehensivemanner.
2. Tounderstandthefundamentalconceptsoflogic gates,counters ,registers, fibreOptics etc.
3. Todevelop skillto buildand troubleshootcombinational digitalcircuits.

UnitI: Linearcircuitanalysisandsemiconductordiodes

Constantvoltagesource – constantcurrentsource – Thevenin'stheorem-procedureforfinding Thevenin Equivalent circuit - PN junction theory - V-I characteristics of a PNjunction diode – Half-wave rectifier - Bridge rectifier - Efficiency - filters - Shunt capacitorfilter–pifilter-Zenerdiode-equivalentcircuit-voltageregulator-LED-V-Icharacteristics– advantages - applications -photodiode- characteristics-applications.

UnitIII: Transistor Amplifier

Transistor - Different modes of operations-CB mode &CE mode – Twoport representationofatransistor-hparameter-ACequivalentcircuitusinghparameters-analysisofamplifiers using h parameters (CE only) - RC coupled amplifier - transformer coupledamplifier- power amplifier.

UnitIII: DigitalFundamentals

NumberSystemsandConversions–Binary,Decimal,Octal,Hexa-BCDCode-Graycode - 1's and 2's complements, 9's complements, 10's complements – Basic logic gates - NAND,NORandEX-ORgates -NAND andNORasUniversalBuildingblocks-LawsandtheoremsofBooleanalgebra–NAND-NANDcircuits-Karnaugh'smap-SOPandPOS-applications

UnitIV:SequentialLogic

RS flip flop, Clocked RS flip flop, D flip flop, J-K flip flop and J-K Master-Slave Flip-flop - Shift registers and Counters-Multiplexers and Demultiplexers – Decoders and Encoders-MemoryCircuits-D/AandA/Dconverters-IC555monostable andastablemulti-vibrators.

UnitV:ModulationandDemodulation

Amplitudemodulation-Frequencymodulation,PhaseModulationandPulseWidthModulation-Detectors of AM, FM, PM and PWM, PLL-Noise in Communication Systems -ASK, FSK, PSK Modulation and Demodulation, Advantages and disadvantages of digitalcommunication

Text Books:

1. GuptaandKumar,HandBookofElectronics – PragatiPrakashan–Meerut,2002.
2. V.K.Mehta,Principles ofElectronics, RohitMehtaS.Chand&Co.,2006.
3. M.ArulThalapathi,Electronics,ComptekPublishers(2005).
4. M.K.Bagde and Singh S.P., Elements of Electronics, S.Chand&Co.,NewDelhi,1990.

5. A.Subramanyam–AppliedElectronics, NationalPublishingCo. 1997.
6. RamakantA.Gayakwad, OP-AMPs and Linear Integrated Circuits, Prentice Hall ofIndia,1994.
7. MalvinoLeach,DigitalPrinciplesandApplication,TataMcGrawHill,4TH1992. Edition
8. Thomas L. Floyd,DigitalFundamentals,UniversalBookStall, NewDelhi(1998).
9. V.Vijayendran,S.Viswanathan,IntroductiontoIntegratedElectronics(PrintersandPublishers)Pvt.Ltd., Chennai, 2005.

BooksforReference:

1. Mittal.G.K.,ElectronicDevicesbyG.K.PublishersPvt.Ltd.,1993.
2. B.L.Theraja,BasicElectronicsS.Chand&Co.,2008.
3. AmbroseandVincent Devaraj,Solid StateElectronics, MeeraPublication.
4. R.S.Sedha,Applied Electronics,S.Chand&Co.1990.
5. Thomas L. Floyd, Digital Electronics Practice Using Integrated Circuits-R.P.Jain– Tata McGrawHill,1996.
6. D.RoyChoudhury and Shail Jain, Linear Integrated Circuits –New AgeInternational(P)Ltd. 2003.
7. I.J.Nagrath - Electronics-Analog and Digital, Prentice-Hall of India, NewDelhi1999.
8. J.Millman and C.Halkias, Integrated Electronics, Tata McGraw Hill, New Delhi2001.

CourseOutcomes(CO):

CO	Learningoutcome	Remarks
CO1	Acquireknowledgeon transistorand its applications	K2
CO2	Studyaboutlinearcircuittheorems anddiode	K1
CO3	Studyabout different numbersystems and basics oflogicgates	K1
CO4	Understandtheoperationofsequentiallogiccircuits	K2
CO5	Design communicationsystemwithdifferentmodulation	K3

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHP53	PRACTICAL-III	L	T	P	C
CORE - XII			-	-	5	4

Objective:
It is aimed at exposing the under graduate students to the technique of handling simplemeasuringinstrumentsandalsomakethemmeasurecertainmechanical,electricalandoptical propertiesofmatter.

ANYFOURTEEN

1. Spectrometer-i-dcurve–i-I'curve.
2. GalvanometerComparison ofcapacitances
3. L- Owen'sbridge.
4. L-Anderson'sBridge.
5. L.Maxwell'sBridge.
6. L.Rayleigh'sBridge.
7. Spectrometer–Cauchy'sConstant.
8. Field alongthe axisofthe Coil.
9. SmallanglePrism.
10. CaryFoster'sbridge.
11. Mutual Inductance.
12. Absolute Capacityofcondenser.
13. Hallowprism.
14. BallisticGalvanometer
15. SolarSpectrum-Light wavelength.
16. SpotGalvanometer– ComparisonsofVoltmeter
17. SpotGalvanometer –Chargesensitivity
18. PotentiometerComparisons of EMF.

Text Books:

1. C.C.Ouseph,G.Rangarajan–ATextBookofPracticalPhysics-S.Viswanathanpublisher–partI,1990.
2. C.C.Ouseph,G.Rangarajan,R.Balakrishnan–ATextBookofPracticalPhysics-S.Viswanathanpublisher–partII.1996..
3. S.L.GuptaandV.Kumar–PracticalPhysics–PragatiPrakashan–25th,Edition2002.

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	Abletofabricatebridgesandmeasureinductance	K3
CO2	CompareEMFvalueusingpotentiometer	K4
CO3	Determinewavelengthsofvisible light	K4
CO4	Comparevoltmeterandchargesensitivityusingspot galvanometer	K3
CO5	DetermineCauchy's constant	K4

K1-Remember K2-Understand K3-ApplyK4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHE531	CHOICE -I	L	T	P	C
ELECTIVE-III		NUMERICALMETHODS	3	-	-	3

Objectives:
Tounderstandvariousapproximationmethodstofindsolutiontoproblemswhich don't haveexactsolutions.

UNITI: Errors andRootofEquations
What is Numerical analysis-numbers and their accuracy – errors-measurement of errors-round off error-truncation error-absolute error-relative error-percentage error-inherent error-accumulatederror-generalerrorformulae-convergenceRoots of equations-Iteration method-Maclaurin's series method-Newton-Raphson method-Von-MoisesFormula-Bisection method.

UNIT II: Matrix andLinearEquations
Introduction- pivotal condensation method- system of linear equations- Gauss EliminationMethod-Gauss Seidel Iteration Method-Gauss Jordan elimination method-Matrix Inversionmethod.

UNITIII: Interpolationand Approximation
LinearInterpolation–QuadraticInterpolation-Lagrange'sInterpolation–Richardson'sExtrapolation–Aitken'siteratedInterpolation

UNITIV:NumericalDifferentiation andIntegration
Numerical differentiation – approximation of derivatives using interpolation polynomials-Taylorseriesmethod. NumericalIntegration-trapezoidalrule-Simpson's1/3and3/8 rules

UNIT V:DifferentialEquations
Introduction-Euler'smethod(AdamsBashforthfirstordermethod)-backwardEulermethod-Taylor'sseriesmethod-Runge-Kuttamethod-predict or correctormethods

LearningOutcomes:
- Oncompletion ofthecoursethe students willhave the abilityto solve equation usinganappropriatenumericalmethod.

BooksforReference:

1. S.S.Sastry,Introductorymethodsofnumericalanalysis–PrenticeHallofIndia,NewDelhi,2000.
2. A.Singaravelu,Numericalmethods–MeenakshiAgency,Chennai,2001.
3. M.K.Venkataraman,NumericalMethodinScienceandEngineering–PHINewDelhi1997.
4. R.Murugesan,MechanicsandMathematicalMethods,S.Chand&Co,NewDelhi1999.
5. P.Kandasamy, K.Thilagavathy and K. Gunavathy, Numerical Methods,S.Chand&Co.(2002).

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	UnderstandbasicsofErrorsandRootof Equations	K2
CO2	SolveproblemusingMatrixandLinearEquations	K3
CO3	InterpretsNumericalDifferentiationandIntegration	K3
CO4	AbletoapplyDifferentialEquationsfordifferent problems	K4
CO5	EnhanceproblemsolvingskillusingInterpolationand Approximation	K2

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	2	3	3	2	2	1
CO2	3	3	3	3	2	2	3	3	2	2	1
CO3	3	3	3	3	2	2	3	3	2	2	1
CO4	3	3	3	3	2	2	3	3	2	2	1
CO5	3	3	3	3	2	2	3	3	2	2	1

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHE532	CHOICE -II	L	T	P	C
ELECTIVE-III		BASICINSTRUMENTATION	3	-	-	3

Objective

To make students skilled in using basic laboratory instruments to carry out their practicalandprojectin efficientmanner.

UNIT-I Basic of Measurement

Instrument's accuracy, precision, sensitivity, resolutionrangeetc.Errors in measurements and loadingeffects.

UNIT II Multimeter

Principles of measurement of dc voltage and dc current, ac volt- age,ac current and resistance.Specifications of a multimeter and their significance. ElectronicVoltmeter:Advantageoverconventionalmultimeterforvoltagemeasurementwithrespecttoinputimpedanceandsensitivity.Principlesofvoltage, measurement(block diagramonly).Specificationsofan electronic Voltmeter/multimeter andtheirsignificance.ACmillivolt meter:Type ofAC millivolt meters: Amplifier-rectifier,andrectifieramplifier.

UNIT-III Cathode Ray Oscilloscope

Block diagram of basic CRO. Construction of CRT,Electron gun, electrostatic focusing and acceleration (Explanation only no mathematicaltreatment), Time base operation, synchronization. Front panel controls. Specifications of aCROandtheirsignificance.UseofCROforthemeasurementofvoltage(dcandacfrequency,timeperiod.DigitalstorageOscilloscope:Blockdiagramandprincipleofworking.

UNIT-IV Signal Generators and Analysis Instruments

Block diagram, explanation andspecifications of low frequency signal generators, pulse generator, and function generator,Briefidea for testing, specifications, Distortion factormeter, waveanalysis.

UNIT-V Digital Instruments

Principle and working of digital meters, Comparison ofanalog and digital instruments, Characteristics of a digital meter, working principles ofdigital voltmeter. Digital Multimeter: Block diagram and working of a digital multimeter,workingprincipleoftimeinterval,frequencyandperiodmeasurementusinguniversalcounter/frequencycounter,time-basestability,accuracyandresolution.

Text Books:

1. B.L.Theraja,AText Book ofElectricalTechnology-(S.ChandPublishing),Volume 1, 1959.
2. Venugopal, Digital circuits and Systems, Tata McGraw Hill Education Private Limited,2011.

ReferenceBooks:

1. SubrataGhoshal,DigitalElectronics-BlueKingfisherpublishing, 24July2012
2. S. Salivahanan and N. S.Kumar, Electronic Devices and Circuits - (Tata Mc-GrawHill),2011.
3. Thomas L.Floyd,ElectronicDevices-(PearsonEducation),2013.

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	Understand CRO as aversatile measuringdevice	K2
CO2	Learntotracecircuits ofelectronicequipment's	K2
CO3	UseDigital multimeter/VTVMtomeasurevoltages	K3
CO4	Applyknowledge to troubleshoot the circuit	K3
CO5	Skilledinwindingacoil /transformer	K4

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	2	3	3	3	3	3	3	3
CO2	3	3	2	2	3	3	3	3	3	3	3
CO3	3	3	2	2	3	3	3	3	3	3	3
CO4	3	3	2	2	3	3	3	3	3	3	3
CO5	3	3	2	2	3	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weaklycorrelating(W)	1
No correlating (N)	0

COURSE CODE	U21PHS531	CHOICE -I	L	T	P	C
SKILLBASED ELECTIVE-III		MICROPROCESSORFUNDAMENTALS	2	-	-	2

Objective:
Thiscoursedealswiththebasicconceptsofmicroprocessor,programminginstructionsandinterfacingconcepts.

Unit1:Architecture
Architectureof8085–registers,flags,ALU,addressanddatabus,demultiplexingaddress/data bus – control and status signals – control bus, Programmer's model of 8085 –Pinout diagram– Functions of different pins.

Unit2:ProgrammingTechniques
Instruction set of 8085 – data transfer, arithmetic, logic, branching and machine controlgroup of instructions – addressing modes – register indirect, direct, immediate and impliedaddressing modes. Assembly language & machine language – programming techniques:addition,subtraction,multiplication,division,ascending,descendingorder,largestandsmallest(single byte)

UNIT3:Interfacingmemoryto8085
Memory interfacing – Interfacing 2kx8 ROM and RAM, Timing diagram of 8085 (MOVRd,Rs – MVIRd,data.

Unit4:InterfacingI/OPorts to8085
Interfacinginputportandoutputportto8085–Programmableperipheralinterface8255–flashing LEDs.

Unit5: Interrupts
Interruptsin8085-hardwareandsoftwareinterrupts–RIM,SIMinstructions–priorities–simplepolledand interrupt-controlled data transfer.

Text Books:

1. R.S.Gaonkar, MicroprocessorArchitectureprogrammingand applicationwith8085/8080A., WileyEasternLtd. 1992.
2. V.Vijayendran,FundamentalofMicroprocessor8085,S.ViswanathanPublishers,Chennai,2003.
3. B.Ram, Fundamentals of Microprocessors and Microcomputers - DhanpatRaipublication2012.

CourseOutcomes (CO):

CO	Learning outcome	Remarks
CO1	Knowthebasicideasonmicroprocessor,memoryand I/Odevices	K2
CO2	Familiarwiththebasicconceptsofmicroprocessorarchitectureand interfacing	K2
CO3	Acquireskillsintheprogramminginstructionsetsof microprocessors	K4
CO4	Acquireskills in interrupts	K2
CO5	Applytheprogramminginstructionstoperformsimpleprograms usingmicroprocessor	K2

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	2	1	3	3	3	3	3
CO2	3	3	2	3	2	1	3	3	3	3	3
CO3	3	3	2	3	2	1	3	3	3	3	3
CO4	3	3	2	3	2	1	3	3	3	3	3
CO5	3	3	2	3	2	1	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHS532	CHOICE -II	L	T	P	C
SKILLBASED ELECTIVE-III		TELEVISION TRANSMISSION &RECEIVER	2	-	-	2

Objective

Thecoursedealswiththeoreticalandpracticalknowledgeon TVfunctioninganditsservicingskillare incorporated.

UNIT–I:Elementsof aTelevisionSystem:

Picture transmission – sound transmission – picture reception – sound reception – picturesynchronization–Basicmonochrometransmitterandreceiver– grossstructure,imagecontinuity, number of scanning lines, flicker, fine structure, total gradation – compositevideosignal–horizontalsynchronizationdetails– verticalsynchronizationdetails–function ofvertical pulsetrain.

UNIT– II:Signal Transmission:

AM: Channel band – vestigial side band transmission – transmission efficiency – completechannel band width – reception of vestigial side band signals - demerits of vestigial sidebandtransmission–FM:FMChannelbandwidth–channelbandwidthforcolourtransmission– Televisionsignalstands–monochromepicturetube–beamdeflectionscreen phosphorfaceplate-picture tubecharacteristics – picturetubecircuit controls.

UNIT–III:Camera:

Cameraprinciple–photoelectriceffect–imagestorageprinciple–electronscanningbeam – video signal electron multiplier – image orthicon – vidicon – plumbicon – CCD. TVreceiver Block diagram-antenna-RF section – IF section – vestigial side band correction –choice of IF – sound separation – sound section – sync processing – vertical deflection – EHTsupply.

UNIT – IV:ColourTelevision:

Compatibility – natural light – colour perception – three colour theory – luminance, Hue andsaturation–colourTVcamera–luminancesignal–productionofcolourdifferencevoltage – compatibility considerations – Delta gun picture tube – purity and convergence PIL colourpicturetubepin cushioncorrection- AutoDegaussingcircuit– greyscale tracking.

UNIT –V:Televisionapplications:

Cable television MATV & CATV – closed circuit (CCTV) theatre television – Video taperecordingplayback– Televisionviasatellite.Faultfinding:Troubleshootinginmonochromereceivers.

TEXTBOOK:

1. R.R.Gulati, Monochromeand ColourTelevision, WileyEastern22nd Reprint (1983).

CourseOutcomes (CO):

CO	Learning outcome	Remarks
CO1	Learnaboutcomponentspresent inTVsystem	K1
CO2	DifferentiateAMandFMChannelband	K3
CO3	GainknowledgeaboutdifferenttypesofCamera	K2
CO4	Acquireknowledgeabout colour television	K3
CO5	Analyzethe transmissionofTV usingdifferentmedia	K4

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	2	3	3	3	3	3	3	3	3
CO2	3	3	2	3	3	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	3	3	3	3
CO4	3	3	2	3	3	3	3	3	3	3	3
CO5	3	3	2	3	3	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

SEMESTER-VI

COURSE CODE	U21PHT61	RELATIVITY AND QUANTUMMECHANICS	L	T	P	C
CORE - XIII			5	-	-	4

Objectives:
The aim of this course is to acquire sufficient knowledge in the concept ofRelativity, dualnature of matter waves,Evolution of Quantummechanics,Schrodinger equation and itsapplicationsand Operator formalism

UnitI:Relativity
Framesofreference-Galileantransformation-Michelson-Morleyexperiment-Postulatesof special theory of relativity - Lorentz transformation –lengthContraction – time dilation - Relativity of simultaneity - addition of velocities -variation of mass with velocity– Massenergyrelation –Elementaryideas ofgeneralrelativity.

UnitII:Wave Natureof Matter
Phase and group velocity - wave packet - expression of De Brogile's wave length- Davissonand Germer's experiment - G.P.Thomson's experiment - Heisenberg'suncertainty principleandits consequences.

UnitIII:SchrodingerEquation
Inadequacy of classical mechanics - Basic postulates of quantum mechanics – Schrodingerequation - Properties of wave function - Probability interpretationof wavefunction – linearoperators - selfadjoint operators- expectationvalue –Eigenvalues andEigenfunctions –commutativityand compatibility.

Unit IV:AngularMomentuminQuantumMechanics
Orbital angular momentum operators and their commutation relations -separation of threedimensional Schrodinger equation into radial and angularparts - Elementary ideas of spinangularmomentum of an electron –Paulimatrices.

UnitV: Solutions of SchrodingerEquation
Free particle solution - Particle in a box - Potential well of finite depth (onedimension) – linearharmonic oscillator – rigidrotatorand hydrogenatom.

Text Books:
1.ATextbookofQuantummechanicsbyP.M.MathewsandS.Venkatesan,TataMcGraw-Hill,New Delhi(2005).
2. QuantumMechanics by V.K.Thankappan,NewAgeInternational(P)Ltd.Publishers,NewDelhi(2003).
3.QuantummechanicsbyK.K.ChopraandG.C.Agrawal,KrishnaPrakasamMedia(P)Ltd.,MeerutFirst Edition(1998).
4. ModernPhysicsbyR.Murugeshan andKiruthigaSivaprasath, S.Chand&Co.,(2008).

BooksforReference:
1. Mechanicsand RelativitybyBrijlalSubramanyam, S.Chand&Co.,NewDelhi,(1990).

2. Concepts of modern physics by A.Beiser. Tata McGraw - Hill,5th edition,NewDelhi(1997).
3. Introductiontoquantum mechanicsbyPauling andWilson, McGraw–Hill(1935).
4. QuantummechanicsbyA.GhatakandLoganathanMacmillanIndiaPvt.Ltd(2012).

CourseOutcomes(CO):

CO	Learningoutcome	Remarks
CO1	Gainknowledge in theconceptsofspecial and theoryof relativity	K1
CO2	Evolve ideasabout dualnature ofmatter	K2
CO3	UnderstandaboutSchrodinger equation	K2
CO4	Learnaboutdifferentoperatormechanism	K2
CO5	ApplyofSchrödinger'sequationto micro system	K3

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	2	3	3	3	3	2
CO2	3	3	3	3	2	2	3	3	3	3	2
CO3	3	3	3	3	2	2	3	3	3	3	2
CO4	3	3	3	3	2	2	3	3	3	3	2
CO5	3	3	3	3	2	2	3	3	3	3	2

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHT62	SOLIDSTATE PHYSICS	L	T	P	C
CORE - XIV			5	-	-	4

Objective:

- To understand the different types of bondingin solids
- Tounderstandthemagneticanddielectricproperties ofcrystallinestructures.
- To acquire knowledge on the basics of magnetic phenomena on materials and varioustypesof magnetizations.
- Toknow the propertiesof superconducting materials.

UNITI:CrystalStructure

CrystalLattice-Primitiveandunitcell-sevenclassesofcrystal-Bravais Lattice-Miller Indices - Structure of crystals -Simple cubic, Face centeredcubic, Body centered cubic and Hexagonal close packed structure -Sodium Chloride, ZincBlendeand Diamond Structures.

UNIT II: Crystal Diffraction and Defects

Crystal Diffraction – Bragg's Law-Experimentalmethods-Laue method, powder method and rotating crystal method-Reciprocal lattice- Pointdefects - Frenkel and Schottky defects - Equilibrium concentrations - Line defects – Edgedislocation and screw dislocation - Surface defects - Grain boundary - Effects of Crystalimperfections

UNITIII:BondinginSolids

Typesofbondsincrystals-Ionic,covalent,Metallic,Vander Waal's and Hydrogen Bonding - Bond energy of sodium chloride molecule –variationof inter atomic force with inter atomic spacing -cohesive energy - cohesive energy of ionicsolids-application to sodium chloride crystal.

UNITIV:MagneticProperties

SpontaneousMagnetization–WeissTheory–TemperaturedependenceofMagnetization-classicalTheoryofDiamagnetism–WeisstheoryofParamagnetism–Ferromagneticdomains–Blochwall–Basicideasofanti-ferromagnetism–Ferrimagnetism.

UNIT V: Dielectric Properties

Dielectrics, polarization, polar and non-polar dielectrics–dielectricconstant,PolarizabilityClausiusMossottirelation–DifferenttypesofPolarization – electronic, ionic, orientational, space charge –Dependence of polarization onfrequency and temperature; Dielectric loss sources; Dielectric strength and break-down–contributing

Text Books:

1. M.Arumugam,MaterialsScience,Anuradha Agencies,Publishers.,2002.
2. RLSinghal, SolidStatePhysics,Kedarnath RamNath&Co.,Meerut 2003.
3. Kittel,Introductionto SolidStatePhysics, WilleyEasternLtd.2003.
4. V.Raghavan, Materials Science and Engineering, Prentice Hall of IndiaPrivateLimited, NewDelhi, 2004.

BooksforReference:

1. S.O.Pillai,Solid StatePhysics,NewAgeInternational(P)Ltd.,2002.
2. A.J.Dekker,SolidStatePhysics, MacmillanIndia,1985.
3. HCGupta, SolidState Physics,Vikas PublishingHouse Pvt.Ltd., NewDelhi,2001.

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	Understandabout different crystal structure	K1
CO2	Analyzestructureofdifferentcrystallinematerialand defects	K4
CO3	Abletoknowabouttheinteratomicforcesandbonds betweensolids	K2
CO4	Analyzethevariouskindsofmagnetic materials	K4
CO5	Understandthedielectricpropertiesofcrystalline structures.	K2

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	2	3	3	3	3	3
CO2	3	3	3	3	2	2	3	3	3	3	3
CO3	3	3	3	3	2	2	3	3	3	3	3
CO4	3	3	3	3	2	2	3	3	3	3	3
CO5	3	3	3	3	2	2	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHT63	MATHEMATICAL PHYSICS	L	T	P	C
CORE - XV			5	-	-	4

Objective:
Tounderstand the various mathematicalmethods used in Physics.

UNIT1:Vectors
Vectors and scalars-Vector algebra-The scalar product-The vector (cross or outer) product-Thetriplescalar product-The triplevector product-The linearvectorspaceVn-Vectordifferentiation -Space curves - Motion in a plane - A vector treatment of classical orbittheory - Vector differential of a scalar field andthe gradient- Conservative vector field - The vector differential operator - Vector differentiation of a vector field - The divergence ofavector- Theoperator∇^2, theLaplacian- Thecurl of a vector.

UNIT2:DifferentialEquation
First-order differential equations - Separable variables -Exact equations Integrating factors - Bernoulli's equation- Second-order equationswith constant coefficients - Nature of thesolution of linear equations - General solutions of the second-order equations - Finding thecomplementary function - Finding the particular integral - Rules for D operators - The Eulerlinearequation - Solutions in powerseries.

UNIT3:Matrix
Definition of a matrix - Four basic algebra operations for matrices - Equality of matrices - Addition of matrices - Multiplication of a matrix by a number - Matrix multiplication - Thecommutator-Powersofamatrix-Functionsofmatrices-transposeofamatrix-Symmetric and skew-symmetric matrices - The matrix representation of a vector product -The inverse of a matrix - A method for finding A-1 - Systems of linear equations and theinverseofamatrix-Complexconjugateofamatrix-Hermitianconjugation-Hermitian/anti-Hermitianmatrix-Orthogonal matrix(real)- Unitary matrix- Rotationmatrices- Trace ofa matrix.

UNIT 4: LaplaceTransformation
Definition of the Laplace transform - Existence of Laplace transforms - Laplace transformsofsomeelementaryfunctions-Shifting(ortranslation)theorems-Thefirstshiftingtheorem - The second shifting theorem - The unit step function - Laplace transform of aperiodic function - Laplace transforms of derivatives - Laplace transforms of functionsdefined byintegrals – Anote on integraltransformations.

UNIT5:PartialDifferential Equations
Linearsecond-orderpartialdifferentialequations-SolutionsofLaplace'sequation:separationofvariables-Solutionsofthewaveequation:separationofvariables-Solutionof Poisson's equation. Green's functions - Laplace transform solutions of boundary-valueproblems

Text Books:
1. MathematicalMethodsforPhysicists:Aconciseintroduction,-TAIL.CHOW–CambridgeUniversityPress 1995.

Books forReference:

1. Piyoosh KumarTyagi, MathematicalPhysics- RBSAPublishers2018
2. SatyaPrakash-MathematicalPhysics-SultanChand &Co: 2021
3. R.Murugesan-Mechanics and MathematicalPhysics - Sultan Chand&Co: 2014
4. Gupta-MathematicalPhysics-Sultan Chand & Co: 2014

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	Abletoapplyvectorandscalaroperatorindifferent applications	K3
CO2	Understanddifferent orders ofdifferential equation	K2
CO3	AbletoapplyMatrixandfunctionsofmatricesin differentproblems.	K4
CO4	Enhanceproblem solving skillusing Laplace transform	K3
CO5	SolvedifferentproblemsusingPartialDifferential equations	K4

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	2	3	3	3	3	2
CO2	3	3	3	3	2	2	3	3	3	3	2
CO3	3	3	3	3	2	2	3	3	3	3	2
CO4	3	3	3	3	2	2	3	3	3	3	2
CO5	3	3	3	3	2	2	3	3	3	3	2

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHT64	NANOPHYSICS	L	T	P	C
CORE - XVI			5	-	-	4

Objectives:

- To create thebasicknowledgeinnano materials.
- Tounderstand the scientificperspectiveof nanomaterials.
- Toidentifythetechniquessuitablefornanomaterial synthesis.
- Toknow the significanceofnanomaterials.

UNIT I: Nano Materials

History of Nanotechnology- Nanostructures- synthesis of oxidenanoparticles-Synthesisofsemiconductornanoparticles-Synthesisofmetallicnanoparticles

UNITII:QuantumHeteroStructure

Superlattice-preparationofQuantumnanostructure- Quantum well laser-Quantum cascade laser-Quantum wire- Quantum dot-Application ofQuantumdots.

UNIT III : Carbon Nano tubes

Discovery of Nanotubes- Carbon Allotropes- Types ofcarbonNanotubes–Graphenesheettoasinglewallednanotube-ElectronicstructureofCarbonNanotubes-Synthesis of Carbon Nanotube.

UNIT IV: Application of Nanotechnology I

Nanocrystalline soft material- Permanentmagnetmaterial-Theoreticalbackground-Superparamagnetism-Coulombblockade-QuantumcellularAutomata.

UNITV:ApplicationofNanotechnologyII

ChemistryandEnvironment–Energyapplicationsofnanotechnology-InformationandCommunication – HeavyIndustry – Consumergoods-Nanomedicine-Medicalapplication of Nanotechnology

Text Books:

1. Textbook ofNanoscienceand Nanotechnology– B. S. Moorthy, P. Sankar,Baldev Raj, B.B. Rathand James MurdyUniversityPress –IIM(2013).
2. Nanophysics,Sr.GeradinJayam,HolyCrossCollege,Nagercoil (2010).

BooksforReference:

1. ‘Nanoscience and Nanotechnology: Fundamentals to Frontiers’, M.S. RamachandraRao,ShubraSingh, WileyIndiapvt.Ltd., NewDelhi(2013).
2. ‘NanotheEssentials’- T. Pradeep, TataMc.Graw Hill companyLtd(2007)
3. ‘TheChemistryofNano materials :Synthesis,Propertiesand Applications’,Volume1 C. N. R. Rao,A. Mu¨ller, A.K. Cheetham, ,Germany(2004).

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	Identify the Nanoparticles andapplyphysicsconceptstothenano–scaleandnanocontinuumdomain.	K4
CO2	IdentifytheQuantumheterostructureandacquirethe knowledgein applicationof Quantumdots	K4
CO3	Understandsabout Nanotubes, Allotropes and its structureand synthesis	K2
CO4	Acquiresknowledgeaboutthe Nanocrystallinesoftmaterials, Super-paramagnetism, Quantum cellular automata	K2
CO5	ApplyNanotechnologyin differentfields	K3

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	3	3	3	2	3	3	3
CO2	3	2	2	3	3	3	3	2	3	3	3
CO3	3	2	2	3	3	3	3	2	3	3	3
CO4	3	2	2	3	3	3	3	2	3	3	3
CO5	3	2	2	3	3	3	3	2	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHP64	PRACTICAL-IV	L	T	P	C
CORE-XVII			-	-	5	4

Objective:
Provideopportunityforstudentstolearnaboutbasicconceptsofelectronicsthroughpracticalsettingse.g.testconductors,insulatorsandsemiconductorsfortheirvariouspropertiesandcharacteristics.

ANYFOURTEEN

1. Zenerdiode Characteristics.
2. TransistorCharacteristics – CE mode.
3. Singlestageamplifier.
4. Twostageamplifier –withoutfeedback.
5. LC–IIfilters.
6. Clippersand clampers usingdiode and CRO.
7. ConstructColpitts'sOscillatorandmeasureitsfrequency.
8. ConstructHartleyoscillator andmeasureits frequency.
9. UJT relaxation oscillator.
10. Voltagedoubler.
11. ConstructDual powersupplyusing–IC 7812 andIC 7912.
12. Astable multivibratorusingtransistors.
13. Monostable multivibrator usingtransistors.
14. Bistablemultivibrator – RS flip flop (transistors).
15. Op-ampIC741–characteristics.
16. Op-ampIC741–differentiatorandintegrator.
17. Op-ampIC741–adderandsubtractor.
18. ConstructLogic Gates–usingdiscrete components.
19. XORandXNORgates–usingIC'sandverifytheir truthtable.
20. VerificationofDemorgan'stheorem
21. DesignofHalf adder and Full adder.
22. DesignofHalfsubtractor andFull subtractor.

TEXT BOOKS:

1. AdrianC.Melissions, JimNapolitano,Experiments in ModernPhysics, 2003.
2. PaulB.ZbarandAlbertB.Malvino,BasicElectronics(AText–LabManual),TataMcGrawHill, Edition,5.Publisher,1983.
3. A.P.Malvino,Electronics,Cybergear,2010.
4. JohnMorris,AnalogElectronics,Import,1999.

CourseOutcomes(CO):

CO	Learning outcome	Remarks
CO1	DesignHalfand Fullsubtractor	K3
CO2	Studythecharacteristicsofdiodeand transistor	K4
CO3	Analyzearithmeticaloperation usingOP-Amp	K4
CO4	Constructoscillatorandmultivibratoranddetermine itsfrequency.	K3
CO5	VerifyDemorgan's theorem	K4

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHE641	CHOICE -I	L	T	P	C
ELECTIVE-IV		ASTROPHYSICS	3	-	-	3

Objective:
Tounderstand the basicsabout the universal bodiesand other objectin the universe.

Unit 1: **Birth of Modern Astronomy**
Geocentric and Heliocentric theories – Kepler'slaws of planetary motion – Newtonian gravitation – Celestial sphere – Planets – Terrestrialand Jovian planets (Planets individual description is not required in detail) - Asteroids-Meteorites –Comets.

Unit 2: Telescopes
Elements of telescope – Properties of images – Types of Opticaltelescopes– RefractingandReflectingtelescopes-Radiotelescope–Spectrograph–Limitations – Photographic photometry – Photoelectric photometry – Spectrophotometry –Detectorsand imageprocessing.

Unit3:Sun–Physicalproperties
Composition–Core–NuclearReactions–Photosphere–Chromospheres–Corona–Sunspots– Sunspotcycle–SolarWind–Auroras – space weather effects – History of the Earth – Temperature of a planet – Theatmosphere–PressureandTemperaturedistribution– Magnetosphere–Eclipses–SolarandLunarEclipses.

Unit4:ClassificationofStars
TheHarvardClassificationsystem–LuminosityofaStarHertzsprung-Russel Diagram – Stellar evolution using the HR diagram – Theoreticalevolution of stars – White Dwarfs – Neutron Stars-Black holes – Event horizon – BasicphysicsofBlack Holes.

Unit5:Galaxynomenclature
TypesofGalaxies–Spiral–Elliptical–irregulargalaxiesMilky Way Galaxy and its structure – Rotation and Mass Distribution – Rotation curveand Doppler shift – Star clusters – Galactic clusters – Pulsars – Cosmological Models – Bigbangtheory– Steadystate theory– Hubble'slaw –Olber'sparadox.

Text Books:
1. Niclolas. A. Pananides and Thomas Arny, Introductory Astronomy, Addison WesleyPubl.Co., 1979.
2. A.MujiberRahman,Conceptsto Astrophysics, ScitechPublications,Chennai, 2018.

BooksforReferences:
1. Abell, Morrison and Wolf, Exploration of the Universe, 5th ed., Saunders College Publ.1987,
2. Carrol and Ostlie, Introduction to Modern Astrophysics, 2nd ed., Pearson International.2007

CourseOutcomes (CO):

CO	Learning outcome	Remarks
CO1	Assessthedesignofphysicalnatureofcelestialbodiesthrough co-ordinates ofspaceandtime	K2
CO2	Applyvariousopticalinstrumentsandexploretheobservable universe	K3
CO3	UnderstandaboutStructureandpropertiesofSunandEarth.	K2
CO4	Relate to the stellar observations, the properties, theirenvironmentandeventhepresenceofplanetswithappropriate theories.	K3
CO5	Evaluatethestructureofmilkywaygalaxyandallitscontents withcosmologyforthestudyofthecharacter andevolutionoftheuniverse.	K3

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	2	3	3	3	3	3	3
CO2	3	3	1	3	2	3	3	3	3	3	3
CO3	3	3	1	3	2	3	3	3	3	3	3
CO4	3	3	1	3	2	3	3	3	3	3	3
CO5	3	3	1	3	2	3	3	3	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHE642	CHOICE -II	L	T	P	C
ELECTIVE-IV		ATMOSPHERIC PHYSICS	3	-	-	3

Objective:
This paper aims to describe the characteristics of earth's atmosphere and also its dynamics.Atmospheric waves along with the basic concepts of atmospheric Radar andLidar arediscussedin detail.

UnitI:GeneralfeaturesofEarth'satmosphere
ThermalstructureoftheEarth'sAtmosphere,Compositionofatmosphere,Potentialtemperature,AtmosphericThermodynamics, Greenhouse effect, Local winds, monsoons, fogs, clouds, precipitation,Atmosphericboundarylayer, Seabreeze and landbreeze.

Unit II: Atmospheric Dynamics
Scale analysis, Fundamental forces, Basic conservationlaws, The Vectorial form of the momentum equation in rotating coordinate system, scaleanalysisofequationofmotion,Applicationsofthebasicequations,Circulationsandvorticity, Atmosphericoscillations, annualand semi-annual oscillations.

Unit III: Atmospheric Waves
Surface water waves, wave dispersion, acoustic waves,buoyancy waves, propagation of atmospheric gravity waves (AGWs) in a non-homogeneousmedium, Lamb wave, Rossby waves and its propagation in three dimensions and in shearedflow,waveabsorption, non-linear consideration

UnitIV:AtmosphericRadarandLidar
Radarequationandreturnsignal,Signalprocessinganddetection,Varioustypeofatmosphericradars,Applicationsofradarstostudyatmospheric phenomena,Lidarand itsapplications,

Unit V: Atmospheric Aerosols
Spectral distribution of the solar radiation, Classificationand properties of aerosols, Production and removal mechanisms, Concentrations and sizedistribution, Radiative and health effects, Observational techniques for aerosols, Absorptionandscatteringof solarradiation, Rayleighscatteringand Mie scattering.

Text Book
1. FundamentalofAtmosphericPhysics,M.LSalby;Academic Press,Vol61,1996
UnitI-V

BookforReference
1. The Physics of Atmosphere – John T. Houghton; Cambridge University press; 3rd edn.2002.
2. AnIntroductionto dynamic meteorology– JamesRHolton; AcademicPress,2004
3. Radar for meteorological and atmospheric observations – S Fukao and K Hamazu,SpringerJapan, 2014

CourseOutcomes (CO):

CO	Learning outcome	Remarks
CO1	Understandthecharacteristicofearth'satmosphere	K2
CO2	Studyabout thefundamentalforcesandconservation laws governingthe earth	K2
CO3	Acquireknowledgeabout atmosphericwaves	K2
CO4	Usetheradartheoryindataanalysisandtool techniques	K4
CO5	Evaluatetheapplicationofaerosols	K5

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	3	2	3	3	2	3	3	2
CO2	3	2	2	3	2	3	3	2	3	3	2
CO3	3	2	2	3	2	3	3	2	3	3	2
CO4	3	2	2	3	2	3	3	2	3	3	2
CO5	3	2	2	3	2	3	3	2	3	3	2

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weaklycorrelating(W)	1
No correlating (N)	0

COURSE CODE	U21PHS641	CHOICE -I	L	T	P	C
SKILLBASED ELECTIVE-IV		PROBLEMS SOLVING SKILLS INPHYSICS	2	-	-	2

Objective:
Mainobjectiveofthiscourseistomakethestudenttosolveproblemsincorephysics.Minimumof20 problems based on variousprinciples of Physics arerequired ineach unit.

Unit1: Problemsin Mechanics
Newtonlawsofmotionforvarioussystems(1,2and3dimension),Conservationlawsandcollisions, Rotational mechanics,centralforce,Harmonicoscillator, specialrelativity

UnitII:ProblemsinThermal Physics
Kinetictheory – MBdistribution-Lawsofthermodynamics–IdealGaslaw-VariousThermodynamic process - Entropy calculation for various process-Heat engine-TS and PVdiagram-Freeenergies various relations

UnitIII:ProblemsinElectricity&Magnetism
Electrostatics- calculation of Electrostatic quantities for various configurations-Conductors,Magnetostatics-CalculationofMagneticquantitiesforvariousconfiguration,Electromagneticinduction, Poyntingvector, Electromagnetic waves.

UnitIV: Problemsin Quantummechanics
Origin of Quantum mechanics- Fundamental Principles of Quantum mechanics-potentialwellsand harmonic oscillator-Hydrogen atom.

UnitV: ProblemsinGeneral Physics& Mathematics
Plotting the graphs for various elementary and composite functions-Elasticity- Viscosity andsurfacetension-fluids-Buoyancy-pressure-Bernoulli'stheoremapplications-wavesandoscillations,Errorsand propagation oferrors.

Text books

1. Charles Kittel, Walter D knight, Mechanics (in SI units) (Berkeley Physics course-volume1), Tata McGrawHill Publication, Second Edition (2007).
2. S.C.Garg, RM Bansal&CK Ghosh, Thermal Physics, Tata McGraw Hill Publications, 1stEdition (2013).
3. E.M. Purcell, Electricity & Magnetism (in SI units), Tata McGraw Hill Publication, 2ndEdition (2016).
4. N.Zettili, Quantum Mechanics, WileyPublishers, Second Edition (2009).
5. David. J.Griffith, Introduction to Quantum Mechanics, Pearson Publications, Secondedition (2015).
6. Halliday&Resnick,Fundamentals ofPhysics,WileyPublications, 8thEdition (2007).

CourseOutcomes (CO):

CO	Learning outcome	Remarks
CO1	Developproblem solving skill in mechanics	K3
CO2	Applythermodynamicsprincipletosolveentropy relatedproblem	K3
CO3	Determineelectrostatic quantitiesusingtheorem	K4
CO4	Developproblemsolvingin QuantumMechanics	K3
CO5	To appear for research oriented competitive examinations	K3

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	2	2	3	2	3	3	2
CO2	3	3	3	3	2	2	3	2	3	3	2
CO3	3	3	3	3	2	2	3	2	3	3	2
CO4	3	3	3	3	2	2	3	2	3	3	2
CO5	3	3	3	3	2	2	3	2	3	3	2

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

COURSE CODE	U21PHS642	CHOICE -II	L	T	P	C
SKILLBASED ELECTIVE-IV		WEATHERFORECASTING	2	-	-	2

Objective:
The aim of this course is to impart theoretical knowledge and develop an awareness andunderstanding regarding the causes and effects of different weather phenomenon and basicforecastingtechniques

UnitI:Introductionto atmosphere
Elementary idea of atmosphere: physical structure and composition; compositional layeringoftheatmosphere;variationofpressureandtemperaturewithheight;airtemperature;requirements to measure air temperature; temperature sensors: types; atmospheric pressure:itsmeasurement; cyclones andanticyclones: itscharacteristics.

UnitII:Measuring the weather
Wind; forces acting to produce wind; wind speed direction: units, its direction; measuringwind speed and direction; humidity, clouds and rainfall, radiation: absorption, emission andscatteringin atmosphere;radiation laws.

Unit III: Weather systems
Globalwindsystems;airmassesandfronts:classifications;jetstreams;localthunderstorms;tropicalcyclones: classification; tornadoes; hurricanes.

Unit IV: Climate and Climate Change
Climate: its classification; causes of climate change; global warming and its outcomes; airpollution;aerosols,ozonedepletion, acidrain, environmental issues relatedto climate.

UnitV:Basicsofweather forecasting
Weather forecasting: analysis and its historical background; need of measuring weather;types of weather forecasting; weather forecasting methods; criteria of choosing weatherstation; basics of choosing site and exposure; satellites observations in weather forecasting;weathermaps; uncertaintyand predictability; probabilityforecasts.

Text Book:
1. AviationMeteorology,I.C. Joshi,Himalayan Books,3rdedition2014.
2. TheWeather ObserversHand book, StephenBurt, Cambridge UniversityPress, 2012.

Referencebooks:
1. Meteorology,S.R.Ghadekar,AgrometPublishers,Nagpur,2001.
2. TextBookofAgrometeorology,S.R. Ghadekar,AgrometPublishers,Nagpur, 2005.
3. AtmosphereandOcean,JohnG. Harvey,TheArtemisPress, 1995.

CourseOutcomes(CO):

CO	**Learning outcome**	**Remarks**
CO1	Learn elementary ideas about atmosphere i.e., temperature,cycloneetc.	K1
CO2	Understandaboutweathermeasurement	K2
CO3	GainKnowledgeaboutclimaticchange	K2
CO4	Acquireideas aboutweathersystem	K2
CO5	Analysisonweatherforecasting	K4

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

OutcomeMapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	3	2	3	3	2	3	3	3
CO2	3	3	1	3	2	3	3	2	3	3	3
CO3	3	3	1	3	2	3	3	2	3	3	3
CO4	3	3	1	3	2	3	3	2	3	3	3
CO5	3	3	1	3	2	3	3	2	3	3	3

Correlating	Marks
Stronglycorrelating(S)	3
Moderatelycorrelating(M)	2
Weeklycorrelating(W)	1
Nocorrelation(N)	0

NON-MAJORELECTIVE(NME)

OURSE CODE	U21PHN311	CHOICE -I	L	T	P	C
SEMESTERIII		HOUSEHOLDAPPLIANCES	2	-	-	2

OBJECTIVE

To understand the working principles of different household domestic appliances and torepairtheelectricalappliances for thegeneraltroubleshoots and wiring faults.

UNIT-I

Voltage, Current, Resistance, Capacitance, Inductance, Electrical conductors and Insulators,Ohm'slaw,Seriesandparallelcombinationsofresistors,Galvanometer,Ammeter,Voltmeter,Multimeter,Transformers,Electricalenergy,Power,Kilowatthour(kWh),consumptionof electrical power

UNIT-II

Direct current and alternating current,RMS and peak values, Power factor, Single phase andthree phase connections, Basics of House wiring, Electric shock, First aid for electric shock,Overloading, Earthing and its necessity, Short circuiting, Fuses, MCB, ELCB, Insulation,Inverter,UPS

UNIT-III

Principles of working, parts and servicing of Electric fan, Electric Iron box, Water heater;Induction heater, Microwave oven; Refrigerator, Concept of illumination, Electric bulbs,CFL,LEDlights, Energyefficiencyinelectricalappliances,IS codes& IEcodes.

UNIT IV

1. Studyingtheelectricalperformanceandpowerconsumptionofagivennumberofbulbsconnectedin series and parallel circuits.
2. MeasuringparametersincombinationalDCcircuitsby applyingOhm’sLawfordifferentresistorvalues and voltage sources
3. Awarenessof electricalsafetytools andrescueofpersonin contactwithlive wire.
4. CheckingthespecificgravityofleadacidbatteriesinhomeUPSandtopping-upwithdistilled water.
5. IdentifyingPhase,Neutraland Earthonpowersockets.

UNIT V

1Identifyingprimaryandsecondarywindingsandmeasuringprimaryandsecondaryvoltagesin various typesoftransformers.
2. Observingthe working of transformer underno-loadand full load conditions.
3. Observingthe responseof inductorandcapacitorwithDCand ACsources.
4. Observingthe connections ofelements and identifycurrent flowand voltagedrops.
5. Studyingelectricalcircuit protectionusingMCBs,ELCBs

Text Books:

1. B.L.Theraja, A.K. Theraja, A Text book on Electrical Technology, S.Chand&Co.,Reprint (2018)
2. M.G.Say,ThePerformanceandDesign ofAlternatingCurrentMachines,2002

COURSE CODE	U21PHN311	CHOICE -II	L	T	P	C
SEMESTER III		HOW THINGS WORK	2	-	-	2

OBJECTIVES

The Course aims to give the basic function of domestic Appliance, Music Instruments ,Aircraft&Camera.

UNITI:DOMESTICAPPLIANCES

Electric bell - Door locks - Fans, Blowers and Centrifugal compressors - Refrigerator – Airconditioning - Vacuum cleaner - Sewing machine - Flat iron- Tape recorder – Washingmachine–Fuse

UNITII:LIGHTANDMUSIC

Compact Fluorescent lamp - Incandescent lamp - Colour television - Pianoforte - Piano toneand tuning-Accordion -Electric organ- Electronicmusic.

UNITIII:METALLURGY

Powder metallurgy - Forging - Cutting and machining of metals - Pressure welding – Fusionwelding-Soldering –Metalspraying.

UNITIV:AIRCRAFT

Present day method of aircraft construction - Airfoils and airflow - Wind tunnel – Hydraulicpowersystem – Verticaltakeoffand landingaircraft (VTOC).

UNIT V:CAMERA

Cameras: General Introduction - Focal length and size of image - Interchangeable lenses - Diaphragm shutters - Depth of field - Range finder - Video camera - Projectors – Colorphotography.

TEXT BOOK

1. TheUniversalEncyclopediaofMachines – HowThingsWork1&2 – HarperCollinsPublishersIndia-VolumeI, 1992.

COURSE CODE	U21PHN421	CHOICE -I	L	T	P	C
SEMESTER IV		DIGITALPHOTOGRAPHY	2	-	-	2

Objective:
Tounderstandthefunctionandbasicconceptofdigitalcamera,Photographyandediting.

UnitI: IntroductiontoDigitalPhotography
Understandingfilmandpaperphotography – Learningaboutthedigitalrevolution-Advantages and disadvantages of digital photography over film photography - Computers asphotographictools

Unit II DigitalBasics
Digital image method of storing and processing digital image: Raster and Vector method - Representation of digital image: Resolution – Pixel Depth – Pixel Aspect Ratio – DynamicColourRange–FileSize–ColourModels–ImageCompression–FileFormats– Calculatingimageresolution foroutputs

Unit III Digital Capture
DigitalImageformation–ImageSensors–DifferentCapturingMethod:Digitalcamera–Scanner– FrameGrabber-DIGITALCAMERA:Understandinghowdigitalcameraswork
– Digitalcameratypes:FloppyDisctype,FlashCardtype,HardDisctype–
Overviewofcurrentdigital cameras

UnitIV: Image Editing
Image editing through image editing softwares like Adobe Photoshop – AdjustmentofBrightness,Contrast, Tonaland Colour Values–ExperimentingwithLevel and Curve.

UnitV: DigitalRetouching&ImageEnhancement
Image size – Resolution – Selection tools and techniques – History – Retouching tools – Layers–Photomountingtechniques–Incorporationoftextinto picture -DigitalManipulation: Applying selective effects to images and filters with masks and differentdigitaldarkroom effects.

Text Books
1. PhillipKrejcarek,DigitalPhotography-AhandsonIntroduction,DelmerPublishers1996
2. JonTorrant,UnderstandingDigital Cameras,Focal Press,2002

COURSE CODE	U21PHN422	CHOICE -II	L	T	P	C
SEMESTER IV		PHYSICSINMUSICALINSTRUMENT	2	-	-	2

Objectives:
Thecourse aimsto relate applicationsofPhysics concepts onvarious musicalphenomena.

UNIT – I: Basic Ideas of Sound
Wave motion – types of waves-simple Harmonic motion – Properties of sound waves – reflection, refraction, diffraction and interference of sound velocity of soundstanding waves-Beats-Resonance.

UNIT – II: Basic Idea of Music
The ear-pitch loudness and quality of musical notes-just noticeable difference in pitch-barrelhearing-aural or combination tones-subjective tones-subjective music-vibrato and tremolo-pitchrange of musical instruments.

UNIT–III: Musical Instruments
String instruments-frequency of stretched strings-longitudinal vibration in strings-plucked,bowed and struck stringed instruments-one example for each from carnatic Hindustani andwestern.Wind Instruments modes of oscillation in open and closed pipes-Different types ofwind instruments-examples from carnatic and western.Vibrations in Stretched MembranesandPlates.Drums,cymbals etc.

UNIT– IV: Electronics of music
Microphones (carbon & crystal) – pickup – Loud speaker, Amplifiers.Addition of sound - santoors.

UNIT –V: Electronic systems
Taperecordingandplaybackequalizers,Recordingandreproductionofsoundincinefilms.
Acoustic of Buildings: Acoustics-Reverberation and Reverberation time – Acousticmeasurements:Acousticintensitylevel–Acousticpressurelevel-Factorsaffectingtheacousticsofbuildings–sound distributioninan Auditorium–Requisitesforgoodacoustics.

TEXT BOOKS:

1. Askill.J,Physics of MusicalSounds,VanNostrand ReinholdInc.,U.S. (1979).
2. Johnson.K,Physicsforyou,OUPOxford;5th edition(2016)
3. Berkely,Waves,McGrawHill Education(2017)
4. Krishnasami.S,MusicalInstrumentsof India,PublicationsDivision(30August2017)

VALUE ADDED PROGRAMME

COURSE CODE	U21PHV51	SOLARENERGYTECHNOLOGY	L	T	P	C
SEMESTER - V			30			2

OBJECTIVES

Giveknowledgeabout RenewableEnergy.

UNIT1: Need forSolarEnergy

The need for alternate energy sources – The Sun – Basic parameters of the Sun– Energysource of the Sun– Estimate of energy emitted by Sun and energy that reaches the Earth –Solar radiation – Solar constant – Solar Radiation calculation - Geographical location ofIndia.

UNIT2: Physics of SolarEnergy

Interaction ofsunlight withEarth– Absorptivity–Reflectivity–Transmittivity–Emissivity – Interactionofsunlight with atmosphere–Beamanddiffusesolarradiation–Pyranometer – Energystorage–Salt hydrates– Solarenergyand electricvehicles.

UNIT3:SolarThermalDevices

Heat transfer and losses – Conduction – Convection – Radiation – Collectors – Flat platecollectors–Trackingcollectors–Concentratingcollectors–Tiltedcollectors– Constructionof differenttypes of solarheatingdevices- SolarAirHeaters.

UNIT4: Basics ofSolarPhotovoltaics

SolarCells – Applications and advantages of photovoltaic(PV) devices.

UNIT5:NationalSolarEnergyProgrammes

Short notes on National Solar Mission – Notes on: Green Energy corridors – Solar Parksand Ultra Mega Solar Power Projects – SuryamitraProgramme - other schemes: Canal bank&CanalTop–NISE–NationalInstituteofSolarEnergy:AboutTrainingProgrammes-ISA– InternationalSolar Alliance- objective- vision: One World, One Sun, OneGrid.

BooksforStudy:

1. Zekai Sen. Solar Energy Fundamentals and Modeling Techniques, Springer-Verlog,London2008
2. Chen CJ.PhysicsofSolarEnergy, Wiley2011.

COURSE CODE	U21MAA11	SEMESTER-I	L	T	P	C
B.Sc.Physics /Chemistry		ANCILLARYMATHEMATICSI	5	-	-	4

Objectives:

- The learnerwillbecomeproficientin expansionand summationoffunction
- Thelearnerwillacquireknowledgeof solvingproblems in matrices
- Thelearnerwillcapableofsolvingthe interpolationproblems.
- Thelearnerwillgain knowledgeoftrigonometricfunctionsandrelatedproblems
- Thelearnerwillbecomeproficient invarioustypesofhyperbolic functions

Unit-I: Partial Fractions

Introduction ofPartial Fractions- Binomial Theorem: The General Term – Expansion ofRational Fractions – Summation of Series. Exponential Theorem: Summation of Series, theLogarithmic Series- Problems.

Unit-II: Theory of Equations

IntroductionofthegeneralEquations-FundamentalTheoremofAlgebra–SymmetricFunction of Roots – Relation between Roots and Coefficient of Equation – Formation ofEquation – Diminish the Roots of the Equation – Reciprocal Equation. Newton – RaphsonMethodproblems.

Unit-III: Matrices

Fundamental Concepts ofSpecial Types of Matrices –Addition and Subtraction of Matrices – Matrix Multiplication – Associated Matrices. Rank of a Matrix: Elementary Operations orTransformation.Linear Equations: Homogeneous linear Equation – Non-HomogeneousEquation Characteristic Roots and Vectors: Eigen Value and Eigen Vectors – Properties of theEigenVectors– Cayley-Hamilton theorem.

Unit-IV:Interpolations:

IntroductionaboutInterpolations:Newton'sForwardMethod-Newton'sBackwardMethod-Lagrange'sInterpolationFormula:DifferentformofLagrange'sInterpolationFormula-problems.

Unit-V:Trigonometry:

Basic ideas in Trigonometry:Expansions: $\cos^n\theta$,$\sin^n\theta$ – $\cos n\theta$and $\sin n\theta$ –Expansion of$\sin\theta$,$\cos\theta$ and $\tan\theta$in powers of θ.Hyperbolic Function: Relation between HyperbolicFunctions and Circular Functions – Periods of HyperbolicFunctions – Inverse HyperbolicFunctions.Logarithm ofComplexQuantities

Text Book:

1. **P.Kandasamy, K.Thilagavathy**,"Allied Mathematics Paper I", 1st Semester, S. ChandPublishing. A Division of S. Chand &CompanyPvt.Ltd, Edition 2013

ReferenceBooks:

1.**G.C.Sharma and Madhu Jain**, Algebra and Trigonometry, 1st Edition, GalgotiaPublicationsPvt.Ltd.2003

2.**Dr.S.Arumugam,A.ThangapandiIsaacandA.Somasundaram**,Numerical

Methods,2nd reprint,ScitechPublicationIndiaPvt,Ltd.,2004.

CourseOutcome:

Onthe successfulcoursecompletion, studentswillbeableto:		Cognitive Level
CO1	Remember numbers,sequences,series,basicsummaries frompartialfraction, equations, matrices	K1
CO2	UnderstandtrigonometricvaluesandInterpolations	K2
CO3	Solveproblemsbyusingtheorems.	K3
CO4	Analyzehomogeneous and non-homogeneous linearequations.	K4
CO5	AnalyzeandEvaluate inversefunctions.	K4,K5

K1-Remember;K2-Understand; K3-Apply;K4- Analyse; K5-Evaluate;K6-Create

COURSE CODE	U21MAA22	SEMESTER-II	L	T	P	C
B.Sc.Physics /Chemistry		**ANCILLARYMATHEMATICSII**	**5**	**-**	**-**	**4**

Objectives:

- Tolearn methodsof integrationand properties andits solvingrelated problems.
- Understandthebasic conceptsof firstorderdifferentialequationand its applications.
- Find solutions byapplyingLaplacetransform methods.
- Vectorsand its productand its integrations.

Unit-I:VectorCalculus:

IntroductionaboutVectorCalculus–Gradient,Divergenceandcurl(problemsonly).Integration of vectors: Integration of vector functions, Line integrals – Surface integrals –Green's theorem in the plane (statement only) – Gauss Divergence theorem (statement only) –Problems– Stoke's theorem(statement only) – Problems

Unit-II:Partialdifferentialequation

Introduction of Partial differential equation from differential equations - Formation of Partialdifferential equations by eliminating arbitrary constants and arbitrary functions* – Solutions ofstandard types of first order equations- f (p, q) = 0, f(x, p, q)=0, f(y, p, q)=0, f(z, p, q)=0, $f_1(x,p)= f_2(y, q)$, z = px+qy+f (p, q) , Clairaut's form– Lagrange method of solving linear partialdifferentialequations P p + Qq = R. (problems only)

Unit-III: Total differential equations

Introduction of total differential equations - Bessel's equations : Bessel's equations – Solutions ofBessel's general differential equations (derivations not included) – General solution of Bessel'sequations - Recurrence formulae (derivations not included) – Simple problems using Recurrencerelation.

Unit-IV:Laplace Transforms

Introduction of Laplace Transforms- Definition – Laplace Transform of e^{at}, cos at, sin at,coshat,sinhat,t^n, n, a positive integer–$e^{at}f(t)$, $t^nf(t)$, f (t), f (t) – Inverse Laplace Transformofstandardfunctions–
SolvingdifferentialequationsofSecondorderwithconstantcoefficientsusing Laplace Transform.

Unit-V:Fourier series

IntroductionofFourierseries:Definition-Dirchlet'sconditions-Fourierseriesofperiodicity 2π and 2l - Odd and even functions –Root mean square value of a function Halfrange series: Introduction- Half range series –Cosin series- sin series – Parseval's theorem – Harmonicanalysis

Text Book:

1. **P.Kandasamy and K.Thilagavathy**. "Mathematics for B. Sc., Br. -I, Volume-II andVolume-III",S.Chand& CompanyLtd, Firstedition, 2004.(UNITIandIII)
2. **S.Narayanan and T.K. ManickavasagamPillai**," Calculus Vol. III ", S.Viswanathan(Printersand Publishers, (P)Ltd, Chennai,2010.(UNITIIand V)
3. **S. Narayanan and T. K. ManickavasagamPillai**, "Calculus Vol. III " S.Viswanathan(Printersand Publishers, (P)Ltd, Chennai, 1997.(UNITIV)

ReferencesBook

1.**P. Kandasamy and K.Thilagavathy**, “Mathematics, VolIv”, S.Chand and CompanyLtd.,-2004
2. **Shanti Narayan**, “Differential Calculus”, Shyamlal Charitable Trust, New Delhi, 2004.
3. 3.**P.N.Chatterji**,”VectorCalculus“,1st Edition,RajhansPrakahanPublishers,Chennai,199

CourseOutcome:

Onthe successfulcoursecompletion, studentswillbeableto:		Cognitive Level
CO1	UnderstandtheIandIIintegrals	K2
CO2	Understandpropertiesof integrals,Laplacetransform.	K2
CO3	Understandfirstorderdifferentialequations.	K2
CO4	AnalysisTheorems andproves.	K3,K4
CO5	Evaluate the importance of shiftingproperties.	K3,K4

K1-Remember:K2- Understand:K3-Apply, K4- Analyse,K5-Evaluate;K6-create

COURSE CODE	U21PHA33	SEMESTER III	L	T	P	C
ALLIED-3		ALLIED CHEMISTRY THEORY PHYSICALSCIENCES	5	-	-	4

Objectives

1. Tounderstandthehandlingofchemicalsanderrorsinchemicalanalysis
2. To get knowledge in chemicalbondingand hybridization
3. Toacquireknowledgeinvolumetricanalysis
4. To understand the basicconceptofchemistryof Thermodynamics and Kinetics

Unit-IHandlingof ChemicalsandDataAnalysis

a) Storage and handling of chemicals: Handling of acids, ethers, toxic chemicals. Antidotes,thresholdvapour concentration and first aid procedure.
b) Errors in chemical analysis: Accuracy, precision. Types of error-absolute and relativeerrors.Methods of eliminatingand minimizingerrors.
c) Separationtechniques– Solventextraction.Principleofadsorptionandpartitionchromatography,columnchromatography,thinlayerchromatography(TLC),paperchromatographyand their applications.

Unit-IIChemicalBonding

a) Ionic Bond: Nature of Ionic bond. Structure of NaCl, KCl and CsCl. Factors influencingthe formation of ionic bond.
b) CovalentBond:Natureofcovalentbond.Structure of CH_4,NH_3,H_2Obasedonhybridization.
c) Coordinate Bond: Nature of coordinate bond. Coordination complexes. Werner'stheory.Geometrical and optical isomerism in square planar and octahedral complexes.Mention ofstructureandfunctions ofchlorophyll and hemoglobin
d) HydrogenBond:Theoryandimportanceofhydrogenbonding.Typesofhydrogenbonding.Hydrogenbondingincarboxylicacids,alcohol,amides,polyamides,DNAandRNA.

Unit-III VolumetricAnalysis

a) Methodsofexpressingconcentration:normality,molarity,molality,ppm.
b) Primary and secondary standards: preparation of standardsolutionsc)Principleofvolumetric analysis:endpoint andequivalencepoints.
c) Strongandweakacidsand bases-Ionicproductofwater,pH,pKa,pKb.Buffer solutions-pHof buffersolutions. Mention of Henderson equation &itssignificance.

Unit-IVKinetics

a) Chemical Kinetics: Rate, rate law, order and molecularity. Derivation of rateexpressionsforIandIIorder reactions.
b) Catalysis-Homogeneous and heterogeneous catalysis. Enzyme catalysis, enzymesinbiologicalsystem and in industry.

Unit-VThermodynamics

a) Introduction:Scopeandimportanceofthermodynamics – systemandsurrounding-isolated,closedandopensystems-stateofthesystem-intensiveandextensivevariables. Thermodynamicprocess- reversible andirreversible, isothermaland adiabaticprocess
b) Firstlawofthermodynamics-statement-definitionofinternalenergy(E),enthalpy(H),applicationsoffirst law of thermodynamics.

Thesecondlawofthermodynamics:Limitationsoffirstlawandtheneedforthesecondlaw,differe

ntwaysofstatingIIlawanditssignificance,Spontaneousorirreversibleprocess. Theconcept of entropy–definitionand physicalsignificanceof entropy.

Text Books:

1. A.Bahl and B.S. Bahl, Advanced Organic Chemistry, I Multicolor Edition, S.Chand&Company,New Delhi,2010.
2. SatyaPrakash, Advanced Inorganic Chemistry, R.D.Madan, VolI, 5th Edition, S.Chand andSons,New Delhi, 2012.
3. B.R. Puri, L.R.Sharma and M.S.Pathania, Principles of Physical Chemistry, 46thEdision,Vishal PublishingCompany,NewDelhi, 2013.

ReferenceBook:

1. R.Gopalan, S. Sundaram,*Allied Chemistry*, SultanChand and Sons, 1995.

CO	Courseoutcomes	Remarks
CO1	Studentscangaintheknowledgeonthehandlingofchemicalsand errorsin chemicalanalysis.	K2, K3
CO2	LearnChemical Bonding and Hybridization	K2
CO3	Learnthe calculationsofpreparingstandard solutions	K2, K3
CO4	Understand and appreciate the advanced conceptsand rate equationsinchemicalkinetics.	K2
CO5	Calculatechangein thermodynamic properties, equilibrium constants, partialmolarquantities,chemicalpotential	K2

K1-Remember **K2**-Understand **K3**- Apply **K4**-Analyze K5-Evaluate

COURSE CODE	U21PHA44	SEMESTER IV	L	T	P	C
ALLIED-4		ALLIEDCHEMISTRYPRACTICAL-PHYSICALSCIENCES	4	-	-	4

Objectives

1. Toenable thestudents toacquireknowledgeinOrganicEstimation
2. Tounderstandbasicsandgainknowledgeinorganicanalysis
3. Attheendofthecourse,thestudentsshouldbeabletoplanexperimentalprojectsandexecutethem.

Acidimetry and alkalimetry: Titration acids used: hydrochloric acid, sulphuric Standardsolutionsprepared: sodium carbonate, sodiumbicarbonate, oxalic acid.
Oxidationandreductiontitration: Oxidisingagents:Potassiumpermanganate(permanganimetry) Reducing agents: Ferrous sulphate, ferrous ammonium Sulphate, oxalicacid
Standard solutions prepared: Ferrous Sulphate, ferrous ammonium Sulphate and oxalicacid.
Iodometrytitrations:titrationsofliberatediodineagainstsodiumthiosulphateusingacidified potassium permanganate,potassiumdichromate and copperSulphatesolutions.
Standardsolutions:potassiumdichromate, copper sulphate.

Text Books

1. Sundaram,Krishnan,Raghavan,PracticalChemistry(PartII),S.ViswanathanCo.Pvt.,1996.
2. B.S.Furniss,A.J.Hannaford,P.W.G.Smith,A.R.Tatchell,Vogel'sTextBookofPracticalOrganicChemistry. 5th Edn.,Pearson Education, 2005.

ReferenceBooks

1. PracticalChemistrybyA.O. Thomas, ScientificBook Centre,Cannanore, 2003.
2. BasicPrinciplesofPracticalChemistry,V.Venkateswaran,R.Veeraswamy,A.R.Kulandaivelu,SultanChand &Sons, New Delhi,2nd Edn., 2004.

CO	Courseoutcomes	Remarks
CO1	Learnthe conceptofTitrationmethods and variousTitrations	K2
CO2	Understand the Acidimetryandalkalimetrytitrations	K2
CO3	Thepreparationofstandardsolutionsandmethodsofanalyzethe varioussalts	K2, K4
CO4	Understandthecalculationsofmolarity,molalityandNormalityofthe solutions	K2
CO5	UnderstandtheconceptofIodometrytitrations	K2

K1-Remember **K2**-Understand **K3**- Apply **K4**-Analyze **K5**-Evaluate

ALLIEDPHYSICS(forB.ScMathematics/B.ScChemistry)

Objective:

To impart preliminary knowledge on basic concepts of physics to chemistry and mathematicstudents to makethem understand thefundamentalsofcorephysics.

UNITI:**Mechanics**

Centre of Gravity – Centre of Gravity of a solid hemisphere – Hollow hemisphere – Centreof Gravity of a solid cone – Centre of Gravity of a solid tetrahedron. States of Equilibrium:Equilibrium of a rigid body – Stable, unstable and neutral equilibrium – Example. Stabilityof Floatingbodies – Metacenter– Determinationof Metacentricheight ofaship.

UNIT II: Properties of Matter

Stress – Strain – Young's modulus – Behavior of wire under progressive tension – Bendingof beams – Expression for the bending moment – Measurement of Young's modulus bybending of a beam – Non uniform bending and Uniform bending. Viscosity: StreamlineflowandTurbulentflow–critical velocity -Poiseuille'sformula– Determinationofcoefficient of viscosity of a liquid (Variable pressure head). Surface Tension: Drop weightmethod of determining the surface tension of a Liquid – Experiment to determine theinterfacialtension.

UNITIII: Electronics

Intrinsic and extrinsic semiconductor – PN Junction diode – Biasing of PN junction – V-Icharacteristicsofjunctiondiode–Rectifiers–Halfwave–Fullwaveandbridgerectifiers –Zenerdiode–CharacteristicsofZenerdiode–Voltageregulator–Transistor– Characteristicsoftransistor–CB,CEmode–Transistorsasanamplifier.

Digital: Decimal– Binary – Octal and Hexa Decimal number systems and their Mutual Conversions – 1'sand 2's complement of a Binary number and Binary arithmetic (Addition, Subtraction,Multiplication and Division) – Binary Subtraction by 1's and 2's complement method –Basic logic gates – AND, OR, NOT, NAND, NOR and EXOR gates – NAND and NOR asuniversal building gates – Boolean Algebra – Laws of Boolean Algebra – De Morgan'sTheorems– Their verifications usingtruth tables.

UNITIV: Optics

Geometrical Optics: Spherical aberration of a thin lens – Methods of reducing sphericalaberration – Coma – Aplanatic surface – Astigmatism – Curvature of the field – Distortion.Interference: Introduction – Air wedge – Newton's rings – Colors of thin films. Diffraction:Planediffraction Grating – Theoryof planetransmission Grating

UNIT V: Modern Physics

AtomicPhysicsAtomModels:Sommerfield'sandVectoratomModels– Pauli'sexclusionPrinciple–Variousquantumnumbersandquantizationoforbits.X-rays:Continuous and Characteristic X-rays – Mosley's Law and importance – Bragg's law –Millerindices.

NuclearPhysicsIntroduction–Nucleus–ClassificationofNuclei–NuclearSize–Charge – Mass and Spin -Nuclear Radiations and their properties, Laws of Radioactivity-DecayConstant-Half lifeand meanlife- ageof theearth-carbon Dating.

Text Books:

1. R.Murugeshan,PropertiesofMatter,S.Chand&Co.Pvt.Ltd.,Revisededition,2012.
2. NarayanamoorthyandN.Nagarathinam,Mechanics–PartII,TheNationalPublishingCompany, Chennai, 2005.
3. N.Subramaniyam,BrijlalandM.N.Avathanulu,Optics,S.Chand& Co.Pvt.Ltd.25 th revisededition, New Delhi,2012.
4. V.Vijayendran,S.Viswanathan,DigitalFundamentals,Printers&PublishersPrivateLtd, Chennai, 2004.
5. MehtaV.K.,Principles ofElectronics, S.ChandandcompanyLtd,2014.
6. AlbertPaulMalvino, DigitalPrinciplesandApplications,McGraw-HillInternationalEditions, New York, 2002.
7. PuriV.K.,DigitalElectronicsCircuitsandSystems,TATAMcGrawHillPublications, NewDelhi, 2011.
8. R. Murugeshan, KiruthigaSivaprasath, Modern Physics, S. Chand & Co, New Delhi,Firstedition, 1984.
9. R.S.Sedha,ATextBookofDigitalElectronics,S.Chand&Co,NewDelhi,Firstedition,2004

BooksforReference:

1. D.SMathur.Revisedby:Dr.P.S.Hemne,Mechanics–S.ChandandCo. NewDelhi.First edition 1981, Reprint2015.
2. BrijLalandSubramanyam,PropertiesofMatter–Eurasiapublishinghouse(Pvt.)LTD.New Delhi. SixthEdition 1991
3. B.L.Theraja,Basic Electronics(SolidState),S.ChandandCo.NewDelhi2006
4. R.Murugesan,OpticsandSpectroscopy-S.ChandPublishing,1997.
5. J.B.Rajam,AtomicPhysics.,S.Chand& Company Limited,NewDelhi,Firstedition, 1990.
6. B.N. Srivastava,BasicNuclearPhysic, PragatiPrakashan, Meerut, 2005.

CourseOutcomes(CO):

CO	Learningoutcome	Remarks
CO1	Analyze centerofgravity	K4
CO2	Learnaboutmodulus,viscosityandsurfacetensionof materials	K2
CO3	Studythe characteristicsof diode and transistor	K1
CO4	Understandaboutaberrationanddifferentproperties of lenses	K2
CO5	Gainknowledge about atomic model and basic nuclearproperties	K2

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

ALLIED PRACTICALS

Objective:

It is aimed at exposing the non-physics under graduate students to the technique of handlingsimple measuring instruments and also makes them measure certain mechanical, electricaland opticalproperties ofmatter

AnyTwelveexperiments

1. EstimationofError
2. Compound Pendulum–gandunknownmassdetermination
3. Young'sModulus – Uniformbending–pin and microscopemethod
4. Young'sModulus–Cantilever–Pin&Microscope
5. Young'sModulus –Uniformbending–Opticlevermethod
6. Young'sModulus – Non-Uniformbending–pin and microscopemethod
7. Viscosity–Stoke'sMethod
8. Viscosity– Poiseuille'smethod
9. Sonometer–frequencyofaliningfork
10. Calibration of Voltmeter – potentiometer
11. Comparisonof capacitances– B.G
12. Dispersivepower ofprism– Spectrometer
13. LogicGates–AND, OR,NOTusing discrete components
14. LogicGates–NAND,NOR–using IC's
15. DiodeCharacteristics
16. Zenerdiode Characteristics
17. Newton'srings ofa liquid
18. Spectrometer–Prism-i-dcurve tofindμ
19. NANDasUniversalgate:IC
20. NORasUniversalgate:IC
21. SurfaceTension–CapillaryRise
22. Newton'sLaw ofcooling

TEXT BOOKS

1. C.COuseph,G.Rangarajan-ATextBookofPracticalPhysics,-S.ViswanathanPublisher-PartI(1990).
2. C.COuseph,Rangarajan,R.Balakrishnan,ATextBookofPracticalPhysics,S.Viswanathan Publisher-Part II(1996).
3. S.LGuptaand V.Kumar–PracticalPhysics,PragatiPrakashan –25th, Edition(2002).
4. A.P.Malvino,Electronics,Cybergear, 2010.
5. JohnMorris,AnalogElectronics, Import,1999.
6. S.K. Bhattacharya, ElectricalMachines (TTTIChandigarh) – TMH1998.

CourseOutcomes (CO):

CO	Learning outcome	Remarks
CO1	AbletoEstimateErrors	K3
CO2	Analyzedimensional change of bar	K4
CO3	Determineviscosityofliquid	K4
CO4	Studythecharacteristicsofdiode andICs	K3
CO5	Determine surfacetensionof liquid	K4

K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate

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MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

DEPARTMENT OF PHYSICS

M.Sc. PHYSICS

SYLLABUS TO BE IMPLEMENTED FROM THE ACADEMIC YEAR 2021-2022

(CHOICE BASED CREDIT SYSTEM)

Mother Teresa Women's University, Kodaikanal
Department of Physics
Choice Based Credit System (CBCS)
(2021-2022 onwards)
M.Sc. Physics

1. About the Programme:

M.Sc Physics is a two-year Postgraduate Programme that provides the learners with the theoretical and practical knowledge of Physics and its allied subjects. The Programme, with its strong emphasis on skill development, enriches the learners' research, technological, and employability skills and thereby ensures their broad-based futuristic developments with sound knowledge and ethical values.

2. Program Educational Objective

PEO 1	To pursue their Higher Studies in Leading Institutes.
PEO 2	To attain significant position in Academics with proficiency.
PEO 3	To cultivate their research acumen for resolving challenging research issues, and secure a position in Research Organization.
PEO 4	To create inclusive society with gender equality.
PEO 5	To work in Defence Organization with shrewdness, courage, and confidence.
PEO 6	To imbibe communicative skills and value system and work ethically in a multidisciplinary environment.

3. Eligibility

B.Sc. Physics, Applied Physics, with Mathematics as allied subject at the UG level

4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 90**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance less than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

9. Programme Outcomes (POs):

On completion of this Programme, the learners

PO1	will acquire knowledge about the nature, concepts, methods, techniques and objectives in the core subject
PO2	will be able to cultivate scientific approach and culture of research aptitude.
PO3	will be able to face the national level competitive exams like NET, GATE, and SET etc
PO4	will be able to link Physics with other disciplines and also to the societal issues.
PO5	will be confident with their employability skills and entrepreneurial Skills

10. Program Specific Outcomes (PSO):

On the completion of this Programme the learners will

PSO1	get mastery over the field of Materials Science and Astrophysics and prepare them for research
PSO2	understand and apply inter-disciplinary concepts of Physics for understanding and describing the natural phenomenon
PSO3	gain strong foundations with a sound knowledge of underlying principles along with recent developments
PSO4	work with state-of-the art technologies
PSO5	acquire the ability to plan and execute their own innovative ideas in the form of projects, product design, and development.
PSO6	understand the importance of research methodology in science by acquiring knowledge through project, summer internship and field/industrial visit.

M.Sc. Physics

S.No.	Course Code	Course Title	Credits	Hours		CIA	ESE	Total
				T	P			
Semester I								
1	P21PHT11	Core I **Mathematical Physics I**	4	5	0	25	75	100
2	P21PHT12	Core-II **Classical Mechanics**	4	5	0	25	75	100
3	P21PHT13	Core-III **Analog and Digital Electronics**	4	5	0	25	75	100
4	P21PHT14	Core-IV **Laser Physics and Non-Linear Optics**	4	5	0	25	75	100
5	P21PHP11	Core-V **Practical I (Electronics)**	4	0	6	25	75	100
6	P21CSS11	Supportive Course I **Computer Skills for Web Designing and Video Editing**	2	0	4	25	75	100
		Total	**22**	**30**		**-**	**-**	**600**
Semester II								
7	P21PHT21	Core VI **Mathematical Physics II**	4	5	0	25	75	100
8	P21PHT22	Core-VII **Quantum Mechanics I**	4	5	0	25	75	100
9	P21PHT23	Core-VIII **Thermodynamics and Statistical Mechanics**	4	4	0	25	75	100
10	P21PHT24	Core-IX **Condensed Matter Physics I**	4	4	0	25	75	100
11	P21PHP22	Core-X **Practical II (Non-Electronics)**	4	0	6	25	75	100
12		Non Major Elective	4	4	0	25	75	100
13	P21PHS221/ P21PHS222	Supportive Course II (Skill) **Data Analysis by Origin Software/ Matlab Programming**	2	2	0	25	75	100
		Total	**26**	**30**		**-**	**-**	**700**
Semester III								
14	P21PHT31	Core XI **Electromagnetic Theory**	4	5	0	25	75	100
15	P21PHT32	Core-XII **Quantum Mechanics II**	4	5	0	25	75	100
16	P21PHT33	Core-XIII **Condensed Matter Physics II**	4	4	0	25	75	100
17	P21PHT34	Core-XIV **Nuclear and Particle Physics**	4	4	0	25	75	100
18	P21PHT35	Core XV **Spectroscopy**	4	4	0	25	75	100
19	P21PHP33	Core-XVI **Practical III - (**C programming)	4	0	6	25	75	100
20	P21WSS33	Supportive Course III **(Women Empowerment)**	2	2	0	25	75	100
		Total	**26**	**30**				**700**
Semester IV								
21	P21PHE411/ P21PHE412/ P21PHE413/	Elective-I* Astronomy and Astrophysics/Numerical	4	4	0	25	75	100

	P21PHE414	Methods/Modern Optics and Imaging/Any MOOC Course$						
22	P21PHE421/ P21PHE422/ P21PHE423/ P21PHE424	Elective-II* Materials Characterization Techniques / Physics of non-conventional Energy Resources/Physics of Nano-materials/ Any MOOC Course$	4	4	0	25	75	100
23	P21PHR41	Project	8	0	22	25	75	100
		Total	**16**	**30**				**300**
Total			**90**	**120**				**2300**

Non Major Elective (NME)

1. **NME I -** P21PHN211- **Elements of Nanoscience and Nanomaterials**
2. **NME II -** P21PHN212- **Fundamentals of Astrophysics**

Additional Credit Courses

1. **P21PHV11** - Value Added Program I-Two Credits (First Semester)

   P21PHV111 Classification of Solar Flares in X-Rays

   P21PHV112 Estimation of Solar Differential Rotation of Sunspots from Kodaikanal Solar Observatory (KSO) Data

2. **P21PHI21** - Internship/Industrial Training – Two Credits- (Second Semester)
3. **P21PHO31** - Online Courses-Two Credits- (Third Semester)
4. **P21PHV42** - Value Added Program II-Two Credits (Fourth Semester)

   P21PHV421 Identification of the Solar Radio Bursts

   P21PHV422 Estimation of Coronal Shock Speed

   P21PHV423 Estimation of Coronal Magnetic Field from Type II Radio Burst

*Those who have CGPA as 9, and want to do the project in industry/institution during IV semester, may opt for these two papers in III semester.

$ Students can take one 4 credit course in MOOC as elective or two 2 credit courses in MOOC as elective with the approval of Department committee.

Outside class hours

- Health, Yoga and Physical Fitness
- Library Information access and utilisation
- Employability Training

SEMESTER - I

Course Code	P21PHT11	MATHEMATICAL PHYSICS – I	L	T	P	C
Core-I			5	-	-	4

OBJECTIVES:

- To develop knowledge in Mathematical Physics and its applications.
- To expertise in Mathematical formulations required for Physics.
- To enhance problem solving skills.
- To enable students to interpret and draw inferences from Mathematical Solutions.

UNIT-I: VECTOR ANALYSIS AND VECTOR SPACES

Concept of gradient, divergence and curl - Gauss's divergence theorem, Green's theorem and Stoke's theorem (statement and proof) - Orthogonal curvilinear coordinates - Expression for gradient, divergence, curl and Laplacian in cylindrical and spherical co-ordinates (Theory). Linearly dependent and independent sets of vectors - Inner product (problems)- Schmidt's orthogonalization process.

UNIT-II: MATRICES

Types of Matrices and their properties, Rank of a Matrix, Eigenvalue Equations and their solutions, Theorems on Matrices; Diagonalisation and Diagonalisation of different matrices; Cayley-Hamilton's theorem; Problems.

UNIT–III: TENSOR ANALYSIS

Definition of Tensors – Contravariant, covariant and mixed tensors – addition and subtraction of Tensors – Summation convention- Symmetry and Anti-symmetry Tensor – Contraction and direct product – Quotient rule.

UNIT-IV: COMPLEX VARIABLE

Functions of complex variable-Analytic functions – Cauchy- Riemann equations- integration in the Complex plane-Cauchy's theorem- Cauchy's integral formula-Taylor and Laurent expansions- Singular Points- Cauchy's residue theorem - poles - evaluation of residues - evaluation of definite integrals.

UNIT-V: GROUP THEORY

Definition - Subgroups - Cyclic groups and abelian groups - Homomorphism and isomorphism of groups - Classes - Symmetry operations and symmetry elements - Representations of groups - Reducible and irreducible representations - Character tables for simple molecular types.

TEXT BOOKS:

1. Ken F. Riley, Mike P. Hobson, Stephen J. Bence, Mathematical Methods for Physics and Engineering Cambridge University Press, Third edition, 2018
2. B.S. Rajput, Mathematical Physics, Pragati Prakashan, 20th Edition, 2008.
3. B.D. Gupta, Mathematical Physics, Vikas Publishing House Pvt. Ltd, 1995.
4. Giampaolo Cicogna, Exercises and Problems in Mathematical Methods of Physics, Springer International Publishing, 2020

BOOKS FOR REFERENCE:

1. H.K. Dass and Rama Verma, Mathematical Physics, S. Chand and Company Ltd, 2010.
2. P.K. Chattopadhyay, Mathematical Physics, Wiley Eastern Limited, 1990.
3. Charlie Harper, Introduction to Mathematical Physics, Prentice Hall of India Pvt.Ltd, 1993.
4. L.A. Pipes and L.R. Havevill, Applied Mathematics for Engineers and Physicists, McGraw Hill Publications Co., 3rd Edition, 1971.
5. Murray R. Spigel, Theory and Problems of Laplace Transforms, Schaum's outline series, McGraw Hill, 1986.
6. Matrices and Tensors in Physics, A.W. Joshi, Wiley Eastern limited, 3rd Edition, 1995.

Course Outcomes (CO):

CO1: Expose to solve vector analysis and vector space [K2]
CO2: Acquire sound knowledge on matrices and tensors [K4]
CO3: Evaluate complex variables [K3]
CO4: Grasp problem solving skills in group theory [K4]
CO5: Understand the physics concepts using mathematics [K2]

K1- Remember **K2- Understand** **K3- Apply** **K4- Analyze**
K5-Evaluate **K6-Create**

Outcome Mapping

PO/CO	PO 1	PO 2	PO 3	PO 4	PO 5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	3	2	3	3	3	2	3	1	3
CO2	2	2	3	3	3	3	3	3	3	2	2
CO3	2	2	3	2	3	3	3	2	3	1	3
CO4	1	3	3	3	3	3	3	3	3	2	2
CO5	3	3	3	3	3	3	3	3	3	2	2

Strongly correlating (S) : 3 Marks **Moderately correlating (M): 2 Marks**
Weakly correlating (W) : 1 Marks **No correlation (N) : -**

Course Code	P21PHT12	CLASSICAL MECHANICS	L	T	P	C
Core-II			5	-	-	4

OBJECTIVES:

- To solve the equation of motion using Lagrangian, Hamilton and Hamilton-Jacobi equations.
- To study the kinematics of the rigid body through Euler equation.
- To get knowledge in central force field and relativity.

UNIT-I: LAGRANGIAN FORMULATION:

Lagrangian formulation: System of particles-constraints and degrees of freedom-generalized coordinates, force and energy-conservation laws-conservations of linear and angular– momenta-symmetric properties-homogeneity and isotropy-D'Alembert's principle of virtual work-Lagrange's equation of motion – non–holonomic-systems-applications of Lagrange equations of motion: free particle in space-Atwood's-machine.

UNIT –II: HAMILTON'S EQUATION AND CANONICALTRANSFORMATION-

Calculus of variation- principle of least action-Hamilton's principle-Hamilton`s function-Lagrange's equation from Hamilton's principle-Hamilton's principle for non-holonomic-system- variational principle-Hamilton's equations from variational principle-Legendre transformation and Hamilton's equation of motion. Cyclic coordinates and conservation theorem-Canonical transformations-Hamilton's canonical equations-Generating Functions – Examples -Poisson brackets and its properties.

UNIT-III: HAMILTON-JACOBITHEORYAND SMALL OSCILLATIONS

Hamilton-Jacobi equation for Hamilton's principle function-Example: Harmonic oscillator problem-Hamilton's characteristic function-Action-angle variable-application to Kepler problem in action angle variables. Eigen value equation-Normal Coordinates-Normal frequencies of vibration-vibrations of linear tri-atomic molecule.

UNIT-IV: KINEMATICS OF RIGIDBODY

Independent coordinates of rigid body-orthogonal transformation-properties of transformation matrix-Euler angle and Euler's theorem-infinitesimal rotation-Coriolis-force-angular momentum and kinetic energy of motion about appoint–moment of inertia tensor-non-inertial frames and pseudoforces-Euler's equations of motion-torque free motion of a rigid body.

UNIT-V: CENTRAL FORCE PROBLEM AND THEORY OF RELATIVITY -

Reduction to the equivalent one body problem-Centre of mass-Equation of motion and first integral-classification of orbits-Kepler problem: Inverse-Square law of force-Scattering in a central force field-transformation of scattering to laboratory coordinates. Orbits of artificial satellites, Virial theorem – Lorentz transformation, Relativistic Mechanics, Relativistic Lagrangian and Hamiltonian for a particle, Space time and energy – Momentum vectors.

TEXT BOOKS:

1. H. Goldstein, C. Poole and J. Safko, Classical Mechanics, Pearson Education Asia, New Delhi, Third Edition, 2002. (Unit 1-5)

2. G.Aruldhas, Classical Mechanics PHI Learning Private Limited, New Delhi, 2015.
3. P.C. Deshmukh, Foundation of Classical Mechanics, Cambridge University Press, 2021
4. Reinhard Hentschke, Classical Mechanics- Including an Introduction to the Theory of Elasticity, Springer International Publishing, 2017
5. Hyunsoo Min, Choonkyu Lee, Essential Classical Mechanics, World Scientific Publishing Co Pte Ltd, 2018.

BOOKS FOR REFERENCE:

1. S.L. Gutpa, V. Kumar and H.V. Sharma, Classical Mechanics, Pragati Prakashan, Meerut, 2016.
2. K.C.Gupta, Classical Mechanics of Particles and Rigid Bodies, New Age International Publishers, New Delhi, Third edition,2018.
3. N.C.Rana and P.J. Joag, Classical Mechanics, Tata Mc Graw Hill, New Delhi,2015.
4. J.C.Upadhaya, Classical Mechanics, Himalaya Publishing House Pvt. Ltd,Bangalore, Secondedition,2017.
5. B.D.Gupta, Satya Prakash, Classical Mechanics, Keder Nath Publishers, Meerut, Revised Edition, 2015.
6. R.G.Takwale and P.S.Puranik, Introduction to Classical Mechanics, Tata Mc Graw Hill, New Delhi, 1989.

Course Outcomes (CO):

CO1: Learn about the dynamics of system of particles using Hamiltonian, Lagrangian and Jacobi [K1]
CO2: Understand the planetary motion using Kepler's law [K2]
CO3: Get exposure about kinematics of rigid motion [K4]
CO4: Solve small oscillations using Legendre transformations and Hamiltonian [K3]
CO5: Solve harmonic oscillator problem using canonical transformation and Hamiltonian Jacobi [K5]

K1- Remember K2- Understand K3- Apply K4- Analyze
K5-Evaluate K6 Create

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3	3	3	3	3	3
CO2	3	3	1	3	3	3	3	3	3	1	2
CO3	3	3	1	3	3	3	3	3	3	2	3
CO4	3	3	2	3	3	3	3	3	3	2	1
CO5	3	3	1	3	3	3	3	3	3	2	1

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHT13	ANALOG AND DIGITAL ELECTRONICS	L	T	P	C
Core-III			5	-	-	4

OBJECTIVES:

- Give an insight to the students about basic concepts and techniques of electronic devices.
- Give in depth knowledge of operational Amplifiers, Memories and converters etc., to the students.
- Acquire skills in drawing electronic circuits
- Understand the concepts of CCD devices.
- The theoretical knowledge gained in the class room can be experimented in the practical classes.

UNIT-I: ELECTRONIC DEVICES

Construction, operation and I-V characteristics: Silicon controlled rectifiers (SCR) – Unijunction transistors (UJT) – Diode for alternating current (DIAC) – Triode for alternating current (TRIAC); Insulated gate bipolar junction transistor (IGBT).

UNIT-II: ELECTRONIC CIRCUITS AND CONTROLS

Converters: Chopper – Cycloconverters – Matrix converters; Rectifiers: Single-phase halfwave rectifiers – Single-phase full-wave rectifiers; Inverters: Single-phase inverters – Three-phase inverters – Multilevel inverters – Line-commutated inverters.

UNIT-III: OPERATIONAL AMPLIFIER APPLICATIONS

Operational Amplifier- CMRR-Slew rate -Instrumentation amplifier – V to I and I to V converter – Op-amp stages- Equivalent circuits - Sample and Hold circuits.

Applications of Op-Amp: Inverting, Non- inverting Amplifiers- circuits – Adder-Subtractor- Differentiator- Integrator- Electronic analog Computation solving simultaneous and differential equation –. Schmitt Trigger – Triangular wave generator – Sine wave generator – Active filters: Low, High and Band pass first and second order Butterworth filters – wide and narrow band reject filters.

UNIT-IV: SEMICONDUCTOR MEMORIES

Classification of memories and sequential memory – Static Shift Register and Dynamic Shift Register, ROM, PROM and EPROM principle and operation Read & Write memory - Static RAM, dynamic RAM, Content Addressable Memory - principle, block diagram and operation. Programmable Logic Array (PLA) - Operation, Internal Architecture. Charge Couple Device (CCD) - Principle, Construction, Working and Data transfer mechanism.

UNIT-V: A/D AND D/A CONVERTER

Sampling theorem-Time division multiplexing – Quantization – DAC- Weighted resistor method – Binary Ladder network – ADC – successive approximation, Dual slope and Counter method – Voltage to Frequency conversion and Voltage to Time conversion.

TEXT BOOKS:

1. Timothy L. Skvarenina, The Power Electronics Handbook – Industrial Electronics Series CRC press LLC, USA: 2002 (Unit I, II)

2. R.F. Coughlin and F.F, Driscol, Op-Amp and linear integrated circuits - Prentice Hall of India, New Delhi, 1996. (Unit III)
3. Ramakant A. Gayakwad, Op-Amps and Linear Integrated Circuits - Pearson Education: Fourth Edition, 2015. (IV, V)
4. Charles H. Roth, Jr., Larry L. Kinney, Raghunandan G. H., Analog and Digital Electronics. Cengage Learning India Pvt. Ltd. 2019

BOOKS FOR REFERENCE:

1. Albert Malvino, David J Bates, Electronic Principles- 7th Edition, McGraw Hill, 2007.
2. V.K.Mehta, Principles of Electronics, 6th Revised Edition, S.Chand and Company, 2001.
3.David A. Bell, Electronic Devices and Circuits, 4th Edition, Prentice Hall. 2007.
4. R.P. Jain, Modern Digital Electronics, Tata McGraw Hill, 2007.

Course Outcomes (CO):

CO1: Learn the features of electronic devices. [K1]
C**O2 :**Study the operation of circuits used in electronic devices [K2]
CO3: Understand the concept of OPAMP applications [K2]
CO4: Able to carry out experiments based on applications of OPAMP: [K3]
CO5: Know the industrial applications of Semiconductor devices: [K5]

K1- Remember K2- Understand K3- Apply K4- Analyze K5-Evaluate K6-Create

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	2	2	3	2	2	2
CO2	3	2	3	3	2	2	2	3	3	2	2
CO3	3	2	2	3	2	3	3	3	3	2	2
CO4	3	2	1	3	3	3	3	3	3	2	2
CO5	2	2	2	3	3	3	2	3	2	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 MarksNo correlation (N) : -

Course Code	P21PHT14	LASER PHYSICS AND NON-LINEAR OPTICS	L	T	P	C
Core-IV			5	-	-	4

OBJECTIVES:

- To understand about fundamentals and types of laser.
- To know the basic principles of laser operation
- To grasp knowledge about characteristics and focusing of laser beam
- To know nonlinear optics.

UNIT I: LASERS-FUNDAMENTALS AND TYPES

Basic Construction and Principle of Lasing-Einstein Relations and Gain Coefficient - Creation of a Population Inversion- Three-Level System - Four-Level System - Threshold Gain Coefficient for Lasing- Laser types-He-Ne Laser-CO2 Laser- Nd:YAG Laser-Semiconductor Laser.

UNIT II: LASER OPERATION

Optical Resonator-Laser Modes-Axial modes- Transverse Modes-Modification in Basic Laser Structure- Basic Principle of Mode Locking- Active Mode Locking -Passive Mode Locking-Q-Switching- Pulse Shaping.

UNIT III: LASER BEAM CHARACTERISTICS

Wavelength-Coherence-Mode and Beam Diameter-Polarizations-Introduction to Gaussian Beam Width-Divergence-Radius of Curvature-Rayleigh Range-Guoy Phase Shift-3-D Gaussian Beams.

UNIT IV: FOCUSING OF LASER BEAM

Diffraction- Limited spot size-Concept of Beam Quality-Spherical Aberration- Thermal Lensing Effects-Depth of Focus-Tight focusing of laser beam - Angular Spectrum Representation of Optical Near Field-Aplanatic lens-Focusing of Higher- order laser modes-Radially Polarized Doughnut mode-Azimuthally Polarized Doughnut mode.

UNIT V: NON-LINEAR OPTICS

Introduction-Nonlinear Optical Media-The Nonlinear Wave Equation-Scattering Theory Born Approximation-Second-order Nonlinear Optics-Second-Harmonic Generation (SHG) and Rectification-The Electro-Optic Effect-Three-Wave Mixing- Frequency and Phase Matching- Optical Kerr Effect- Self-Focusing

TEXT BOOKS:

1. D.L. Mills - Nonlinear Optics - Basic Concepts, Springer, Berlin 1998.
2. B.B. Laud, Lasers and Nonlinear Optics - 2nd Edn. New Age International (P) Ltd., New Delhi, 1991
3. Guang S He, Song-Hao Liu, Advanced Nonlinear Optics, World Scientific Publishing Co Pte Ltd; 2nd edition. 2018
4. Peter E. Powers, Joseph W. Haus, Fundamentals of Nonlinear Optics, CRC Press, 2nd Edition, 2017

BOOKS FOR REFERENCE:

1. Subhash Chandra Singh, Haibo Zeng, Chunlei Guo, and Weiping Cai, Nanomaterials: Processing and Characterization with Lasers, Wiley-VCH Verlag GmbH & Co.K GaA. (2012).
2. Walter Koechner, Solid state Laser Engineering-6th edition-Springer (2006)
3. L. Novotny and B. Hecht- Principles of Nano Optics, Cambridge University Press (2006)
4. R.G.Driggers, C.Hoffman, Encyclopedia of Optical Engineering- Marcel Dekker(2003)
5. M. Steen, J.Mazumder, Laser Material Processing, Springer (2010)
6. Bahaa E. A. Saleh, Malvin Carl Teich Fundamentals of Photonics, John Wiley Sons, Inc, 1991.

COURSE OUTCOME

CO1: Know about laser fundamentals and characteristics [K2]
CO2: Understand the laser operation [K3]
CO3: Apply the knowledge for experimentation [K4]
CO4: Develop a skill in laser focusing [K5]
CO5: Understand non-linear optics [K5]

K1- Remember K2- Understand K3- Apply
K4- Analyze K5-Evaluate K6- Create

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	2	2	2	2	2	2	1
CO2	3	3	2	2	3	2	2	2	3	2	1
CO3	3	3	2	3	3	3	3	3	3	2	1
CO4	3	3	2	3	3	3	3	3	3	3	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHP11	PRACTICAL I (Electronics)	L	T	P	C
Core-V			-	-	6	4

Objectives:

This paper aims at providing an in- depth knowledge of the operational amplifier. The students will also get the opportunity to practically work out during the lab sessions.

1. Operational Amplifier – Design – Phase – Shift Oscillator,
2. Operational Amplifier – Design – Wein Bridge Oscillator
3. Operational Amplifier – Square wave generator
4. Operational Amplifier – Saw tooth wave generator
5. Operational Amplifier – Triangular wave generator
6. Operational Amplifier – Design of Schmitt Trigger
7. Operational Amplifier – Construction of Monostable Multi vibrator
8. Timer IC NE 555 Schmitt Trigger
9. Clock Generators using 7400 and 7413 ICs
10. Up- Down Counters – Design of modulus counters
11. Arithmetic operations using IC 7483
12. 7490 as modulus counters and display using 7447
13. Study of Multiplexer and Demultiplexer
14. Active Filters using IC 741

COURSE OUTCOME

On successful completion of this practical course the students will able to construct and understand the working principle of OP-Amp based circuits and circuits construct using different ICs.

SEMESTER - II

Course Code	P21PHT21	MATHEMATICAL PHYSICS – II	L	T	P	C
Core-VI			5	-	-	4

OBJECTIVES:

- To develop knowledge in mathematical physics and its applications.
- To develop expertise in mathematical techniques required in physics.
- To enhance problem solving skills.
- To enable students to formulate, interpret and draw inferences from mathematical solutions.

UNIT-I: DIFFERENTIAL EQUATIONS

Homogeneous linear equations of second order with constant coefficients and their solutions – ordinary second order differential with variable coefficients and their solution by power series and Frobenius methods – extended power series method for indicial equations.

UNIT-II: SPECIAL FUNCTIONS – I

Gamma and Beta function- Legendre's differential equation: Legendre polynomials - Generating functions - Recurrence relation - Rodrigue's formula - Orthogonality; Bessel's differential equation: Bessel polynomials - Generating functions - Recurrence relation - Rodrigue's formula – Orthogonality.

UNIT-III: SPECIAL FUNCTIONS – II

Hermite differential equation – Generating functions – Hermite polynomials - Recurrence relations – Rodrigue's formula - Orthogonality:

FOURIER SERIES:

Fourier Series - Functions of Any Period p = 2L - Even and Odd Functions- Half-Range Expansions

UNIT-IV: PARTIAL DIFFERENTIAL EQUATIONS

Solution of Laplace Differential Equation - Two-dimensional flow of heat in cartesian and cylindrical co-ordinates. Solution of heat flow equation in one dimension - Solution of wave equation - Transverse vibrations of a stretched string (Theory).

UNIT - V: INTEGRAL TRANSFORMS

Fourier transforms - cosine and sine transforms - Linearity theorem - Parseval's theorem - solution of differential equation. Laplace transforms - Definition - Linearity, shifting and change of scale properties. Inverse Laplace transforms – Definition - Problems - Solution of differential equation (problems using the above methods).

TEXT BOOKS:

1. A.B. Gupta, Fundamentals of Mathematical Physics, Books and Allied (P) Ltd. 6th Edn., 2016. (Chapter 8, Chapter 14, Chapter 10, Chapter 12 and Chapter 13)

2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons Pvt. Ltd., 2002 (Chapter 2, Chapter 6)
3. Ken F. Riley, Mike P.Hobson, Stephen J. Bence, Mathematical Methods for Physics and Engineering , Cambridge University Press; Third edition, 2018
4. Giampaolo Cicogna, Exercises and Problems in Mathematical Methods of Physics, Springer International Publishing, 2020

BOOKS FOR REFERENCE:

1. B.D. Gupta, Mathematical Physics, Vikas Publishing, 1995.
2. B.S. Rajput, Mathematical Physics, Pragati Prakashan, 20th Edition, 2008.
3. H.K. Dass and Rama Verma, Mathematical Physics, Chand and Company Ltd, 2010.
4. P.K. Chattopadhyay, Mathematical Physics, Wiley Eastern Limited, 1990.
5. Charlie Harper, Introduction to Mathematical Physics, Prentice Hall of India Pvt. Ltd, 1993.
6. L.A. Pipes and L.R. Havevill, Applied Mathematics for Engineers and Physicists, 3rd Edition, McGraw Hill, 1971.
7. Murray R. Spigel, Theory and problems of Laplace Transforms, International edition, McGraw Hill, 1986.

Course Outcomes (CO):

CO1: Understand about differential equation [K2]
CO2: Solve Physics problem using partial differential equations [K3]
CO3: Gain knowledge about special functions[K4]
CO4: Evaluate physical problem using Hermite polynomials and Fourier series [K4]
CO5: Identify right transforms to solve problem in Physics. [K5]

K1- Remember K2- Understand K3- Apply K4- Analyze
K5-Evaluate K6-Create

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	3	3	3	3	2	3	1
CO2	3	3	3	3	3	3	3	3	3	3	1
CO3	3	3	3	2	3	2	3	2	2	2	1
CO4	3	3	3	3	3	3	3	3	3	2	2
CO5	3	3	3	3	3	3	3	3	3	3	2

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHT22	QUANTUM MECHANICS –I	L	T	P	C
Core-VII			5	-	-	4

OBJECTIVES:

- To understand the basic concepts of wave mechanics.
- To study the stationary state and Eigen spectrum of systems using time dependent Schrodinger Equation.
- To solve the exactly soluble Eigen value problems.
- To know the matrix formulation of quantum theory and how it can be used to understand the equation of motion.
- To understand the theory of identical particles and Angular momentum.

UNIT-I: FOUNDATIONS OF WAVE MECHANICS

Postulates of wave mechanics – adjoint and self-adjoint operators-degeneracy-eigen value, eigen functions- Hermitian operator- parity - observables-Physical interpretation-expansion coefficients-momentum eigen functions-Uncertainty principle-states with minimum value-commuting observables -Matter waves – Equation of motion – Schrodinger equation for the free particle–physical interpretation of wave function - normalized and orthogonal wave functions-expansion theorem- admissibility conditions-stationary state solution of Schrodinger wave equation-expectation values-probability current density-Ehrenferts theorem.

UNIT-II: STATIONARY STATE AND EIGEN SPECTRUM

Time independent Schrodinger equation Particle in a square well potential–Bound states–eigenvalues, Eigen functions–Potential barrier–quantum mechanical tunneling- alpha emission.

Identical Particles and Spin:

Identical Particles– symmetry and antisymmetric wave functions–exchange degeneracy – Spin and statistics: Pauli's exclusion principle-Slater determinant-spin and Pauli's matrices.

UNIT-III: EXACTLY SOLUBLE EIGEN VALUE PROBLEMS

One dimensional linear harmonic oscillator–properties of stationary states-abstract operator method- Angular momentum operators-commutation relation – spherical symmetry systems – Particle in a central potential– radial wave function– Hydrogen atom: solution of the radial equation–functions – bound states-rigid rotator.

UNIT-IV: MATRIX FORMULATION OF QUANTUM THEORY, EQUATION OF MOTION & ANGULAR MOMENTUM

Quantum state vectors and functions – Hilbert space - Dirac's Bra-Ket notation-matrix theory of Harmonic oscillator–Equation of motions-Schrodinger, Heisenberg and Interaction representation. **Angular Momentum:** Angular momentum-commutation relation of J_Z, J_+, J_- -eigen values and matrix representationofJ^2, J_Z, J_+, J_-Spin angular momentum –spin½, spin-1-addition of angular momenta- Clebsch - Gordan coefficients.

UNIT – V: SCATTERING THEORY

Kinematics of scattering process – wave mechanical picture - Green's functions–Born approximation and its validity –Born series–screened coulombic potential scattering from Born approximation.

Partial wave analysis

Asymptotic behavior–phase shift–scattering amplitude in terms of phase shifts–differentialandtotalcrosssections–opticaltheorem–lowenergy scattering–resonant scattering–non-resonant scattering-scattering length and effective range.

TEXT BOOKS:

1. P.M. Mathews and K. Venkatesan, A Textbook of Quantum Mechanics, Tata McGraw– Hill Publications, Second Edition,2010 (Unit I –V)
2. G. Aruldhas, A Textbook of Quantum Mechanics, Prentice Hall of India Pvt., Ltd., 2002
3. Satya Prakash, Quantum Mechanics, KedarNath RamNath and Co. Publications,2018.
4. Alastair I. M. Rae, Jim Napolitano, Quantum Mechanics, CRC Press, 2016

BOOKS FOR REFERENCE:

1. A. K. Ghatak and Lokanathan, Quantum Mechanics–Theory and applications, Macmillan India Ltd Publication, Fifth Edition, 2015.
2. Leonard I. Schiff, Quantum Mechanics, McGraw-Hill International Publication, Third Edition, 1968.
3. V.K. Thankappan, Quantum Mechanics, New Age International (P) Ltd. Publication, Second Edition,2003.
4. E. Merzbacher, Quantum Mechanics, John Wiley Interscience Publications, Third Edition, 2011.
5. Claude Cohen -Tannoudji, Bernard Diu, Franck Laloë, Quantum Mechanics (Vol.I) John Wiley Inter science Publications, First Edition,1991.
6. Pauling &Wilson, Quantum Mechanics, Dover Publications, New Edition, 1985.
7. R. Shankar, Principle of Quantum Mechanics Plenum US Publication, Second Edition, 1994.

COURSE OUTCOME:

CO1: Gain knowledge about the fundamentals of wave mechanics. [K1]
CO2: Apply wave mechanics in three dimensions. [K3]
CO3: Estimate the various components of angular momentum. [K5]
CO4: Evaluate the addition of two spin angular momenta. [K5]
CO5: Understand scattering theory and the approximation methods employed in solving quantum mechanical problems. [K2]

K1- Remember K2- Understand K3- Apply K4- Analyze
K5-Evaluate K6- Create

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	2	3	3	2	3
CO2	3	3	3	2	3	3	3	3	2	3	3
CO3	3	3	3	3	3	2	3	3	3	2	3
CO4	2	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	3	2	3	3	3	3	3	3

Strongly correlating (S) : 3 Marks **Moderately correlating (M): 2 Marks**
Weakly correlating (W) : 1 Marks **No correlation (N) : -**

Course Code	P21PHT23	THERMODYNAMICSAND STATISTICAL MECHANICS	L	T	P	C
Core-VIII			4	-	-	4

OBJECTIVES:

- To provide a phenomenological introduction to thermodynamics through thermodynamics postulates, quantities and relations.
- Studying the micro and macroscopic properties of the mater through the statistical probability laws and distribution of particles.
- Understanding the classical and quantum distribution laws and their relations.
- Studying transport properties, different phases of maters, equilibrium and non-equilibrium process.

UNIT- I: THERMODYNAMICS, MICROSTATES AND MACROSTATES

Basic postulates of thermodynamics – Phase space and ensembles – Fundamental relations and definition of intensive variables – Intensive variables in the entropic formulation – Equations of state – Euler relation, densities - Gibbs-Duhem relation for entropy - Thermodynamic potentials– Maxwell relations – Thermodynamic relations – Microstates and macro-states – Ideal gas – Microstate and macro-state in classical systems – Microstate and macro-state in quantum systems – Density of states and volume occupied by a quantum state

UNIT-II: MICROCANONICAL, CANONICAL AND GRAND CANONICAL ENSEMBLES

Microcanonical distribution function – Two level system in microcanonical ensemble – Gibbs paradox and correct formula for entropy – The canonical distribution function – Contact with thermodynamics - Partition function and free energy of an ideal gas –The grand partition function – Relation between grand canonical and canonical partition functions – One-orbital partition function

UNIT-III: BOSE-EINSTEIN, FERMI-DIRAC AND MAXWELL-BOLTZMANN DISTRIBUTIONS

Bose-Einstein and Fermi-Dirac distributions – Thermodynamic quantities – Non-interacting Bose gas and thermodynamic relations – Chemical potential of bosons – The principle of detailed balance – Number density of photons and Bose condensation - Thermodynamic relations for non-interacting Fermi gas – Fermi gas at zero and low temperature – Fermi energy and Fermi momentum - Maxwell-Boltzmann distribution law for microstates in a classical gas - Physical interpretation of the classical limit – Fluctuations in different ensembles

UNIT-IV: TRANSPORT AND NON-EQUILIBRIUM PROCESSES

Derivation of Boltzmann transport equation for change of states without and with collisions – Boltzmann equation for quantum statistics – Equilibrium distribution in Boltzmann equation – Transport processes; One speed and one dimension - All speeds and all directions - Conserved properties - Distribution of molecular velocities – Equipartition and Virial theorems –Random walk - Brownian motion - Non-equilibrium process; Joule-Thompson process - Free expansion and mixing - Thermal conduction - The heat equation.

UNIT-V: HEAT CAPACITIES, USING MODEL AND PHASE TRANSITIONS

Heat capacities of hetero nuclear diatomic gas – Heat capacities of homonuclear diatomic gas – Heat capacity of Bose gas –One-dimensional using model and its solution by variational method – Exact solution for one-dimensional using model - Phase transitions and criterion for phase transitions – Classification of phase transitions by order and by symmetry – Phase diagrams for pure systems – Clausius-Clapeyron equation – Gibbs phase rule

BOOK FOR STUDY

1. E.S.R.Gopal, Statistical Mechanics and Properties of Matter (Theory and Applications), Ellis Horwood Ltd, 1974. (Unit 1-5)

BOOKS FOR REFERENCE:

1. Reif, Fundamentals of Statistical and Thermal Physics, Sarat Book Distributors (2010).
2. B.B. Laud, Fundamentals of Statistical Mechanics, New Age International Private Limited, 2012.
3. C.Kittel, Elementary Statistical Physics, John Wiley & Sons, 2004.
4. F.Reif, Statistical and Thermal Physics, McGraw Hill, Fifth Edition, 2010.
5. Gupta & Kumar, Statistical Mechanics, 20th Edition, Pragati Prakashan, Meerut, 2003.
6. B.K.Agarwal and M.Eisner, Statistical Mechanics, Second Edition, New Age International Private Limited, Delhi, 2016.
7. Keith Stowe , An Introduction to Thermodynamics and Statistical Mechanics, Cambridge University Press; 2nd edition, 2013
8. Piero Olla, An Introduction to Thermodynamics and Statistical Physics, Springer International Publishing, 2015

Course Outcomes (CO):

CO1: Learn basic concept of ensembles [K2]
CO2: Explore the different theories and functions related to properties of gases [K3]
CO3: Distinguish between Bose –Einstein and Fermi- Dirac statistics [K4]
CO4: Exposure about kinetic theory of gases [K2]
CO5: Get knowledge about the different fluctuations in thermodynamics [K2]

K1- Remember **K2- Understand** **K3- Apply**
K4- Analyze **K5-Evaluate** **K6-Create**

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	2	3	3	3	3	3	3	3	3
CO3	3	3	3	2	3	3	3	3	2	3	2
CO4	3	2	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	2	3	3	3	3

Strongly correlating (S) : 3 Marks **Moderately correlating (M): 2 Marks**
Weakly correlating (W) : 1 Marks **No correlation (N) : -**

Course Code	P21PHT24	CONDENSED MATTER PHYSICS – I	L	T	P	C
Core – IX			4	-	-	4

OBJECTIVES:

- To study about structure of crystal and crystal binding
- To grasp knowledge about diffraction of waves by crystals
- To enhance knowledge about crystal imperfections
- To know about lattice dynamics
- To understand theory of electrons

UNIT-1: CRYSTAL PHYSICS: CRYSTAL STRUCTURE

Lattice representation - Simple symmetry operations - Bravais Lattices, Unit cell, Wigner - Seitz cell - Miller planes and spacing - Characteristics of cubic cells - Structural features of NaCl, CsCl, Diamond, ZnS – Close packing.

Crystal Binding*:* Interactions in inert gas crystals Van der Waals Interaction – Repulsive Interaction – Equilibrium lattice constant - cohesive energy - ionic crystals and Madelung energy - Covalent bonding – Hydrogen bonding – metallic bonding.

UNIT-2: DIFFRACTION OF WAVES AND PARTICLES BY CRYSTALS

Diffraction of waves by Crystals X-ray diffraction – The Laue equations – Equivalence of Bragg and Laue equations – Interpretation of Bragg equation – Ewald construction – Brillouin zones- Reciprocal lattice – Reciprocal lattice to SC, BCC and FCC crystals- Importance properties of the Reciprocal lattice – Diffraction Intensity - The Powder method – Powder Diffractometer - The Laue method -The Rotating Crystal method - Neutron Diffraction - Electron diffraction.

UNIT-3: CRYSTAL IMPERFECTIONS AND ORDERED PHASES OF MATTER

Point imperfections – Concentrations of Vacancy, Frenkel and Schottky imperfections – Line Imperfections – Burgers Vector – Presence of dislocation – surface imperfections-Polorans – Excitons.

Ordered phases of matter: Translational and orientation order - Kinds of liquid crystalline order - Quasi crystals - Superfluidity.

UNIT-4: LATTICE DYNAMICS

Theory of elastic vibrations in mono and diatomic lattices - Phonons – Dispersion relations - Phonon momentum.

Heat Capacity

Specific heat capacity of solids – Dulong and Petit's law - Vibrational modes - Einstein model - Density of modes in one and three dimensions - Debye Model of heat capacity.

Anharmonic Effects

Explanation for Thermal expansion, Conductivity and resistivity – Umklapp process.

UNIT-5: THEORY OF ELECTRONS

Energy levels and Fermi-Dirac distribution for a free electron gas – Periodic boundary condition and free electron gas in three dimensions – Heat capacity of the electron gas – Ohm's law, Matthiessen's rule – Hall effect and magnetoresistance – Wiedemann – Franz law.

Nearly free electron model and the origin and magnitude of energy gap – Bloch functions - Bloch theorem - Motion of an electron in a periodic potential – Kronig – Penney model - Approximate solution near a zone boundary –Metals, semiconductors and insulators – effective mass – Limitations of K-P model – Tight binding approach - Construction of Fermi surfaces: Reduced and periodic zone schemes of construction- de Haas – van Alphen effect.

TEXT BOOKS:

1. Charles Kittel, Introduction to Solid State Physics, 7th Edition, Wiley India Pvt. Ltd, New Delhi, 2004. (Unit 1-V)
2. Rita John, Solid State Physics, Tata Mc Graw Hill Publications, 2014.
3. M. A. Wahab, Solid State Physics, Structure and Properties of Materials. Narosa, New Delhi, 1999.

BOOKS FOR REFERENCE:

1. Steven M. Girvin, Kun Yang, Modern Condensed Matter Physics, Cambridge University Press, 2019.
2. J. Blakemore, Solid State Physics, 2nd Edition, W. B. Saunders Co, Philadelphia, 1974.
3. J.D. Patterson, B.C. Bailey Solid-State Physics: Introduction to the Theory, Springer Publications, 2007.
4. M. Ali Omar, Elementary Solid-State Physics – Principles and Applications, Pearson, 1999.
5. C. M. Kachhava, Solid State Physics, Tata McGraw Hill, New Delhi, 1990.
6. N. W. Aschroft and N. D., Mermin, Solid State Physics, Rhinehart and Winton, New York. 1976.
7. M. Tinkham, Introduction to Superconductivity, Tata McGraw Hill, New Delhi, 1996.
8. K.K.Chattopadhyay, A.N.Banerjee, Introduction to Nanoscience & Nanotechnology, PHI learning private Ltd., Delhi 2014.
9. A. J. Dekker, Electrical Engineering Materials, Prentice Hall of India, 1975.
10. S.O. Pillai, Problems and Solutions in Solid State Physics, New Age international Publishers, New Delhi, 1994.

Course Outcomes

CO1: Understand about crystal structure and crystal binding [K1]
CO2: Calculate structure parameters of crystal and analyze reciprocal lattice of crystal [K4]
CO3: Analyze the defects in crystals [K4]
CO4: Understand the thermal parameters of crystal [K2]
CO5: Calculate parameters involved in Semiconductor. [K5]

K1- Remember **K2- Understand** **K3- Apply**
K4- Analyze **K5- Evaluate** **K6- Create**

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3	3	2	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	3	2	2	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHP22	PRACTICAL II (Non-Electronics)	L	T	P	C
Core –X			-	-	6	4

Objectives:

The course aims at exposing the students to the intricacies of handling general equipment's and analysis of results. This laboratory session also aims the students to analysis the data given by Indian Institute of Astrophysics, Kodaikanal.

1. Solar Spectrum – Hartmann's Interpolation formula
2. Electrical resistance of a metal / an alloy by four probe method – as a function of temperature
3. Measure of numerical aperture (NA) of a telecommunication-grade Optic fiber
4. Fiber attenuation of a given optical fiber
5. Laser Experiments
6. Zeeman effect
7. Band Gap of Thermistor
8. Determination of Solar Constant
9. Michelson Interferometer – Wavelength and separation of wavelengths
10. Michelson Interferometer- Thickness of a mica sheet / thin film
11. Susceptibility – Quinke's or Gouy's method
12. Hall Effect
13. Spectral analysis of a salt by FTIR
14. Absorption spectra
15. Ultrasonics – Compressibility of a liquid
16. Ultrasonics – Compressibility of a solid
17. B-H curve using CRO
18. Calibration of a Gamma ray spectrometer and determination of the energy of unknown source
19. Any 4 experiments on Astrophysics to be recommended by **IIA**

Course Outcomes:

On successful completion of this course the students will

- Understand the concept and get hands on training on instruments
- Give acquaintance to measure and determine various physics constant using various physics instruments
- Apply different physics concept to analyze the data
- Analysis the data obtain from Indian Institute of Astrophysics, Kodaikanal and get information about different astronomical objects.

Course Code	P21PHS221	DATA ANALYSIS BY ORIGIN SOFTWARE	L	T	P	C
Supportive Course – II			2	-	-	2

Objectives:

- To develop understanding of the basics of Data analysis using Origin software.
- To enhance practical skills to analyse data using Origin software.
- To Determine baseline and curve fitting
- To Acquire skills to install and start-up origin software
- To Analyse data with Origin 7.5 version

Unit 1: Basic Data Analysis

Starting Origin, Reading Data, Subtracting Reference Data, Viewing Worksheet Data, Normalizing the Data, creating a Baseline, Fitting the Data, The Fitting Session, Calibration, Error analysis. Setting Range and Integrating the Data, Displaying the Integration Results, Plotting the Integration Area Data

Unit 2: Baseline Determinations & Curve Fitting

Starting the Baseline Session, User Adjustment of Linear Segments, choosing a Baseline Option, Cursor Draw Baseline -General Comment, Fitting Example 1, Fitting Example 2, Fitting Example3 χ 2 (chi-sqr) Minimization, Response Time – VP-DSC, Line Types for Fit Curves, Inserting an Origin graph into Microsoft® Word.

Unit 3: Origin version 7.5

Introduction, installing origin, uninstalling origin, selecting a User Files Folder, Licensing Origin, Registering Origin, Setting the Origin Display Language.
Introduction, Data Exchange, Analysis, Programming, The Origin Workspace, Origin Project Files, Project Windows, Window Templates, Themes, Tutorials

Reference

1. DSC Data Analysis in Origin ® Tutorial Guide Version 5.0 - October 1998
2. https://www.chem.purdue.edu/courses/chm224/Miscellaneous/INTRODUCTION%20TO%20ORIGIN%202012.pdf
3. https://www.originlab.com/pdfs/GettingStarted.PDF
4. https://www.originlab.com/pdfs/Origin_8.1_Getting_Started_Booklet.pdf

Course Outcome:

CO1: Understand basics of data analysis [K2]
CO2: Identify the selector tools and integrating the data [K4]
CO3: Determine baseline and curve fitting [K5]
CO4: Computing χ 2 and making use of details in Origin [K5]
CO5: Acquire skills to install and start-up origin software 7.5 version [K2]

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	3
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	2	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	2	3	3	3	3	3	2	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHS222	MATLAB PROGRAMMING	L	T	P	C
Supportive Course – II			2	-	-	2

The main objectives are:

1. Understanding the MATLAB environment
2. Know about MATLAB programming
3. Write simple programs in MATLAB to solve scientific and mathematical problems
4. Apply for Array operations and solving linear equations
5. Plotting using MATLAB

Unit I Basic features
Creating MATLAB variables - Overwriting variable - Error messages - Making corrections - Controlling the hierarchy of operations or precedence - Controlling the appearance of floating point number - Managing the workspace - Keeping track of your work session - Entering multiple statements per line - Miscellaneous commands - Getting help

Unit II Introduction to programming in MATLAB
Introduction - M-File Scripts - Examples - Script side-effects - M-File functions - Anatomy of a M-File function - Input and output arguments - Input to a script file - Output commands

Unit III Matrix generation
Entering a vector - Entering a matrix - Matrix indexing - Colon operator - Creating a sub-matrix - Deleting row or column – Dimension - Transposing a matrix - Matrix generators

Unit IV Array operations and solving linear equations
Matrix arithmetic operations - Array arithmetic operations - Matrix inverse - Matrix functions Introduction to programming in MATLAB

Unit V Basic plotting
Overview - Creating simple plots - Adding titles, axis labels, and annotations - Multiple data sets in one plot - Specifying line styles and colors.

Books for References:

1. David Houcque, Introduction to Matlab for Engineering Students, Northwestern University (version 1.2), August 2005
2. S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India (1983)
3. S.C. Chopra and R.C. Canale, Numerical Methods for Engineering, McGraw-Hill (1989).
4. Numerical Methods for Scientists and Engineers, Prentice Hall of India (1988). 49 I
5. http://www.mathworks.com/help/pdf_doc/matlab/getstart.pdf
6. http://www.mathworks.com/matlabcentral
7. http://www.mathworks.com/company/newsletters/

Course outcomes

CO1: Understand the necessity features of MATLAB [K1]
CO2: Learn about the programming in MATLAB [K2]
CO3: Expertise to write simple programme [K3]
CO4: Acquire skills to solve problems [K4]
CO5: Apply to plot graph [K5]

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	1	1	1	3	2	1	1	1	3	1
CO2	2	1	1	1	3	2	1	1	1	3	1
CO3	2	1	1	1	3	2	1	1	1	3	1
CO4	2	1	1	1	3	2	1	1	1	3	1
CO5	2	1	1	1	3	2	1	1	1	3	1

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

SEMESTER - III

Course Code	P21PHT31	ELECTROMAGNETIC THEORY	L	T	P	C
Core -XI			5	-	-	4

OBJECTIVES:

- To develop theoretical knowledge in electromagnetism.
- To develop skills on solving analytical problems in electromagnetism.
- To give basics of defining the complete electromagnetic response of complex systems.

UNIT -I: ELECTROSTATICS

Coulomb's law; the electric field – line, flux and Gauss's Law in differential form - the electrostatic potential; conductors and insulators; Gauss's law - application of Gauss's law – curl of E - Poisson's equation; Laplace's equation – work and energy in electrostatics – energy of a point charge distribution – energy of continuous charge distribution – induced charges – capacitors. Potentials: Laplace equation in one dimension and two dimensions – Dielectrics – induced dipoles – Gauss's Law in the presence of dielectrics.

UNIT- II: MAGNETOSTATICS

Lorentz force – magnetic fields – magnetic forces – currents – Biot-Savart Law – divergence and curl of B – Ampere's Law – Electromagnetic induction - comparison of magnetostatics and electrostatics – Magnetic vector potential. Magnetization: effect of magnetic field on atomic orbit – Ampere's Law in magnetized materials – ferromagnetism.

UNIT-III: **ELECTROMOTIVE FORCE**

Ohm's Law – electromotive force – motional emf – Faraday's Law – induced electric field – inductance – energy in magnetic field – Maxwell's equation in free space and linear isotrophic media – continuity equation – Poynting theorem.

Electromagnetic waves in vacuum: Waves in one dimension – wave equation – sinusoidal waves – reflection and transmission – Polarization.

UNIT-IV: ELECTROMAGNETIC WAVES

The wave equation for E and B – Monochromatic Plan waves – energy and momentum in electromagnetic waves – electromagnetic waves in matters –TE waves in rectangular wave guides – the co-axial transmission line. Potentials: potentials and fields – scalar and vector potentials – Gauge transformation – Coulomb Gauge and Lorentz Gauge – Lorentz force law in potential form.

UNIT-V: APPLICATION OF ELECTROMAGNETIC WAVES

Boundary conditions at the surface of discontinuity – Reflection and refraction of E.M waves at the interface of non – Conducting media – Kinematic and dynamic properties – Fresnel's equation – Electric field vector 'E' parallel to the plane of incidence and perpendicular to the plane of incidence – Reflection and transmission co-efficients at the interface between two non–Conducting media – Brewster's law and degree of polarization – Total internal reflection.

TEXT BOOKS:

1. B.B Laud, Electromagnetics, Wiley Eastern Company, 2000. (Unit 1-5)
2. David J. Griffiths, Introduction to Electrodynamics, 4th Edition, Pearson, 2015.
3. Sathya Prakash, Electromagnetic Theory and Electrodynamics, KedarNath Ram Nath and Co, 2017.
4. Wazed Miah, Fundamentals of Electromagnetic, Tata Mc Graw Hill, 1980.
5. George E. Owen, Introduction to Electromagnetic Theory, Dover Publications, 2013
6. Narayana Rao, Basic Electromagnetics with Application, (EEE) Prentice Hall, 1997.

BOOKS FOR REFERENCE:

1. John R.Reitz, Frederick J Milford and Robert W.Christy, Fundamentals of Electromagnetic Theory, Third edition, Narosa Publishing House, New Delhi, 1998.
2. J.D. Jackson, Classical Electrodynamics, II Edition, Wiley Eastern Limited, 1993.
3. P.Lorrain and D.Corson Electromagnetic Fields and Waves, W.H.Freeman & Co Ltd; 2nd edition,1970

Course Outcomes (CO):

CO1: Learn the fundamentals of electrostatics [K1]
CO2: Acquire the knowledge about magnetostatics [K2]
CO3: Gain knowledge about the Maxwell equation [K2]
CO4: Learn about electromagnetic waves [K2]
CO5: Apply electromagnetic waves for different field [K3]

K1- Remember K2- Understand K3- Apply K4- Analyze
K5-Evaluate K6- Create

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	2	3	2	3
CO3	3	2	3	3	3	3	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	1	2
CO5	3	3	2	3	3	3	3	2	3	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHT32	QUANTUM MECHANICS –II	L	T	P	C
Core -XII			5	-	-	4

OBJECTIVES:

- To study the effect of magnetic and electric field on quantum particles.
- To learn about the approximation methods for time independent and time dependent perturbation theory.
- To understand the kinematics of scattering process
- To study the theory of relativistic quantum mechanics and field quantization.
- To study the quantum theory of atomic and molecular structures.

UNIT-I: APPROXIMATION METHODS FOR TIME INDEPENDENT PROBLEMS

Time independent perturbation theory –stationary theory - non-degenerate case: first and second order-Normal Helium atom– Zeeman effect without electron spin – Stark effect in hydrogen molecule - Degenerate case: Energy Correction-Stark effect in hydrogen atom.

UNIT-II: APPROXIMATION METHODS FORTIME DEPENDENT PERTURBATION THEORY

Time dependent Perturbation theory –first order transitions–constant perturbation-transition probability: Fermi Golden Rule–Periodic perturbation –harmonic perturbation– a diabatic and sudden approximation.

Semi-classical theory of radiation: Application of the time dependent perturbation theory to semi-classical theory of radiation – Einstein's coefficients – absorption – induced emission-spontaneous emission–Einstein's transition probabilities-dipole transition-selection rules– for bidden transitions.

UNIT-III VARIATION METHOD

Variation method: Variation Principle – upper bound states – ground state of Helium atom– Hydrogen molecule – WKB approximation – Schrodinger equation – Asymptotic solution - validity of WKB approximation – solution near a turning point– connection formula for penetration barrier– Bohr-Summer field quantization condition-tunneling through a potential barrier.

UNIT–IV: QUANTUM THEORY OF ATOMIC AND MOLECULAR STRUCTURE

Central field approximation: Residual electrostatic interaction-spin-orbit interaction-Determination of central field: Thomas Fermi statistical method – Hartree and Hartree-Fock approximations (self consistent fields) –Atomic structure and Hund's rule.

Molecules

Born – Oppenheimer approximation –An application: the hydrogen molecule Ion (H_2^+) – Molecular orbital theory: LCAO approximation- Hydrogen molecule.

UNIT-V: RELATIVISTIC QUANTUM MECHANICS &QUANTIZATION OF THE FIELD

Schrodinger relativistic equation – Klein-Gordan equation – charge and current densities– interaction with electromagnetic field – Hydrogen like atom – non relativistic limit - Dirac relativistic equation: Dirac relativistic Hamiltonian–probability density-Dirac matrices-plane

wave solution–eigen spectrum –spin of Dirac particle –significance of negative eigenstates– electron in a magnetic field– spin magnetic moment.

Quantization of the Field

Quantization of wave fields- Classical Lagrangian equation- Classical Hamiltonian equation- Field quantization of the non-relativistic Schrodinger equation- Creation, destruction and number operators- Anti commutation relations- Quantization of Electromagnetic field energy and momentum.

TEXT BOOKS:

1. P.M. Mathews and K.Venkatesan, A Text book of Quantum Mechanics- TataMcGraw– Hill Publications, Second Edition,2010.**(Unit I – V)**
2. Satya Prakash, Quantum Mechanics, Kedar Nath Ram Nath and Co. Publications, 2018.
3. Claude Cohen-Tannoudji, Bernard Diu, Franck Laloë, Quantum Mechanic (Vol.II), Quantum Mechanics (Vol. II), John Wiley Publications, 2008.

BOOKS FOR REFERENCE:

1. V.K.Thankappan, Quantum Mechanics, New Age International (P) Ltd. Publication, Second Edition,2003.
2. Franz Schwabl, Quantum mechanics, Narosa Publications, Fourth Edition, 2007.
3. P.W. Atkins and R.S. Friedman, Molecular Quantum mechanics, Oxford University Press Publication, Fifth Edition, 2010.
4. A.K. Ghatak and Lokanathan, Quantum Mechanics–Theory and Applications, Macmillan India Ltd Publication, Fifth Edition, 2015.
5. Leonard I. Schiff, Quantum Mechanics, McGraw-Hill International Publication, Third Edition,1968.
6. E. Merzbacher, Quantum Mechanics-John Wiley Interscience Publications, Third Edition, 2011.
7. Edwin C. Kemble, Fundamental principles of Quantum mechanics with elementary applications - Dover Publications,2005.
8. R. Shankar, Principle of Quantum Mechanics - Plenum US Publication, Second Edition, 1994.

COURSE OUTCOMES:

CO1: Describe the advanced knowledge in quantum mechanics [K1]

CO2: Understand the effect of magnetic and electric field on quantum particles. [K2]

CO3: Analyze Approximation methods for time independent problems and for time dependent perturbation theory [K4]

CO4: Apply different approximation methods to quantum particles. [K3]

CO5: Analyze the theory of relativistic quantum mechanics and quantization of field. [K4]

K1- Remember **K2- Understand** **K3- Apply**
K4- Analyze **K5-Evaluate** **K6-Create**

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	2	3	3	3	3
CO2	3	3	3	3	3	2	3	3	3	3	3
CO3	3	2	3	2	3	3	3	2	3	2	3
CO4	3	3	2	3	3	3	3	3	2	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Strongly correlating (S) : 3 Marks **Moderately correlating (M): 2 Marks**
Weakly correlating (W) : 1 Marks **No correlation (N) : -**

Course Code	P21PHT33	CONDENSED MATTER PHYSICS – II	L	T	P	C
Core – XIII			4	-	-	4

OBJECTIVES:

- To develop knowledge on dielectric properties of materials
- To understand the phenomenon of ferroelectrics and piezoelectrics
- To grasp knowledge on various magnetic properties of materials
- To know about superconductivity
- To acquire knowledge on physics involved in nanosolids

UNIT – I: THEORY OF DIELECTRICS

Dipole moment – Polarization – The electric field of a dipole – Local electric field at an atom – Clausius –Mosotti equation - Dielectric constants and its measurements - Polarizability – The Classical theory of electronic polarizability – Ionic polarizabilities - Orientational polarizabilities - The polarizability catastrophe - Dipole orientation in solids - Dipole relaxation and dielectric losses – Debye Relaxation time - Relaxation in solids - Complex dielectric constants and the loss angle - Frequency and temperature effects on Polarization – Dielectric breakdown and dielectric loss

UNIT – II: THEORY OF FERROELECTRICS AND PIEZO ELECTRICS

Ferroelectric Crystals – Classifications of Ferroelectric crystals - Dipole theory of ferroelectricity – Landau Theory of the phase transition – Second order Transition – First Order Transition - Ferroelectric Transition - One-Dimensional Model of the Soft Mode of Ferroelectric Transitions – Antiferroelectricity - Ferroelectric domains – Ferroelectric domain wall motion – Piezoelectricity - Phenomenological Approach to Piezoelectric Effects - Piezoelectric Parameters and Their Measurements -Piezoelectric Materials

UNIT – III: MAGNETIC PROPERTIES OF MATERIALS

Terms and definitions used in magnetism – Classification of magnetic materials – Atomic theory of magnetism – The quantum numbers- The origin of permanent magnetic moments – Langevin's classical theory of diamagnetism – Sources of paramagnetism – Langevin's classical theory of paramagnetism – Quantum theory of paramagnetism – Paramagnetism of free electrons - Ferromagnetism – The Weiss molecular field – Temperature dependence of Spontaneous magnetization – The physical origin of Weiss Molecular field - Ferromagnetic domains - Domain theory – Antiferromagnetism – Ferrimagnetism – Structure of Ferrite.

UNIT – IV: SUPERCONDUCTIVITY

Occurence of super conductivity - Destruction of super conductivity by magnetic fields - Meissner Effect – Type I and Type II Super conductors - Heat Capacity - Energy gap - Microwave and infrared properties - Isotope effect - Thermodynamics of the superconducting transition - London equation - Coherence Length - BCS theory of superconductivity, BCS ground state - Flux quantisation in a super conduction ring - Duration of persistence currents - Single particle tunnelling - DC Josephson effect - AC Josephson effect - Macroscopic quantum interference – High temperature super conductors – Applications.

UNIT – V: PHYSICS OF NANOSOLIDS

Definition of nanoscience and nanotechnology – Nanoparticles – Metal nanoclusters – Semiconductor nanoparticles - Preparation of nanomaterials – Surface to volume ratio – Quantum confinement – Qualitative and Quantitative description – Density of states of nanostructures – Bulk solid- quantum dots - quantum wires - quantum well - Excitons in Nano semiconductors – Properties of Nanomaterials – Carbon in nanotechnology – Graphite – Graphene –Fullerenes- Carbon nanotubes

TEXT BOOKS:

1. Charles Kittel, Introduction to Solid State Physics, 7th Edition, Wiley India Pvt. Ltd. , New Delhi, 2004. (Unit I-IV)
2. Rita John, Solid State Physics, Tata Mc Graw Hill Publications, 2014.
3. M. A. Wahab, Solid State Physics – Structure and Properties of Materials. Narosa, New Delhi, 1999.
4. J.D. Patterson, B.C. Bailey Solid-State Physics: Introduction to the Theory, Springer Publications, 2007.
5. M. Ali Omar, Elementary Solid-State Physics – Principles and Applications, Pearson, 1999.
6. G. Grosso, G. Parravicini, Solid State Physics, Academic Press, 2013

BOOKS FOR REFERENCE:

1. J. Blakemore, Solid State Physics, 2nd Edition, W. B. Saunders Co, Philadelphia, 1974.
2. C. M. Kachhava, Solid State Physics, Tata McGraw Hill, New Delhi, 1990.
3. N. W. Aschroft and N. D., Mermin, Solid State Physics, Rhinehart and Winton, New York. 1976.
4. M. Tinkham, Introduction to Superconductivity, Tata McGraw Hill, New Delhi, 1996.
5. K.K.Chattopadhyay, A.N.Banerjee, Introduction to Nanoscience & Nanotechnology, PHI Learning private Ltd., Delhi 2014.
6. A. J. Dekker, Electrical Engineering Materials, Prentice Hall of India, 1975.
7. S.O. Pillai, Problems and Solutions in Solid State Physics, New Age international Publishers, New Delhi, 1994.
8. A.K. Bain, P. Chand, Ferroelectrics, Wiley, 2017.
9. Kwan Chi Kao, Dielectric phenomena in solids with emphasis on physical concepts of electronic processes, Elsevier Academic Press, 2004
10. Alexander O. E. Animalu, Intermediate Quantum Theory of Crystalline solids, Prentice Hall of India, New Delhi, 1978.
11. Eleftherios N. Economou, The Physics of Solids – Essentials and Beyond, Springer, 2010.

Course Outcomes (CO)

On completion of this course, the learners are able to

CO1: understand about dielectric properties [K2]

CO2: Gain knowledge about ferroelectrics and piezoelectrics materials [K1]

CO3: analyze the various kinds of magnetic materials [K4]

CO4: analyze different types of superconductors [K4]

CO5: understand about low dimensional physics behind different nanosolids. [K6]

K1- Remember K2- Understand K3- Apply

K4- Analyze K5-Evaluate K6- Create

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	2	3	2	3	3	3	2	3	3
CO5	3	3	3	3	2	3	3	3	3	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHT34	NUCLEAR AND PARTICLE PHYSICS	L	T	P	C
Core - XIV			4	-	-	4

Objectives:

- Know about the properties of nuclei
- Study the nuclear models
- Understand the concept of radioactivity
- Understand the elementary particles
- Thorough knowledge on nuclear reactions

UNIT-I: NUCLEAR FORCES

Characteristics of Nucleus Forces – Exchange forces and tensor forces – charge independence-Spin dependence of Nucleus Forces - Meson theory of nuclear forces- Ground state of deuteron- Nucleon-nucleon scattering singlet and triplet parameters – Nucleon-Nucleon scattering: Cross-section, Differential Cross-section, Scattering Cross-sections – magnetic moment- Quadrupole moment –S and D state admixtures - Effective range theory of n-p scattering at low energies.

UNIT-II: NUCLEAR MODELS

Binding energy & mass defect – Weizacker's formula – mass parabola - Liquid drop model - Bohr -Wheeler theory of fission- Activation energy for fission- Shell model- Spin –Orbit coupling-Spins of nuclei- Magnetic moments – Schmidt lines- Electric quadrupole moments - Collective model of Bohr and Mottelson: Nuclear vibration – Nuclear rotation –Nelson model.

UNIT-III: NUCLEAR REACTIONS

Nuclear reaction - Q- value – Nuclear reaction cross section – Direct Nuclear Reactions: Knock out reaction, Pick-up reaction, Stripping reaction – Nuclear fission –Nuclear fusion – Nuclear reactor-Compound nucleus theory – Formation – Disintegration energy levels – Resonance Scattering and Reaction cross-section (Breit-Wigner dispersion formula) – Scattering matrix - Reciprocity theorem – Breit -Wigner one level formula – Resonance scattering – Absorption cross section at high energy.

UNIT-IV: RADIOACTIVE DECAYS

Alpha decay - Beta decay –Energy release in beta decay – Fermi theory of beta decay – Shape of the beta spectrum – decay rate Fermi-Curie plot – Fermi & G.T Selection rules - Comparatives half - lives and forbidden decays- Gama decay - Multipole radation – Angular momentum and parity selection rules – Internal conversion – Nuclear isomerism.

UNIT-V: ELEMENTRY PARTICLE PHYSICS

Classification of elementary particles - Types of interaction between elementary particles – Unification of Different Interactions-Hadrons and leptons – Symmetry and conservation laws – Strangeness and associate production - CPT theorem – classification of hadrons – Quark model - Isospin multiples - SU(2)- SU(3) multiplets- Gell-Mann - Okubo mass formula for octet and decuplet hadrons – Phenomenology of weak interaction hadrons and leptons - Universal Fermi interaction –Cosmic rays-introduction-discovery.

TEXT BOOKS:

1. B. B. Cohen, Concepts of Nuclear Physics, TMGH, Bombay, 1971. (Unit I to II)
2. D.C. Tayal, Nuclear Physics, Himalaya Publishing House Pvt., Ltd., V edition, 2018.(III to IV)
3. D. Griffiths, Introduction to Elementary Particles, 2nd Ed., Wiley-Vch, 2008 (V)
4. K. Krane, Introductory Nuclear Physics, Wiley, New York, 1987.

BOOKS FOR REFERENCE:

1. V. Devanathan, Nuclear Physics, Narosa Publishing house, 2012.
2. S. N. Ghoshal, Nuclear Physics, S. Chand and Co., II edition, 1994.
3. Irving Kaplan, Nuclear Physics, Narosa Publishing House, 2012.
4. B.N. Srivatsava, Basic Nuclear Physics and Cosmic Rays, Pragati Prakashan publications, Meerut, Edition: XVII, 2016.
5. M.L. Pandya and P.R.S Yadav, Elements of Nuclear Physics, Kedar Nath Ram Nath publications, Meerut, 2016.

Course Outcomes (CO):

CO1: Learn about nuclear forces [K1]
CO2: Acquire knowledge about different nuclear models [K2]
CO3: Understand about different nuclear reactions [K2]
CO4: Gain knowledge about Q-value and theories of nuclear reactions [K4]
CO5: Learn about different classification and properties of elementary particles [K4]

K1- Remember **K2- Understand** **K3- Apply**
K4- Analyze **K5-Evaluate** **K6- Create**

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	2	2	2	2	2	2	3
CO2	3	3	3	3	3	2	3	2	3	2	2
CO3	3	3	2	3	3	3	3	3	3	3	2
CO4	3	3	3	3	2	3	2	3	3	3	3
CO5	3	2	3	3	3	3	3	2	3	2	3

Strongly correlating (S) : 3 Marks **Moderately correlating (M): 2 Marks**
Weakly correlating (W) : 1 Marks **No correlation (N)** : -

Course Code	P21PHT35	SPECTROSCOPY	L	T	P	C
Core – XV			4	-	-	4

OBJECTIVES:

- To give advanced knowledge infrared Spectroscopy
- To enhance knowledge about Raman Spectroscopy
- To study about electronic spectroscopy
- To know about NMR and ESR
- To gain knowledge about NQR and Mossbauer Spectroscopy

UNIT-I: INFRARED SPECTROSCOPY

Vibrational energy of a diatomic molecule- Infrared selection rules-Vibrating diatomic molecule Diatomic vibrating rotator- Vibrations of polyatomic molecules-Fermi resonance-Rotation vibration spectra of polyatomic molecules-Normal modes of vibration in crystal-Interpretation of vibrational spectra-Group frequencies-IR spectrophotometer-Instrumentation-Sample handling techniques-Fourier Transform Infrared spectroscopy-Applications

UNIT II: RAMAN SPECTROSCOPY

Introduction-Theory of Raman scattering-Rotational Raman spectra-Vibrational Raman spectra Mutual Exclusion principle-Raman spectrometer-Sample handling techniques-Polarization of Raman scattered light-Structure determination using IR and Raman spectroscopy-Raman investigation of phase transitions-Resonance Raman scattering-Nonlinear Raman phenomena Preliminaries-Hyper Raman effect-Stimulated Raman scattering-Inverse Raman effect-Coherent Anti-Stokes Raman scattering.

UNIT III: ELECTRONIC SPECTROSCOPY

Structure of atoms- Electronic Angular Momentum – Many Electron atoms – Angular momentum of Many Electron atom – Photoelectron Spectroscopy – Zeeman effect – Influence of Nuclear spin – Electronic spectra of Diatomic molecule – Electronic structure of diatomic molecules- Electronic spectra of Polyatomic molecule-Chemical analysis by Electronic Spectroscopy

UNIT IV: NUCLEAR MAGNETIC AND ELECTRON SPIN RESONANCE SPECTROSCOPY

Basic principles – Quantum theory of NMR - magnetic resonance – relaxation processes – chemical shifts – spin-spin coupling - Spectra and molecular structure – Fourier Transform NMR –Instrumentation – Applications. Basic principles – Quantum theory - g-factor – Nuclear Interaction and Hyperfine structure – Relaxation effects - Hyperfine interaction – line widths – ESR spectrometer – Instrumentation – applications.

UNIT V: NUCLEAR QUADRUPOLE RESONANCE AND MOSSBAUER SPECTROSCOPY

Basic theory - Nuclear Electric quadrupole interaction – Energy levels – Transition frequency – Excitation and Detection – Effect of magnetic field – Instrumentation – applications. Mossbauer effect - recoilless emission and absorption - hyperfine interaction - chemical isomer shift - magnetic hyperfine and electric quadruple interactions – ` Instrumentation – applications.

TEXT BOOKS:

1. Colin N. Banwell, Elaine M. McCash, Fundamentals of Molecular Spectroscopy (Fourth Edition), Tata McGraw-Hill Publishing Company Ltd, 2017. (Chapter 3-7)

BOOKS FOR REFERENCE:

1.Donald L. Pavia Introduction to Spectroscopy, Cengage Learning India Private Limited, 5th Edn. 2015
2. K. Veera Reddy, Symmetry and Spectroscopy of Molecules, New Age International Publisher, 2021.
3. J.D. Graybeal, Molecular Spectroscopy, McGraw-Hill, New York, 1988.
4. Hollas, Michael, Modern Spectroscopy (Fourth Edition) John Wiley, New York, 2004.
5.R.P Straughen, S.Walker, Spectroscopy Vols.I,II and III, Chapman & Hall, London, 1976.

Course Outcomes (CO):

CO1: Understand about principle and concept of different kinds of spectroscopy [K2]
CO2: Acquisition of knowledge about working procedure of spectroscopic instruments. [K2]
CO3: Analyze the properties of the materials using various spectroscopic **techniques** [K4]
CO4: Experimenting spectroscopic tools for research [K4]
CO5: Acquire sound instrumentation skills [K2]

K1- Remember **K2- Understand** **K3- Apply**
K4- Analyze **K5-Evaluate** **K6-Create**

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3	3	3	3	3
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	2	3	3	3	3	3	3	3	3	3

Strongly correlating (S) : 3 Marks **Moderately correlating (M): 2 Marks**
Weakly correlating (W) : 1 Marks **No correlation (N) : -**

Course Code	P21PHP33	PRACTICAL III (C Programming)	L	T	P	C
Core – XVI			-	-	6	4

Objectives:

The course aims at exposing the students to solve different numerical equation by C programming.

1. Ascending and descending order of numbers and characters
2. Matrix addition, subtraction and multiplication
3. Transpose of a matrix
4. Evaluating a root of non-linear equation by Newton-Raphson method using external function
5. Program to solve system of linear equations using simple Gaussian elimination method
6. Program for straight line fit using the method of least squares for a table of data points
7. Program for polynomial curve fitting
8. Program to integrate any function or tabulated data using trapezoidal rule
9. Program to integrate any function or tabulated data using Simpson's rule
10. Program to compute the solution of a first order differential equation of type y'=f(x,y) using the fourth order Runge-Kutta method
11. Program to compute the interpolation value at a specified point, given a set of data points using Lagrangian interpolation representation
12. Program to compute the interpolation value at a specified point, given a set of data points using Newton's interpolation representation
13. Program to calculate and print the mean, variance and standard deviation of set of N numbers
14. Program to solve the quadratic equation
15. Program to read a set of numbers, count them and find and print the largest and smallest numbers in the list and their positions in the list

Course Outcomes (CO):

Upon successful completion of this course the students will able to write C program for different mathematical problems.

SEMESTER - IV

Course Code	P21PHE411	ASTRONOMY AND ASTROPHYSICS	L	T	P	C
Elective -I			4	-	-	4

Objectives:

- To enhance knowledge on the concepts of coordinate system and stellar spectra
- To understand about astronomical instruments,
- To grasp knowledge about cosmology
- To acquire knowledge about concepts of stellar evolution

Unit I: BASIC CONCEPTS & CELESTIAL MECHANICS

Coordinate systems, systems of time, parallaxes, distances, Luminosity, Apparent and absolute magnitudes, stellar radial velocities, masses, Binary stars, stellar spectra, spectral classification, HR diagram, Variable stars (definition only)

Unit II: ASTRONOMICAL INSTRUMENTS AND OBSERVATIONAL TECHNIQUES & SOLAR PHYSICS

Varieties of optical telescopes (Reflecting, Refracting, Catadioptrics), Angular resolution, Focal length and Focal Ratio, Imperfections in optics, large telescopes - TMT, Segmented mirrors, spectrographs, Filters, Adoptive optics, Characteristics, Photometers, UBV System, color index, atmospheric effects, CCD camera.

Solar Interior structure (Pressure Density, temperature, generation of energy, radiative and convective zones), Solar Neutrino – future of Neutrino studies.

Solar Atmosphere: Photosphere, Model of solar photosphere, chromosphere, corona, sunspots, their properties, cyclic variation, connection with magnetic fields, solar prominences, solar flares, active regions, helioseismology

Unit III: SOLAR SYSTEM

Physical processes in solar system, the terrestrial planets, asteroid belt, Jupiter, Saturn, Uranus and Pluto, Kuiper belt objects, Comets, Asteroids, Meteoroid – formation of the solar system

Unit IV: COSMOLOGY

Hubble's Law: Newtonian Cosmology, Cosmic Background radiation, cosmological blue shifts, cosmological red shifts, Observational techniques

Unit V: STELLAR EVOLUTION, WHITE DWARFS, NEUTRON STARS AND BLACK HOLES

Vogt-Russel Theorem, mass luminosity relation - Proto stars, Pre-main sequence evolution, main sequence evolution, last stage of stellar evolution, fate of massive stars, discovery of Sirius – B, White dwarfs, Quantum mechanics of degenerate matter, mass radius relation for neutron stars, pulsars, crab nebula pulsar, stellar and super massive black holes

TEXT BOOK:

1.Shu F.H: The Physical Universe – An Introduction to Astronomy, University Science Books, 1981.
2.Nicola Vittorio, Cosmology, CRC Press; 1st edition 2017.

BOOKS FOR REFERENCE:

1. B.W.Carroll & D.A.Ostlie: An Introduction to Modern Astrophysics, 2nd Edn, Cambridge University Press, 2017
2. Karttunen, H., Kröger, P., Oja, H., Poutanen, M., Donner, K.J. : Fundamental Astronomy, Springer Verlag 2007
3. Astrophysics II: Interstellar Matter and Galaxies 1st Edition, Richard Bowers, Terry Deeming, 1984, Jones & Bartlett Pub.
4. Abhayankar K.D: Astrophysics of the Solar System, Cambridge university Press, 1999
5. Abhayankar K.D: Astrophysics; Stars and Galaxies, Cambridge university Press, 2001

Course Outcomes (CO):

CO1: Grasp basic knowledge about celestial mechanics [K1]
CO2: Understand the usage of various astronomical instruments [K2]
CO3: Know the physical processes involved in solar systems [K3]
CO4: Gain deep insight on cosmology and Cosmic radiation [K3]
CO5: Acquire the fundamental concepts of Stellar Evolution, White dwarfs, Neutron Stars and Black Holes [K2]

K1- Remember **K2- Understand** **K3- Apply**
K4- Analyze **K5-Evaluate** **K6 Create**

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	3	2	3	3	3	2	3	3
CO2	3	3	2	2	3	3	3	3	3	3	3
CO3	3	3	1	3	3	3	3	3	3	3	3
CO4	3	3	2	3	3	3	3	3	3	3	3
CO5	3	3	1	3	3	3	3	3	3	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHE412	NUMERICAL METHODS	L	T	P	C
Elective -I			4	-	-	4

OBJECTIVES:

- To understand the numerical techniques to solve the physical problems.
- To understand various methods used to solve the physical problems.
- To find out the roots of non linear equations
- To find out the solutions of linear equations
- To apply numerical methods of integration and differentiation to mathematical problems.

UNIT-I : INTERPOLATION

Introduction, Polynomial Forms, Linear interpolation, Lagrange Interpolation Polynomial, Newton Interpolation Polynomial, Divided difference table, Interpolation with equidistance points, Spline interpolation

UNIT-II: ROOTS OF NON-LINEAR EQUATIONS

Introduction, Methods of Solution, Iterative Methods, Starting and Stopping and Iterative Process, evaluation of Polynomials, Bisection method, False Position Method, Newton-Raphson Method, Secant Method, Fixed Point Method, Determining All Possible Roots.

UNIT-III: SOLUTIONS OF LINEAR EQUATIONS

Need and Scope, Existence of Solutions, Solution by Elimination, Basic Gauss Elimination Method, Gauss Elimination with Pivoting, Gauss- Jordan Method, Triangular Factorization Methods, Round-off Errors and Refinement, III-Conditioned Systems, Matrix Inversion Method, Jacobi Iteration Method, Gauss Seidel Method.

UNIT-IV: NUMERICAL DIFFERENTIATION ANDINTEGRATION

Numerical Differentiation: Need and Scope, differentiating continuous functions, Differentiating tabulated functions, Difference tables, Numerical Integration: Trapezoidal Rule, Simpson's1/3 Rule, Simpson's 3/8 Rule, Higher Order Rules.

UNIT-V: NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS

Need and Scope, Tailor Series Method – Improving accuracy, Picard's method, Euler's Method – accuracy of Euler's method, Heun's Method–Error analysis, Polygon Method, Runge-Kutta Methods- Determination of weights

BOOKS FOR STUDY:

1. E. Balagurusamy, Numerical Methods, Tata McGraw-Hill, India 1999 (Unit I-V).
2. M.K. Jain, S.R.K. Iyangar, R K. Jain, Numerical Methods: Problem and Solution, New Age International Publisher, New Delhi 2021

BOOKS FOR REFERENCE:

1. Steven C. Chapra and Raymond P. Canale, Numerical Methods for Engineers, McGraw Hill International editions, 2nd edition) 1990.

COURSE OUTCOMES:

CO1: Distinguish Different Interpolation Method [K2]
CO2: Apply Numerical Methods of Integration and Differentiation to Mathematical Problems [K3]
CO3: Analyze Ordinary Differential Equation and Find Numerical Solution [K4]
CO4: Solve Linear and Nonlinear Equations [K3]
CO5: Understand the Numerical Techniques to Solve the Physical Problems [K2]

K1- Remember **K2- Understand** **K3- Apply**
K4- Analyze **K5-Evaluate** **K6- Create**

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	2	3	3	3	2	3	3
CO3	3	3	2	3	3	3	3	3	3	3	2
CO4	3	3	3	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	2	3	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHE413	MODERN OPTICS AND IMAGING	L	T	P	C
Elective -I			4	-	-	4

OBJECTIVES:

- To understand the concept wave and its propagation.
- To study the optical devices and Fourier optics.
- To obtain knowledge in non-linear optics, holography and microscopic techniques.

UNIT-I: WAVENATURE AND LIGHT PROPAGATION

Electromagnetic wave propagation, Harmonic waves, phase-velocity, group-velocity, energy flow–Poynting Vector-Wave motion–equation superposition of waves, interference, diffraction, basics of coherence theory, temporal and spatial coherence-Multi wave interference-Michelson and Fabry-Perot interferometer – Scattering and polarization – types – Birefringence.

UNIT – II: OPTICAL ENGINEERING AND FOURIER OPTICS

Image formation (first-order optics), aberrations, prisms and mirrors, stops and apertures, basic optical devices, the design of optical systems: general, aplanatic points, solid immersion lens, numerical aperture increasing lens. Fourier-optics- Thin lens as phase transformation–Thickness function-Various types of lenses.

UNIT - III: NON-LINEAR OPTICS

Non-linear optics-principle-nonlinear wave equation-Born approximation-second order non-linear optics-second harmonic generation-phase-matching-frequency conversion-electro-optic effect-three wave mixing. Third order non-linear optics-third harmonics generation-optical Kerr- effect-parametric oscillator-self focusing-soliton

UNIT –IV: HOLOGRAPHY

Basic Principles of Holography-Recording of amplitude and phase-There cording medium-Reconstruction of original wave-front-Image formation by wave front reconstruction-Gabor Hologram-Limitations of Gabor Hologram-Off axis Hologram**.**

UNIT -V: OPTICAL MICROSCOPY &IMAGING TECHNIQUES

Basics of optical microscopy, bright field and dark field microscopy, polarizing microscopy, phase contrast microscopy, fluorescence microscopy, light sheet fluorescence microscopy, nonlinear optical microscopy, two photon fluorescence microscopy.

TEXT BOOKS:

1. Francis Jerkins and Harvey White, Fundamental Optics - McGraw Hill Inc., New Delhi, Fourth Edition, 2011 (Unit 1,2, 3)
2. N.Subramaniyam, Brijlal and M.N. Avadhanulu, A Textbook of Optics S.Chand &Co, New-Delhi, Twenty Fifth-Edition, 2012.

BOOKS FOR REFERENCE:

1.W.J. Smith, Modern Optical Engineering, Third-Edition, McGraw-Hill, 2000.
2.J.W. Goodman, Introduction to Fourier optics, Roberts and Company Publishers, Third Edition, 2005 (Unit 4)
3.B.B. Laud, Lasers and Non-Linear optics, Wiley, Second Edition, 1992.
4.J. Mertz, Introduction to Optical Microscopy, Roberts &Company publishers, First Edition, 2010. (Unit 5)

Course Outcomes (CO):

CO1: Learn the fundamentals of wave nature and Light Propagations [K1]
CO2: Clear knowledge about Optical Engineering and Fourier Optics [K2]
CO3: Gain knowledge about the Nonlinear Optics [K2]
CO4: Learn the fundamentals of Holography [K3]
CO5: Get the Knowledge about different microscopy and image techniques [K2]

K1- Remember K2- Understand K3- Apply
K4- Analyze K5-Evaluate K6 - Create

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	3	2	3	2	3	2	S
CO3	3	3	3	3	2	2	2	3	3	3	2
CO4	3	3	3	3	3	3	3	2	3	1	2
CO5	3	3	2	3	2	2	3	2	3	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHE421	MATERIAL CHARACTERIZATION TECHNIQUES	L	T	P	C
Elective -II			4	-	-	4

OBJECTIVES:

- To know about measurement and error analysis in instrument
- To grasp knowledge instruments used for thermal analysis of materials
- To know about instrument for characterizing materials using x-rays
- To acquire knowledge on electron microscopes
- To acquit knowledge on instrument used to determine electrical parameters of material

UNIT - I: MEASUREMENTS, SIGNALS AND DATA

Signal to Noise ratio – Sensitivity and Detection Limit – Sources of Noise- Hardware Techniques for Signal to Noise Enhancement- Software Techniques for Signal to Noise Enhancement- Errors- Types of Error- Precision and Accuracy- Statistical Methods and Their Application- Accuracy and Instrument Calibration.

UNIT II: THERMAL ANALYSIS

Introduction – thermo gravimetric analysis – instrumentation - weight loss and decomposition products – differential scanning calorimetric – instrumentation – specific heat capacity measurements – determination of thermo chemical parameters – differential thermal analysis – basic principles – melting point- determination and analysis.

UNIT - III: X-RAY ANALYSIS

Single Crystal and powder diffraction – Diffractometer – interpretation of diffraction patterns – indexing – unknown and phase identification – thin film characterization – X-ray fluorescence spectroscopy- Different types – uses.

UNIT – IV: OPTICAL METHODS AND ELECTRON MICROSCOPY

Photoluminescence – light-matter interaction – fundamental transitions – excitons – instrumentation – electroluminescence – instrumentation – photo reflectance- electronic transitions – behavior of electronic transitions as a function of electric field. Principles of SEM, TEM, EDAX, AFM, EPMA – Instrumentation – sample preparation – analysis of materials – study of dislocations – ion implantation – uses – Nanolithogrphy.

UNIT – V: ELECTRICAL METHODS

Hall Effect – carrier density – resistivity – two probe and four probe methods – scattering mechanism – van der pauw method – CV characteristics – Schottky barrier capacitance – impurity concentration – electrochemical CV profiling – limitations.

TEXT BOOKS:

1. Willard.M, Steve.D, Instrumental Methods of Analysis - CBS Publishers, New Delhi, 1986.
2. Stradling, R.A, Electron Microscopy and Microanalysis of Crystalline materials, Applied Science Publishers, London, 1979.

3. Belk.J.A, Electron microscopy and Microanalysis of Crystalline Materials, Applied Science Publishers, London, 1979.
4. Philips V.A Modern Metallographic Techniques and their Applications, Wiley Interscience, 1971.

Course Outcomes

CO1: Understand about error analysis technique in different kinds of instrument [K1]
CO2: Analyze different thermal parameters of the sample [K2]

CO3: Estimate structural parameters and composition of the sample [K3]
CO4: Interpret surface morphology and composition of the materials [K1]
CO5: Deduce the electronic properties of the sample [K6]

K1- Remember K2- Understand K3- Apply
K4- Analyze K5-Evaluate K6-Create

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	3	3	3	2	3	3
CO2	3	3	2	3	3	3	3	3	3	3	3
CO3	3	3	2	3	3	3	3	3	3	3	3
CO4	3	3	2	3	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M) : 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHE422	PHYSICS OF NON-CONVENTIONAL ENERGY RESOURCES	L	T	P	C
Elective -II			4	-	-	4

OBJECTIVES:

- To develop the human recourse in non-conventional energy resources.
- To create the people who will teach the science of non-conventional Energy resources, this will be also helpful for the promotion of Research in this field.
- To create several self-employment opportunities in renewable energy and energy efficiency sectors.
- It will help to develop the skills required in renewable energy and energy management fields.
- To do useful research in this field.

UNIT-I: INTRODUCTION:

Introduction-Various non-conventional energy resources-Introduction, availability, classification, relative merits and demerits. Solar Cells: Theory of solar cells. Solar cell materials, DSSC, solar cell array, solar cell power plant, limitations.

UNIT-II: SOLAR THERMAL ENERGY:

Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT-III: GEOTHERMAL ENERGY AND FUEL CELLS:

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations.

Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

UNIT-IV: WIND POWER:

Wind power and its sources, sites election, criterion, momentum theory, classification of rotors, Concentrations and augments, wind characteristics. Performance and limitations of energy conversion systems.

UNIT-V: BIO-MASS:

Bio-mass: Availability of bio-mass and its conversion theory. Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations. Wave and Tidal Wave: Principle of working, performance and limitations.

TEXT BOOKS:

1. A.K. Raja, M. Dwivedi, A.P. Srivasta, Introduction to Non-Conventional Energy Resources- Sci Tech Publications. (Unit I to V), 2006.

BOOKS FOR REFERENCE:

1. John Twideu and Tony Weir, Renewal Energy Resources, BSP Publications, 2006.
2. M.V.R. Koteswara Rao, Energy Resources: Conventional & Non-Conventional, BSP Publications, 2006.
3. D.S.Chauhan, Non-conventional Energy Resources- New Age International, 2006
4. C.S. Solanki, Renewal Energy Technologies: A Practical Guide for Beginners PHI Learning, 2008.

Course Outcomes (CO):

CO1: Understand importance of nonconventional energy (K1)
CO2: Gain insight in the materials used to fabricate solar panels K 2)
CO3: Explain the principles on which non conventional energy devices work (K3)
CO4: Apply the principles to create simple energy devices (K4)
CO5: Create plans for small scale device manufacturing set up (K5)

K1- Remember **K2- Understand** **K3- Apply**
K4- Analyze **K5-Evaluate** **K6-Create**

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	3	3	3	3	2	3	2	2
CO2	3	3	2	3	3	3	3	2	2	2	3
CO3	3	3	2	3	3	2	3	3	3	3	3
CO4	3	3	3	3	3	2	3	3	3	3	3
CO5	2	3	3	3	3	2	2	3	3	3	2

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHE423	PHYSICS OF NANOMATERIALS	L	T	P	C
Elective -II			4	-	-	4

OBJECTIVES:

- Know the properties of low dimensional Physics
- Understand the interdisciplinary importance of this course
- Learn about creation, manipulation and applications of materials at nanometer scale.
- Learn the characterization techniques for nanostructures.
- Take up nanotechnology as field of research.

UNIT – I: INTRODUCTION

Introduction – History of nanotechnology - Classification of nanomaterials: Definition of – Zero, one and two dimension nano structures – Examples - Classification of synthesis methods. Surface energy – Chemical potential as a function of surface curvature

UNIT – II: NANOMATERIALS

Carbon Fullerenes and Nanotubes: Carbon fullerenes, Fullerene derived crystals, Carbon nanotubes. Micro and Mesoporous Materials: Ordered mesoporous structures, Core-shell structures: Metal-oxide structures, Metal-polymer structures, Oxide-polymer structures. Organic- Inorganic Hybrids. Nanocomposites.

UNIT – III: PROPERTIES

Physical properties of nanomaterials: Melting points, Specific heat capacity and lattice constants – Mechanical properties – Optical properties: -Surface Plasmon Resonance – Quantum size effects – Electrical property: charge of electronic structure, Quantum transport, effect of microstructure: Ferroelectrics and dielectrics – Variation of magnetism with size- Super para magnetism.

UNIT – IV: SYNTHESIS

Synthesis of nano materials: Physical vapour deposition - Chemical vapour deposition plasma arching - Sol gel - Ball milling technique - Electro deposition. Synthesis of Semiconductors: Nanostructures fabrication by physical techniques – Nano lithography.

UNIT – V: CHARACTERIZATION AND APPLICATIONS

Structural Characterization: X-Ray diffraction – Scanning tunneling Microscopy – Transmission Electron Microscopy – Chemical Characterization: Optical spectroscopy.
Applications: Nano electronics, Nano electromechanical systems- Colorants and pigments – DNA chips – Drug delivery systems.

TEXT BOOKS:

1. T. Tsakalakos, I. Ovidko and A.K. Vasudevan (eds.), Synthesis, functional properties and applications of nanostructures Kluwer Academic Publishers, Dordrecht, 2003.
2. Kenneth F. Klablunde, Nanoscale Materials in Chemistry, John Wiley and sons, Inc., 2001.

BOOKS FOR REFERENCE:

1. Wilson M, K Kannangara, G. Smilt, M. Simmons and B. Boguse Nanotechnology, Overseas Press, 2005
2. Freitas R A, Landes., Nanomedicine, TX publication, 1996.
3. Viswanathan B, Nano Materials, Narosa publishing house, 2010.

Course Outcomes (CO):

CO1: Understand the physics of nanotechnology [K1]
CO2: Important features and unique properties of nanomaterials learnt along with emphasis on significant nanomaterials [K2]
CO3: Learn various synthesis techniques to prepare different nanostructures [K1]
CO4: Expertise in handling characterization tools to analyze nanomaterials [K3]
CO5: Prepare novel nanomaterials for interdisciplinary applications [K3]

K1- Remember **K2- Understand** **K3- Apply**
K4- Analyze **K5-Evaluate** **K6-Create**

OUTCOME MAPPING

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	2	2	3	2	2	2	2	3	3
CO2	3	3	2	3	3	2	2	2	2	3	3
CO3	3	3	2	3	3	3	3	3	3	3	2
CO4	3	3	3	3	3	2	2	3	3	3	3
CO5	2	3	3	3	3	2	2	3	3	3	3

Strongly correlating (S) : 3 Marks Moderately correlating (M): 2 Marks
Weakly correlating (W) : 1 Marks No correlation (N) : -

Course Code	P21PHR41	PROJECT	L	T	P	C
Core – XVII			22	-	-	8

Each Candidate will submit a project report on a topic in Physics/ Material Science/ Astrophysics after carrying out the project work under the supervision of a guide. The project may be theoretical or experimental or even a compilation of literature on a current topic. The duration of the project will be roughly two months (including the vacation of one month) in the final semester.

The project report will be evaluated by an external examiner and viva voce will be conducted by a committee consisting of the external examiner, guide and the department faculty.

NON-MAJOR ELECTIVE COURSES

Course Code	P21PHN211	ELEMENTS OF NANOSCIENCEAND NANOTECHNOLOGY	L	T	P	C
NME – I			5	-	-	4

OBJECTIVES:

- To provide the basic Knowledge about basics nanoscience and technology
- To acquire the knowledge about synthesis methods and characterization techniques and its applications.

UNIT I: OVERVIEW OF NANOSCIENCE

Introduction –Emergence of Nanotechnology- Bottom up and top-down approaches-chemical potential as a function of surface curvature-interaction between two particles: DLVO theory-applications: band gap engineering quantum devices-nano mechanics-photoelectrochemical cells.

UNIT II: DIFFERENT CLASSES OF NANOMATERIALS

Metal and Semiconductor Nanomaterials, Quantum dots, Wells and Wires, Molecule to Bulk Transitions Bucky Balls and Carbon Nanotubes.

UNIT III: SYNTHESIS OF NANOMATERIALS

Top-down (Nanolithography, CVD), bottom- up (sol-gel processing, chemical synthesis). Wet Deposition Techniques, Self-assembly (Supra molecular approach), Molecular Design and Modeling.

UNIT IV: CHARACTERIZATION

TEM, SEM and SPM Technique, Fluorescence Microscopy and Imaging.

UNIT V: APPLICATIONS

Solar Energy Conversion and Catalysis, Molecular Electronics and Printed Electronics Nanoelectronics, Polymers with a special architecture, Liquid Crystalline Systems, Linear and Nonlinear Optical and Electro Optical properties, Applications in Displays and other devices, Advanced Organic Materials for Data Storage, Photonics, Plasmonics, Chemical and Biosensors, Nanomedicine and Nano Biotechnology.

TEXT BOOKS:

1. Hari Singh Nalwa, Nanostructured Materials and Nanotechnology, Academic Press, 2002.
2. G. Cao, Y.Wong, Nanostructures and Nanomaterials (Synthesis, Properties and Applications),World Scientific, 2nd Edition, 2011 (Unit I- V)

BOOKS FOR REFERENCE:

1. Organic and Inorganic Nanostructures, A. Nabok-ArtechHouse,2005
2. Nanoscience: "Nanotechnologies and Nanophysics", C. Dupas, P.Houdy, M.Lahmani, Springer-Verlag Berlin Heidelberg, 2007
3. Introduction to Nanotechnology, Charles P. Poole, Frank JOwens, Wiley- Inter science, 2003.

Course Code	P21PHN212	FUNDAMENTALS OF ASTROPHYSICS	L	T	P	C
NME – I			5	-	-	4

Objectives:

- To provide the fundamental knowledge about electromagnetic spectrum and telescopes
- To gain knowledge about Planetary and Interplanetary space
- To know Stars, Suns, Planets, Asteroids, Meteors and Comets

UNIT I: ELECTROMAGNETIC SPECTRUM AND TELESCOPE:

The nature of light: Light as an electric vibration, the electromagnetic radiation from a heated object, Doppler shift. Tools of the astronomer: Optical & Space telescopes (Galielian, Newtonian, & Hubble Space Telescope), Magnifying power & Resolving power of telescopes

UNIT II: INTRODUCTION TO PLANETARY AND INTERPLANETARY SPACE:

Kepler's Laws, Earth-Moon System, Solar and Lunar types, Exploration of Solar System by Telescopes, Rockets and Satellites. Structure of Earth's Atmosphere- Lower, Middle and Upper Troposphere, Stratosphere, Ionosphere, Protonosphere, Interplanetary space, Earth as a Magnetic Comet.

UNIT III: STARS:

Measuring stellar characteristics (temperature, distance, luminosity, mass, size) - HR diagram - stellar structure (equilibrium, nuclear reactions, energy transport) - stellar evolution; Stellar Evolution (HR diagram): Life cycle; Stellar Processes (Nuclear) and spectral classification of Stars O, B, A, F, G, K, M.

UNIT IV: THE SUN AND PLANETS:

Origin of the solar system, Internal structure and surface features of sun, Sun spots and Magnetic field on the sun and Solar activity. Surface features of planets, Atmospheres and Magnetic fields of Planets and their moons.

UNIT V: ASTEROIDS, METEORS AND COMETS:

Asteroids: Discovery and designation, Origin, Nature and Orbits of Asteroids. Meteors: Meteor showers and sporadic meteors. Comets: Periodic comets, Brightness variation in Comets. Gas production rates, dust and ion tails.

TEXT BOOKS:

1. V.B. Bhatia, Textbook of Astronomy and Astrophysics with elements of cosmology, Alpha Science International Ltd. 2001.
2. B.W.Carroll & D.A.Ostlie: An Introduction to Modern Astrophysics, 2nd Edn, Cambridge University Press, 2017
3. Shu F, The Physical Universe, University of Science Press,1981
4. K.D.Abhyankar, Astrophysics: Stars and Galaxies- Tata McGraw Hill Publication,1992

VALUE ADDED COURSES

Course Code	P21PHV111	CLASSIFICATION OF SOLAR FLARES IN X-RAYS	L	T	P	C
SEMESTER - I			30			2

Objective:

- To determine different types of Solar flares using WARM telescope data observed in Kodaikanal Solar Observatory

Unit I
Solar Interior structure (Pressure Density, temperature, generation of energy, radiative and convective zones), Solar Neutrino

Unit II
Solar Atmosphere: Photosphere-Model of solar photosphere- Chromosphere- corona

Unit III
Coronal Mass Ejection- Solar flares-Causes- Classification – A, B, C, M and X Classes-Hα classification- Hazards

Unit IV
Optical Observation- Radio Observation- Space telescopes- Whitelight Active Region Monitor (WARM)Telescope – components- GOES X-ray space satellite

Unit V
Observation of Solar flare using WARM telescope at Kodaikanal Solar Observatory- Identification of different class

Text Books

1. V.B. Bhatia, Textbook of Astronomy and Astrophysics with elements of cosmology, Alpha Science International India, 2000
2. B.W.Carroll & D.A.Ostlie: An Introduction to Modern Astrophysics, 2nd Edn, Cambridge University Press, 2017
3. Shu F, The Physical Universe, University of Science Press,1981
4. K.D.Abhyankar, Astrophysics: Stars and Galaxies- Tata McGraw Hill Publication 2001

Course Code	P21PHV112	ESTIMATION OF SOLAR DIFFERENTIAL ROTATION OF SUNSPOTS FROM KODAIKANAL SOLAR OBSERVATORY (KSO) DATA	L	T	P	C
SEMESTER - I			30			2

Objective:

- To estimate solar differential rotation of Sunspots from data observed from Kodaikanl Solar Observatory data

Unit I

Solar Interior structure (Pressure Density, temperature, generation of energy, radiative and convective zones), Solar Neutrino

Unit II

Solar Atmosphere: Photosphere-Model of solar photosphere- Chromosphere- corona

Unit III

Sunspots- their properties- cyclic variation- connection with magnetic fields- heliographic coordinates-Rotation periods.

Unit IV

Telescope-Different types of telescope- Telescopes available in Kodaikanal Solar Observatory Data Collection from Kodaikanal Solar Observatory

Unit V

Estimation of Solar Differential rotation of Sunspots from KSO data

References:

1. V.B. Bhatia, Textbook of Astronomy and Astrophysics with elements of cosmology, Alpha Science International India, 2000
2. B.W.Carroll & D.A.Ostlie: An Introduction to Modern Astrophysics, 2nd Edn, Cambridge University Press, 2017
3. Shu F, The Physical Universe, University of Science Press,1981
4. K.D.Abhyankar, Astrophysics: Stars and Galaxies- Tata McGraw Hill Publication 2001

Course Code	P21PHV421	ESTIMATION OF SOLAR DIFFERENTIAL ROTATION OF SUNSPOTS FROM KODAIKANAL SOLAR OBSERVATORY (KSO) DATA	L	T	P	C
SEMESTER - IV			30			2

Objective:

- To monitor Space weather using solar radio burst data observed in Kodaikanal Solar Observatory

Unit I

Solar Interior structure (Pressure Density, temperature, generation of energy, radiative and convective zones), Solar Neutrino

Unit II

Solar Atmosphere: Photosphere, Model of solar photosphere, Chromosphere, corona

Unit III

Sunspots, their properties, cyclic variation, connection with magnetic fields, solar prominences, solar flares, active regions

Unit IV

Solar Burst- Different types- Radio spectrometer- Detection

Unit V

Data collection from Radio spectrometer at Kodaikanal Solar Observatory- Analysis of Spectrum- Space Weather Monitoring

Text Books

1. V.B. Bhatia, Textbook of Astronomy and Astrophysics with elements of cosmology, Alpha Science International India, 2000
2. B.W.Carroll & D.A.Ostlie: An Introduction to Modern Astrophysics, 2nd Edn, Cambridge University Press, 2017
3. Shu F, The Physical Universe, University of Science Press,1981
4. K.D.Abhyankar, Astrophysics: Stars and Galaxies- Tata McGraw Hill Publication 2001

Course Code	P21PHV422	ESTIMATION OF CORONAL SHOCK SPEED	L	T	P	C
SEMESTER - IV			30			2

Objective:

- To estimate coronal shock speed using data observed in Kodaikanal Solar Observatory

Unit I

Solar Interior structure (Pressure Density, temperature, generation of energy, radiative and convective zones), Solar Neutrino

Unit II

Solar Atmosphere: Photosphere, Model of solar photosphere, Chromosphere, corona

Unit III

Coronal Mass Ejection- Radio Burst – Different types- Detection

Unit IV

Coronal Shock Waves - Determination of location- 2D electron density – Alfven Speed Maps

Unit V

Data collection from Radio spectrometer at Kodaikanal Solar Observatory- Analysis of Spectrum- Estimation of Coronal Shock Speed

Text Books

1. V.B. Bhatia, Textbook of Astronomy and Astrophysics with elements of cosmology, Alpha Science International India, 2000
2. B.W.Carroll & D.A.Ostlie: An Introduction to Modern Astrophysics, 2nd Edn, Cambridge University Press, 2017
3. Shu F, The Physical Universe, University of Science Press,1981
4. K.D.Abhyankar, Astrophysics: Stars and Galaxies- Tata McGraw Hill Publication 2001

Course Code	P21PHV423	ESTIMATION OF CORONAL MAGNETIC FIELD FROM TYPE II RADIO BURST	L	T	P	C
SEMESTER - IV			30			2

Objective:

- To estimate coronal magnetic field using type II radio burst data observed in Kodaikanal Solar Observatory

Unit I
Solar Interior structure (Pressure Density, temperature, generation of energy, radiative and convective zones), Solar Neutrino

Unit II
Solar Atmosphere: Photosphere, Model of solar photosphere, Chromosphere, corona

Unit III
Coronal Mass Ejection- Radio Burst – Different types- Detection

Unit IV
Coronal Magnetic field- Newkirks's density model

Unit V
Data collection from Radio spectrometer at Kodaikanal Solar Observatory- Analysis of Spectrum- Estimation of Coronal magnetic field from type II radio burst

Text Books

1. V.B. Bhatia, Textbook of Astronomy and Astrophysics with elements of cosmology, Alpha Science International India, 2000
2. B.W.Carroll & D.A.Ostlie: An Introduction to Modern Astrophysics, 2nd Edn, Cambridge University Press, 2017
3. Shu F, The Physical Universe, University of Science Press,1981
4. K.D.Abhyankar, Astrophysics: Stars and Galaxies- Tata McGraw Hill Publication 2001

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Department of Chemistry

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

DEPARTMENT OF CHEMISTRY

B.Sc. CHEMISTRY

SYLLABUS TO BE IMPLEMENTED FROM THE ACADEMIC YEAR 2021-2022

(CHOICE BASED CREDIT SYSTEM)

Mother Teresa Women's University, Kodaikanal
Department of Chemistry
Choice Based Credit System (CBCS)
(2021-2022 onwards)
B. Sc. Chemistry

1. About the Programme

The B.Sc Chemistry Degree Program aims to impart sound knowledge in the fundamental aspects of the important branches of Chemistry. The curriculum is designed to integrate theoretical aspects with experimental/laboratory techniques and analytical thinking which are incorporated in the core and elective courses to equip the learners with the skills required for employability and research. The non-major elective courses, "Clinical chemistry" and "Applied chemistry" provide an overview of the important applications of chemistry to the non-major students. The unique features of the curriculum are ICT based and management oriented skilled based courses, which equip the learners with the essential knowledge of computer applications and managerial skills.

2. Programme Educational Objectives

PEO1	To develop broad knowledge in Chemistry in addition to understanding of key chemical concepts, principles and theories
PEO2	To employ critical thinking and scientific knowledge to design, carry out, record and analyze the results of chemical reactions.
PEO3	To develop students' ability and skill to acquire expertise in solving both theoretical and applied chemistry problems.
PEO4	To provide knowledge and skill to the students' thus enabling them to undertake further studies in Chemistry related areas or multidisciplinary areas that can be helpful for self- employment/entrepreneurship.
PEO5	inculcate the scientific temperament in the students.

3. Eligibility

A candidate who has passed the Higher Secondary Examination with Chemistry, Physics and Mathematics/Zoology as core subjects of Tamil Nadu Higher Secondary Board or an examination of some other board accepted by Mother Teresa Women's University shall be eligible for admission into B.Sc., course in Chemistry.

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

Evaluation Pattern	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**10**	**25**	**10**	**25**
External	**30**	**75**	**30**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade
(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

9. Program Outcomes (POs)

On completion of this Programme, the learners will be able to

PO1	develop sound disciplinary knowledge and experimental skill
PO2	acquire communication skill to express the subject through technical writing and oral presentation
PO3	identify chemistry related problems, analyse and apply data using appropriate methodologies.
PO4	inculcate ethical awareness, environmental and social responsibility
PO5	become digitally literate to increase their core competency via e-learning resources for lifelong learning.

10. Program Specific Outcomes (PSOs)

On completing the B. Sc. Chemistry programme, the students will acquire

PSO1	systematic and coherent understanding of the fundamental concepts in Organic chemistry, Inorganic Chemistry, Physical Chemistry, Analytical Chemistry and all other related allied chemistry subjects.
PSO2	the ability to use evidence based comparative chemistry approach to explain chemical synthesis and analysis.
PSO3	the ability to demonstrate the experimental techniques and methods of their area of specialization in Chemistry.
PSO4	critical thinking ability by way of solving problems / numerical using Basic chemistry knowledge and concepts.
PSO5	the habit of learning continuously through use of advanced ICT technique and other available techniques / books / journals for academic growth

B.Sc. - CHEMISTRY

S. No	Course Code	Course Title	Credits	Hours		CIA	ESE	Total
				T	P			
Semester I								
1	U21LTA11	Part I – Tamil-I	3	6	0	25	75	100
2	U21LEN11	Part II – English-I	3	6	0	25	75	100
3	U21CHT11	Core I-General Chemistry I	4	5	0	25	75	100
4	U21CHP11	Core II-Practical I Organic Analysis and Estimation	4	0	6	25	75	100
5	U21MTA11/ U21ZOA11	Allied Theory Mathematics I/ Zoology	4	5	0	25	75	100
6	U21EVS11	Environmental Studies	2	2	0	25	75	100
7	U21PEPS11	Professional English I	4	6	0	25	75	100
		Total	**24**	**36**		**-**	**-**	**700**
Semester II								
8	U21LTA22	Part I – Tamil-II	3	6	0	25	75	100
9	U21LEN22	Part II – English-II	3	6	0	25	75	100
10	U21CHT21	Core III- General Chemistry II	4	5	0	25	75	100
11	U21CHP22	Core IV-Practical-II-Volumetric Analysis	4	5	0	25	75	100
12	U21MTA22/ U21ZOA22	Allied: Theory Mathematics II / Practical Zoology	4	5	0	25	75	100
13	U21VAE21	Value education	3	3	0	25	75	100
14	U21PEPS22	Professional English II	4	6	0	25	75	100
		Total	**25**	**36**		**-**	**-**	**700**
Semester III								
15	U21LTA33	Part I – Tamil-III	3	6	0	25	75	100
16	U21LEN33	Part II – English-III	3	6	0	25	75	100
17	U21CHT31	Core V- Analytical Chemistry	4	5	0	25	75	100
18	U21PHA33/ U21BOA33	Allied Chemistry - Physical Sciences / Life Sciences	4	5	0	25	75	100
19	U21CHE311/ U21CHE312	**Elective I-** Polymer Chemistry/Water Treatment	3	4	0	25	75	100
20	U21MSS31	**SBE-1-** Managerial Skills	2	2	0	25	75	100
21	U21CHN31	**Non Major Elective - I**	2	2	0	25	75	100
22	U21PEPS32	Professional English III	4	6	0	25	75	100
		Total	**25**	**36**		**-**	**-**	**800**
Semester IV								
23	U21LTA44	Part I – Tamil-IV	3	6	0	25	75	100
24	U21LEN44	Part II – English-IV	3	6	0	25	75	100
25	U21CHT41	Core VI- Medicinal Chemistry	4	4	0	25	75	100
26	U21CHT42	Core VII-Biochemistry	4	4	0	25	75	100
27	U21PHA44/	Allied Practical- III	4	0	4	25	75	100

	U21BOA44	Physical Sciences/ Life Sciences						
28	U21CHE421/ U21CHE422	**Elective-II**-Agricultural Chemistry/Textile Chemistry	3	3	0	25	75	100
29	U21CSS42	**SBE-II-**Computer Skills for office Management	2	2	0	25	75	100
30	U21CHN42	**Non Major Elective - II**	2	2	0	25	75	100
31	U21PEPS42	Professional English IV	4	6	0	25	75	100
		Total	**29**	**37**		**-**	**-**	**800**
Semester V								
32	U21CHT51	Core VIII- Organic Chemistry-I	4	5	0	25	75	100
33	U21CHT52	Core IX- Inorganic Chemistry –I	4	5	0	25	75	100
34	U21CHT53	Core X–Physical Chemistry-I	4	5	0	25	75	100
35	U21CHP53	Core XI-Practical-IV Inorganic Qualitative Analysis	4	0	5	25	75	100
36	U21CHP54	Core XII- Practical V Physical Chemistry	4	0	5	25	75	100
37	U21CHE531/ U21CHE532	**Elective III**-Forensic Chemistry/Chemistry of Materials	3	3	0	25	75	100
38	U21CHS53	**SBE III-**Clinical Chemistry	2	2	0	25	75	100
		Total	**25**	**30**		**-**	**-**	**700**
Semester VI								
39	U21CHT61	Core XIII- Organic Chemistry-II	4	5	0	25	75	100
40	U21CHT62	Core XIV- Inorganic Chemistry –II	4	5	0	25	75	100
41	U21CHT63	Core XV- Physical Chemistry-II	4	5	0	25	75	100
42	U21CHT64	Core XVI-Spectroscopy	4	4	0	25	75	100
43	U21CHP65	Core XVII:-Practical VI-Gravimetric Estimation & Organic Preparation	4	0	6	25	75	100
44	U21CHE641/ U21CHE642	**Elective IV**- Nano science and Technology/ Molecular Dynamics	3	3	0	25	75	100
45	U21CHS64	**SBE-IV-**Engineering Chemistry	2	2	0	25	75	100
46	U21EAS61	Extension Activities (NSS/NCC/RRC/YRC/Physical Education)	3	-	-	100	-	100
		Total	**28**	**30**		**-**	**-**	**800**
		Total Credits	**156**	**205**		**Grand Total**		**4600**

Non Major Elective

The candidates, who have joined the UG Programme, can also undergo Non Major Elective offered by other Departments.

Non Major Elective (NME) offered by Department of Chemistry:

Code	Course Title
U21CHN31	NME-I-Cosmetic Chemistry
U21CHN42	NME-II-Applied Chemistry

Additional Credit Courses (Two Credit courses)

1. **U21CHO31 Online course 3rd Semester**
2. **U21CHI41 Internship 4th Semester**
3. **U21CHV51 Value added course - 5th Semester (Pharmaceutical Chemistry)**

SEMESTER - I

Course Code	U21CHT11	GENERAL CHEMISTRY –I	L	T	P	C
CORE –I			5	-	-	4

Learning Objectives	The course aims to 1. understand the basics of organic reactions, to know the chemistry of Hydro carbons. 2. know the basic principles of cleavage of bonds 3. understand the periodic properties 4. know the critical phenomena of gases

Unit -I - Basics of Organic Chemistry –I

a) Introduction: Sources and classification of organic compounds, Geometry of hydrocarbons. Hybridization.
b) Functional Groups: Definition – various functional groups – IUPAC – Nomenclature – Homologous series.
c) Molecular weight determination of organic acids and bases.
d) Problems to derive empirical and Molecular formula incorporating the estimation of elements and molecular weight calculations. Detection of elements - lassaigne's test.

Unit -II- Basics of Organic Chemistry-II

a) Tetra valency of carbon atom
b) Cleavage of bonds: Homolytic and heterolytic cleavages, bond energy, bond length and bond angle.
c) Electron displacement effects: Inductive, electrometric, mesomeric, resonance, hyper conjugation and steric effects.
d) Stability of Reaction Intermediates: Free radicals, carbonium and carbanion.

Unit- III–Periodicity

a) Periodic law and arrangement of elements in the periodic table, IUPAC nomenclature and group number.
b) Horizontal, vertical and diagonal relationships in the periodic table, atomic radii, ionic radii, ionization potential, electron affinity; electro negativity-Pauling, Mulliken-Jaffe, Alfred-Rochow definitions
c) Oxidation states and variable valency; isoelectronic relationship; inert-pair effect. Atomic, molecular and equivalent weights; Avogadro's principle and mass-volume relationship.

Unit– IV - Atomic Structure

a) Bohr's theory, its limitations, Particle and wave character of electron, de Broglie's theory – equation, Davission – Germer experiment – photo electric effect – Compton effect, Heisenber's uncertainty principle – the Schrodinger equation derivation
b) Postulates of quantum theory – quantum numbers and their significance
c) Pauli's exclusion principle, atomic orbitals, shapes of orbitals, filling up of orbitals – Aufbau principle, (n+1) Hund's rule – Electronic configurations of the elements.

Unit –V- Gaseous State

a) Gaseous state: Ideal gas laws – deviations – limiting density of gases -van der Waal's equation – Equation of state – clausius, Berthelot and Dielectric – reduced equation of state and the law of corresponding state – Compressibility factor for gases – Boyle and inversion temperature of gases and their calculations Determination of van der Waal's constants.

b) Critical phenomena of gases: PV isotherms of real and van der Waal's gases – critical state of gases. Definitions and determination of Pc, Vc, Tc – relation between van der Waal's constants.

Text Books

1. A.Bahl and B.S. Bahl, Advanced Organic Chemistry, I Multicolor Edition, S.Chand& Company, New Delhi,2010.
2. SatyaPrakash, Advanced Inorganic Chemistry, R.D.Madan, VolI, 5th Edition, S.Chand and Sons, New Delhi, 2012.
3. B.R. Puri, L.R.Sharma and M.S.Pathania, Principles of Physical Chemistry, 46thEdision, Vishal Publishing Company, New Delhi, 2013.

Reference Books

1. I.L. Finar, Organic Chemistry Vol. I, 6 th Edition, Pearson Education, New Delhi, 2014.
2. P.L. Soni, Text book of Inorganic Chemistry, Sultan Chand and Sons, 2007.

CO	Course outcomes	Remarks
CO1	Identify the Sources and Classification of Organic compounds and hybridization	K4
CO2	Understanding the Electron displacement effects in organic reactions	K2
CO3	Learn the Periodic law and arrangement of elements in the periodic table,	K2
CO4	Understand the Postulates of quantum theory	K2
CO5	Learn the Gaseous state and Critical phenomena of gases	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	S	M	M	S	S	M	M
CO3	S	S	S	S	M	M	S	M	M	M
CO4	S	S	S	S	M	M	S	S	M	M
CO5	S	S	S	M	M	M	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHP11	ORGANIC ANALYSIS AND ESTIMATION (Practical)	L	T	P	C
CORE II			-	-	6	4

Learning Objectives	The course aims to 1. enable the students to develop analytical skills in organic qualitative analysis and preparative skills in organic preparations. 2. enable the students to check the purity of organic compounds by determining the melting or boiling points. 3. know the titration methods 4. plan the experimental projects and execute them.

Organic Analysis

a. Identification of acidic, basic, phenolic, and neutral organic substances.
b. Detection of N, S and halogens.
c. Test for aliphatic and aromatic nature of substances.
d. Test for saturation and unsaturation.
e. Identification of functional groups:
i) Carboxylic acids ii) Phenols iii) Aldehydes iv) Ketones v) Esters
vi) Carbohydrates vii) Amines viii) Amides ix) Halogen compounds
f. Preparation of derivatives for the functional groups
g. Determination of melting and boiling points

Organic Estimation

a. Estimation of aniline
b. Estimation of phenol

Text Books

1. B.S. Furniss, A.J. Hannaford, P.W. G. Smith, A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry. 5th Edition, Pearson Education, 2005.
2. Mann & Saunders, Practical Organic Chemistry, 4th Edition, 2009.

Reference Books

1. J. Leonard, B. Lygo, G. Procter, Advanced Practical Organic Chemistry, 3rd Edition, 2013
2. Basic Principles of Practical Chemistry, V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu, Sultan Chand & Sons, New Delhi, 2nd Edn., 2004.

CO	Course outcomes	Remarks
CO1	Learn the concept of Organic Analysis	K2
CO2	Understand the saturated and unsaturated groups	K2
CO3	Learn the preparation of standard solutions	K2
CO4	Learn the calculations of concentration of the solutions	K2
CO5	Acquire the knowledge of Organic Estimation	K2,K4

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	M	S	S	S	S
CO2	S	M	S	S	M	M	S	S	S	S
CO3	S	S	M	S	M	M	S	M	S	S
CO4	S	S	M	S	M	M	S	S	S	S
CO5	S	S	M	M	M	M	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER - II

Course Code	U21CHT21	GENERAL CHEMISTRY – II	L	T	P	C
CORE-III			5	-	-	4
Learning Objectives	1. To understand the substitution and elimination reactions 2. To understand the nature of bonding in inorganic compounds 3. To know the concept of phase equilibria					

Unit-I -Aliphatic Halogen Compounds

a) Nomenclature and classification
b) Preparation of aliphatic and aromatic halides: Free radical mechanism, addition and Substitution reactions.
c)Reactions: Nucleophilic substitutions, SN_1, SN_2 and SNAr mechanisms, stereochemistryand reactivity, effects of structure, substrate, solvent, nucleophile and leaving groups.
d) Eliminations: E_1 and E_2 mechanisms, evidences, orientations and stereochemistry.

Unit-II - Hydroxy Compounds

a) Aliphatic alcohols: Preparation by hydroboration, oxidation, Reduction of carbonyl compounds, epoxidation, Grignard synthesis and haloform reaction.
b) Phenols: Nomenclature, physical properties, hydrogen bonding.
c) Reactions: acidity, ether formation, ester formation, mechanism of ring substitution, nitration, sulphonation, halogenation, Friedel -Craft's reaction, nitrosation, coupling reactions, Kolbe's reaction and Riemer-Tiemen reaction.

Unit – III -Energetics of Ionic Bonding

Solubility of ionic compounds – energetics of formation of ionic compounds, Lattice energy – Born – Lande Equation – Born-Haber's cycle- Fajan's rule – van der wall's forces, ion-ion, ion-dipole interaction, hydrogen bonding, intermolecular theory and applications.

Unit – IV - Phase Equilibria

a) Statement of significance of the terms involving derivation of phase rule.
b) Application of phase rule to one-component systems. Water, Sulphur and Carbon dioxide.
c) Application of phase rule to two component systems- Pb-Ag, Zn- Mg Condensed systems and reduced phase rule
d) Solids in solids: simple eutectic with suitable examples, Compound formation with congruent and incongruent melting points with suitable examples.

Unit – V - Ideal solutions:

a) Ideal solutions: Vapour pressure- Composition diagrams of solutions. Raoults law, positive and negative deviations from the law. Principle of fractional distillation: Binary systems. Vapour diagram and azeotropicdistillation, Variation of solubility with temperature – critical solution temperature (consolute temperature) lower, upper and critical solution temperature – influence of impurities on C.S.T. and applications.
b) Solubility of gases in liquids; Henry's law, its relationship with Raoults law.

c) Lowering ofvapour pressure: Thermodynamic derivation for elevation of boiling pointand depression of freezing point. Relationship between osmotic pressure and vapourpressure.

Text Books

1. A.Bahl and B.S. Bahl, Advanced Organic Chemistry, 5th Edition, S.Chand& Company, New Delhi, 2010.
2. SatyaPrakash, Advanced Inorganic Chemistry, R.D.Madan, VolI, 5th Edition, S.Chand and Sons, New Delhi, 2012.
3. B.R. Puri, L.R.Sharma and M.S.Pathania, Principles of Physical Chemistry, 46thEdision, Vishal Publishing Company, New Delhi, 2013.

Reference Books

1. F. A. Cotton, G. Wilkinson, C. Murillo and M. Bochman,Advanced Inorganic Chemistry,6thed., John Wiley, New York, 2007.
2. B. R. Puri, L. R. Sharma, K. C. Kalia,Principles of Inorganic Chemistry, 33rd Edition, 2020.

CO	Course outcomes	Remarks
CO1	Learn the aliphatic halogen compounds Nomenclature	K2
CO2	Understand the importance of Hydroxy compounds	K2
CO3	Learn the Boron and carbon family in the periodic table	K2
CO4	Statement of significance of the terms involving derivation of phase rule.	K2,K3
CO5	Learn the Ideal solutions, Solubility of gases in liquids, Lowering ofvapour pressure and Distribution law	K2, K3

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	S	M	M	S	S	M	M
CO3	S	S	S	S	M	M	S	M	M	M
CO4	S	S	S	S	M	M	S	S	M	M
CO5	S	S	S	M	M	M	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHP22	VOLUMETRIC ANALYSIS (Practical)	L	T	P	C
PRACTICAL-II			-	-	5	4
Learning Objectives		1. To understand basics and gain knowledge on laboratory reagents and their uses in Volumetric analysis. 2. To enable the students to acquire knowledge in preparation of standard solutions 3. At the end of the course, the students should be able to plan experimental projects and execute them				

A double titration involving the making up of the solution to be estimated and the preparation of a primary standard.

Acidimetry and alkalimetry

1. Titration acids: hydrochloric acid, sulphuric Standard solutions prepared: sodium carbonate, sodiumbicarbonate, oxalic acid.

Oxidation and reduction titration:

1. Oxidising agents: Potassium permanganate (permanganometry) Reducing agents: Ferrous sulphate, ferrous ammonium Sulphate, oxalic acid
2. Standard solutions prepared: Ferrous Sulphate, ferrous ammonium Sulphate and oxalic acid.

Iodometry titrations:

1. Titrations of liberated iodine against sodium thiosulphate using acidified potassium permanganate, potassium dichromate and copper Sulphate solutions.
2. Standard solutions: potassium dichromate, copper sulphate.

Text Books

1. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 2009.
2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith, A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry. 5th Edn., Pearson Education, 2005.

Reference Books

1. Mann & Saunders, Practical Organic Chemistry, 4th Edition, 2009.
2. V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, 2nd Edn., 2004.

CO	Course outcomes	Remarks
CO1	Learn the concept of Titration methods and various Titrations.	K2
CO2	Understand the Acidimetry and alkalimetry titrations	K2
CO3	Learn the preparation of standard solutions	K2
CO4	Learn the calculations of molarity, molality and Normality of the solutions	K2
CO5	Understand the concept of organic analysis	K2,K4

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	M	S	S	S	S
CO2	S	M	S	S	M	M	S	S	S	S
CO3	S	S	M	S	M	M	S	M	S	S
CO4	S	S	M	S	M	M	S	S	S	S
CO5	S	S	M	M	M	M	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER - III

Course Code	U21CHT31	ANALYTICAL CHEMISTRY	L	T	P	C
CORE-V			5	-	-	4
Learning Objectives		1. To understand laboratory safety measures and error analysis 2. To emphasize the basic principles of purification techniques 3. To know the basic principles and applications of separation techniques				

Unit- I -Handling of Chemicals and Analysis

a) Safety and hygiene in the Chemistry Lab

Storage and handling of chemicals, handling of acids, ethers, toxic and poisonous chemicals, antidotes, threshold vapour concentration and first aid procedure. Heating methods, stirring methods filtration techniques. Calibration of pipette, standard measuring flask and burette. Weighing principle in chemical balance and single pan balance

b) Errors:

Definition – terms- absolute and relative error – precision and accuracy – Methods of expressing precision: mean, median, deviation, average deviation and coefficient of variation -classification of errors - t-test rejection of experimental data – Q-test sources and elimination of errors or Minimizing errors -Significant figures and its application with respect to the glassware used. Normal error curve and its importance.

Unit-II - Purification Techniques

a) Chromatography

Definition of Chromatography, mobile phase and stationary phase. Classification of Chromatography. Principle of adsorption and partition chromatography.

b) Column chromatography:

Requirement of a good adsorbent- solid stationary phase-liquid stationary phase, adsorbents, classification of adsorbents, solvents, preparation of column, applications.

c) Thin Layer Chromatography:

Choice of adsorbent, choice of solvent, preparation of chromatogram, preparation of plate, developing chambers, development of plate, Rf value, applications.

d) Paper chromatography:

Types of paper used, various method of development (ascending, descending and radial) solvent used, Rf value, factors which affect Rf value. Separation of amino acids by paper chromatography – TLC is superior to other methods of chromatography.

Unit-III - Solubility Equilibria

a) **General Separation Techniques**

Solubility and solubility products, expressions for solubility products. Determination of solubility from solubility products.

b) **Precipitation titrations**

Argentometric titrations, indicators for precipitation titrations involving silver. Determination of chloride by Volhard's method. Adsorption indicators.

c) **Gravimetric methods of analysis**

Separation by precipitation, factors affecting solubility, gravimetric factor. Purity of precipitates, Co-precipitation, post precipitation. Precipitation from homogenous solution.

Unit –IV - Titrimetric Methods of Analysis

a) General Introduction

General principle- Types of titrations- Requirements for titrimetric analysis. Concentration systems: Molarity, formality, normality, wt% ppm, milli-equivalence and millimoles-problems. Primary and secondary standards, criteria for primary standards, preparation of standard solutions, standardization of solutions. Limitation of volumetric analysis, endpoint and equivalence point.

b) Acid-baseEquilibria

pH of strong and weak acid solutions. Buffer solutions. Henderson equations. Preparation of acidic and basic buffers. Relative strength of acids and bases from Ka and Kb values. Neutralisation- titration curve, theory of indicators, choice of indicators. Use of phenolphthalein and methyl orange.

c) Complexometric titrations

Stability of complexes, titration involving EDTA. Metal ion indicators and characteristics.

Unit-V - Atomic Absorption Spectroscopy

Introduction, Instrumentation source, burner, flame, monochromators, Detectors, Double beam Absorption Spectrometer, Interference, Applications.

Thermal Analysis

Thermal analytical methods, principle involved in thermogravimetric analysis and differential gravimetric analysis, discussion of various components with block diagram, characteristics of TG and DTA, Factors affecting TG and DTA curves.

Polarography

Introduction—migration current-diffusion current-residual current-polarogram-Instrumentation-advantages of DME-Ilkovic equation (no derivation)- Applications.

Text Books

1. P.L.Soni; Sultan Chand &Sons,Text Book of Organic Chemistry, 29thedition ,2012.
2. Gopalan et al;Analytical Chemistry, Sultan Chand & Sons,2013.

Reference Books

1. N. Colin, Banwell, B and Elaine.M. Fundamentals of Molecular spectroscopy by 4th edition, McGraw Hill Edn (Ind) Pvt Ltd, 2016.
2. A.K. Srivastava, P.C. Jain, Chemical Analysis: An Instrumental Approach for B.Sc. Hons. and M.Sc. Classes, S. Chand and company Ltd., Ram Nagar, New Delhi. 2011.

CO	Course outcomes	Remarks
CO1	Study the importance of safety and security, responsibility types of hazards and risk in chemical laboratory.	K2
CO2	Understand the use of personal protective and other safety equipments, handling of chemical in laboratory	K2
CO3	Understand the accuracy and precision and classification error.	K2
CO4	Learn good laboratory practices and its applications	K2, K3
CO5	Understand the Purification Techniques and Titrimetric method of analysis	K2,K4

K1- Remember **K2**- Understand**K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	M	S	S	S
CO2	S	S	M	S	M	S	M	S	S	S
CO3	S	S	M	S	M	S	M	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	M	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHE311	POLYMER CHEMISTRY	L	T	P	C
ELECTIVE –I			4	-	-	3
Learning Objectives		1. To understand the importance of polymers and an exposure to polymer chemistry 2. To understand various polymer and characterization of polymers 3. To enable a student to understand polymer structures and properties 4. To know the basic importance of molecular weight determination of polymer				

Unit – I - Introduction of Polymers

Introduction – Monomers, Oligomers, Polymers and their characteristics-Degree of polymerization- Functionality of polymer-Classification of polymers-addition polymers – PVC, orlon, Condensation polymers – Definition, Dacron, Nylon 6-Nylon 6,6 – preparation properties, uses – copolymers – preparation, properties and uses of saron. Mechanism of addition polymerization – free radical polymerization – ionic polymerization.

Unit – II- Thermoplastics and Thermosetting

Introduction of Thermoplastics and thermosetting polymers.Thermoplastics- difference between thermoplastic and thermosetting: Preparation, Properties and Uses of Polyethylene, Polypropylene, polystyrene, Polyacrylonitrile, Poly Vinyl Chloride, Poly tetrafluoro ethylene, nylon and polyester. Thermosetting Plastics: Phenol formaldehyde and epoxide resin

Unit – III –Rubber

History of Rubber- Elastomers or Rubber – natural rubber – compounding of rubber, properties, uses, synthetic rubbers – buna-s neoprene, silicone rubber. Preparation, Properties and use of Conducting Polymers,examples: poly sulphur nitriles, poly phenylene, polypyrrole and poly acetylene.

Unit – IV - Weight determination of polymer and polymerization Techniques

Nature and structure of polymers-structure property relationships weight determination – number average, weight average methods of determination – osmotic pressure, viscosity, light scattering methods. Polymerization Techniques: Bulk, Solution, Suspension and Emulsion.

Unit –V - Inorganic Polymers

Introduction of Inorganic polymers – Classification of Inorganic Polymers- Homo-atomic polymer-Hetero-atomic polymer – general properties of Inorganic polymers – glass transition temperature classification – polymer containing boron -preparation, properties and uses of Boron Nitride, Borazine, silicone rubber.

Text Books

1. B.R. Puri, L.R. Sharma and K.C. Kalia, Principles of Inorganic Chemistry, 31st Edition, Milestone Publishers and Distributors, New Delhi, 2013.
2. SatyaPrakash, Advanced Inorganic Chemistry, R.D.Madan, Volume 1, 5th Edition, S. Chand and Sons, New Delhi, 2012.

3. R. Gopalan, Text book of Inorganic Chemistry, Universities Press India Ltd., Hyderabad, 2012.

Reference Books

1. D.A. Skoog, D.M. West, F.J. Holler and S.R. Crouch, Fundamentals of Analytical Chemistry, 8th Edition, Brooks/Cole, Thomson Learning, Inc., USA, 2004
2. B. K. Sharma, Polymer Chemistry, GOEL Publishing House, 2014.

CO	Course outcomes	Remarks
CO1	Gain the knowledge of formulation for manufacturing, properties and applications of variety of thermoset plastic materials.	K2, K3
CO2	Can brings the knowledge toward polymer and characterization of polymers, Thermoplastics and thermosetting polymers, rubber – properties, uses, synthetic rubbers, Molecular weight determination and Inorganic polymers.	K2, K3
CO3	Utility of copolymerization reaction & preparation techniques	K3
CO4	Learn the basic importance of molecular weight determination of polymer	K2
CO5	Learn the Inorganic polymer and its classification	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	M	S	S	S	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHE312	WATER TREATMENT	L	T	P	C
ELECTIVE –I			4	-	-	3
Learning Objectives	1. To give an in-depth understanding of water quality parameters, ground water and surface water pollution and its control measures. 2. In addition, the students will also learn the water treatment methods, sewage and industrial effluent treatment methods and water resources management. 3. To understand the pollutants and their effect on environment and on human health 4. To know the basic information of water treatment methods for domestic and industrial purposes					

Unit-I - Source of water

Uses of water – safe and wholesome water – sources of water supply: Rain: hydrological cycle, acid rain, artificial rain, rain water harvesting. Surface water: impounding reservoir, river and tanks – their characteristics and impurities. Ground water; wells and springs.Water borne diseases/substances affecting the portability of water.

Unit-II - Effects of impurities in natural water

Effects of impurities in natural water: colour taste and odour, turbidity and sediment and micro organism. Dissolved mineral matter – hardness types – estimation (EDTA method) – methods of softening – boiling, addition of lime – addition of sodium carbonate – ion exchange method.

Unit – III - Water Treatment methods

Clarification of water: sedimentation and filtration. Coagulation of water electrochemical coagulation – flocculants – sterilization and disinfection of water: chemical methods and physical methods.

Unit- IV - Water analysis

Demineralization of water – ion exchange process – desalination of sea water: electrodialysis method, reverse osmosis methods.

Water analysis: physical examination – chemical examination bacteriological examination – BOD, COD.

Unit – V - Miscellaneous methods of water treatment

Miscellaneous methods of water treatment: color, odour and taste removal – iron and manganese removal – fluoridation – deflouridation, prevention of plumb solvency – removal of slime and algae from water - de- oxygenation of water.

Text Books

1. A. K. De, Environmental Chemistry, 5th Edition., New Age International Publisher, 2005.
2. B. K. Sharma,Environmental Chemistry, 11th Edition., Krishna Prakashan media Limited, 2007.

Reference Books

1. D. Samuel & D. Faust, Chemistry of Water Treatment, 2nd Edition, 2018.
2. A.D. Patwardhan, Industrial Wastewater Treatment 2nd Edition, 2017.

CO	Course outcomes	Remarks
CO1	Understand the in-depth knowledge of acid rain, artificial rain, rain water harvesting, and BOD, COD.	K2
CO2	Learn the effects of impurities in Natural waters	K2
CO3	Learn the techniques of filtration and sedimentation	K2
CO4	Study the chemical, physical and biological examination of water analysis	K2, K3
CO5	Study about water quality parameters, ground water and surface water pollution and its control measures and the water treatment methods, sewage and industrial effluent treatment methods and water resources management.	K2, K3

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	S	S	S	S	S
CO2	S	S	S	S	S	M	M	M	M	M
CO3	S	S	S	M	M	M	M	M	M	M
CO4	S	S	M	M	M	S	S	S	S	M
CO5	S	S	M	M	M	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER - IV

Course Code	U21CHT41	MEDICINAL CHEMISTRY	L	T	P	C
CORE-VI			4	-	-	4

Learning Objectives	1. To understand the basic concepts and strategies in drug design and synthesis. 2. To provide preliminary introduction to vitamins and their classification 3. To provide preliminary introduction to sulpha drugs and antimalarial activity. 4. To provide preliminary knowledge on Anesthetics drugs, antibiotics and their synthesis.

Unit – I - Introduction and Importance of Chemistry in Pharmacy

Important terminologies used their meaning – molecular pharmacology – pharmacodynamics, pharmacophore – metabolites, antimetabolits – drugs – definition – important drugs dosage – Indian medicinal plants and trees. Discovery and Development of Drugs- History of drug discovery, Strategies in drug discovery, lead discovery.

Unit – II - Types of Drugs

Antibacterial drugs – synthesis, properties and applications of Sulpha drugs: sulphanilamide, sulphadiazin– Analgesics: synthesis, properties and application of morphine, heroin – Antimalarials: quinine, plasmoquinine.Cardio vascular drugs: Antiarrhythemic drugs, antihypertension drugs.

Unit – III –Vitamins

Definition-Classification –Sources-Daily Requirement-Functions & deficiencies of
Vitamin B1, B2, B3 & B6-Folic acid (Vitamin B9)-Cynocobalmin (Vitamin B12)-therapeutic uses and Deficiency of Vitamin A - Vitamin D & its role in calcium Metabolism-Vitamin- E & Vitamin- K.

Unit – IV–Anesthetics

Definition –chloroform – ethylchloride – trichloroethylene – gaseous anesthetics – cyclopropane and nitrous oxide – local anesthetics, classification, characteristics – benzocine, piperocaine and lidcaine.

Antibiotics Definition – pencillins, teracyclins, teramycin, streptomycin and chloromycetin.

Unit- V - Structure prediction and Drug Design

Structure prediction - Introduction to comparative Modeling- Sequence alignment- Constructing and evaluating a comparative model -Predicting protein structures by 'Threading' - Introduction of Molecular docking.

Text Books

1. G. Jayashree, A Text book of Pharmaceutical Chemistry, S. Chand & Co., New Delhi, 2009.
2. B.K.Sharma, Industrial Chemistry byKrishnaPrakashan Media(p) Ltd, 2011.

Reference Books

1. A.R. Leach, Molecular Modelling Principles and Application, Longman, 2001.
2. SatyaPrakash Gupta, QSAR and Molecular Modeling, Springer - Anamaya Publishers, 2008.

CO	Course outcomes	Remarks
CO1	Understand the important terminologies of molecular pharmacology	K2
CO2	Learn the classification of Vitamins and its importance	K2
CO3	Study the importance of sulpha drugs and antimalarials.	K2
CO4	Learn the concept of Anesthetics and transportation and antibiotics	K2
CO5	Study the importance of structure –prediction and drug design	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	M	M	S	S	S	S	S
CO4	S	S	M	M	M	S	S	S	S	M
CO5	S	S	M	M	M	M	M	M	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHT42	BIOCHEMISTRY	L	T	P	C
CORE-VII			4	-	-	4
Learning Objectives		1. To enable the student to develop a sound knowledge of fundamental concepts in biochemistry. 2. To emphasis on the various aspects of lipids and proteins 3. To understand the classification and properties of nucleic acid, amino acid and hormones. 4. To emphasis on the various aspects of metabolism and interrelationship of metabolic events.				

Unit – I –Lipids

a) Introduction- Classification - neutral lipids, Phospho lipids (lecithines, cephalins, plasmalogens) and glycolcoipids.
b) Fatty acids – saturated, unsaturated fatty acids, Properties – Hydrolysis-acid number, saponification number.
c) Cholesterol – biosynthesis. Bile salts derived from cholesterol.
d) Metabolism: biosynthesis of lipids – synthesis of fatty acids and synthesis of triglycerides.

Unit –II –Proteins

Protein Introduction to protein, classification of protein based on solubility, shape, composition and Function. Peptide bond – Structure of peptide bond. Denauration – renaturation of protein, properties of protein. Introduction to lipoprotein, glycoprotein and nucleoprotein. Biological function of protein (Protein structure) Protein structure - Primary, secondary / tertiary and quaternary. Separation and purification of proteins – dialysis – gel filtration – electrophoresis.

Unit – III - Amino Acids

Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Malonic ester synthesis c) strecker's synthesis. Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Unit – IV - Nucleic Acids

Introduction to nucleic acid, Difference between nucleotide and nucleoside, composition of DNA & RNA Structure of Nitrogen bases in DNA and RNA along with the nomenclature. · DNA double helix (Watson and crick) model · · Types of RNA , structure of t – RNA (clover leaf model).

Unit –V–Hormones

a) Introduction-Vertebrate hormones – classification – Testosterone – progesterone – Insulin Functions of hormones and their regulation. Chemical classification of hormones, transport of hormones in the circulation. Thyroid hormone: Thyroid gland. Biosynthesis of thyroid hormone and its regulation; Mechanism of Ca2+ regulation and pathways involving bone, skin, liver, gut and kidneys.

Text Books

1. Lehninger, Principles of Biochemistry, Fourth Edition, David L. Nelson and Michael M. Cox, Worth Publishers, New York, 2005.
2. A.Bahl and B.S. Bahl, Advanced Organic Chemistry, I Multicolor Edition, S.Chand& Company, New Delhi,2010.

Reference Books

1. L. Veerakumari, Biochemistry, MJP publishers, Chennai, 2004.
2. J. M. Berg, J. L. Tymoczko. and L. Stryer, L. Biochemistry, 6th Edition, 2007.

CO	Course outcomes	Remarks
CO1	Understand the structure of organic natural products	K2
CO2	Know and appreciate the importance of chemistry of natural compounds	K2,K3
CO3	Identify the structures of Lipids and Proteins.	K4
CO4	Learn the classification of Amino acids and Nucleic acids	K2, K4
CO5	Understand the importance of Harmones and its functions	K2,K3

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	S	M	S	M	S	S
CO2	S	S	S	S	S	S	S	M	S	M
CO3	S	S	S	S	M	M	S	M	S	S
CO4	S	S	M	S	S	M	S	S	S	M
CO5	S	S	M	S	M	S	M	S	S	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHE421	AGRICULTURAL CHEMISTRY	L	T	P	C
ELECTIVE-II			3	-	-	3
Learning Objectives	1. To give the students the importance of Agricultural chemistry and an exposure 2. To analyze and find a suitable method to cultivate and promote agricultural methods.					

Unit- I - Soil Chemistry

Introduction of soil chemistry-Soil analysis. Composition of soil: Organic and Inorganic constituents. Soil acidity: buffering capacity of soils. Limiting of soil. Absorption of cations and anions: availability of soil nutrients to plants.

Unit- II –Fertilizers

Introduction – classification -Peat and organic manures (composts)-Role of humus. Effluent form gobar gas plants. Use of fertilizers: urea, DAP, Super phosphate, Gypsum, NPK-mixed fertilizers, Optimal addition of Fertilizers to obtain estimated yields. .

Unit- III–Fungicides

Inorganic (Bordeaux Mixture) and organic (dithiocarbamate). Industrial fungicides: creosote fractions.

Herbicides and Weedicides: Selective and non-selective, 2, 4-D and 2, 4, 5-t (structure and function)

Unit- IV - Plant Growth Regulators

3-Indole acetic acid-Napthalene acetic acid-Ethepon(2-chloroethyl phosphoric acid)- Alar (succinin acid-2, 2-dimethyhydrzine) their function. Plant hormones: Gibberlin, Cyclocel, Phosphon, dwarfing compound (CCC: 2-Chlorethyltrimethyl ammonium chloride). Defoliants.

Unit- V –Insecticides

Introduction of Insecticides, stomach poisons, contact insecticides, fumigants, manufacture and applications of insecticides. DDT, BHC, pyrethrin mention of aldrin, dieldrin, endrin and pentachlorophenol

Text books

1. D.Choudhary,Basics of Agricultural Chemistry, Anmol Publication,2009.
2. J. Subbiah, An Introduction of Agricultural Chemistry, JV Publishers, 2020.

Reference Books

1. R. Rajeswari et. all., Elements of Agricultural Chemistry, Satish Serial Publishing House, 2014.
2. T. Anderson,Elements of Agricultural Chemistry, Good Press Publishes,2019.

CO	Course outcomes	Remarks
CO1	Acquire knowledge about Soil Chemistry and composition	K2
CO2	Learn the use of fertilizers	K2
CO3	Understand the industrial Fungicides and its application	K2, K3
CO4	Learn the plant growth regulators	K2
CO5	Understand the types of insecticides	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHE422	TEXTILE CHEMISTRY	L	T	P	C
ELECTIVE-II			3	-	-	3
Learning Objectives		1. To facilitate the students to learn about the pre-treatments of Various kinds of textile materials involved in textile wet processing industries. 2. To acquire knowledge of natural fibers 3. To get basic importance of dying process 4. To understand the basic concept of printing methods				

Unit – I - Natural Fiber

Properties of textile fiber – classification of fibers. Natural fibers of vegetables origin – chemical and physical properties of cotton, jute. Natural fibers of animal origin: chemical and physical properties of wool and silk – natural mineral fibers: chemical and physical properties of asbestos and glass.

Unit – II – Man made fiber

Mode of production – types of spinning – wet dry and melt spinning.

a. viscose rayon: Raw material, method of conversion to fiber and filament form. Physical and chemical properties and uses.
b. Cuprammoniumrayon and cellulose acetate: raw materials, method of conversion to fiber and filament form. Physical and chemical properties and uses.
c. Synthetic organic fiber: polyamide and polyester fiber – raw materials, method of production, physical and chemical properties fiber structure.

Unit – III–Dyeing

Dyeing: classification of dyes – theories of dyeing

Direct dye: properties, method of application to cotton – assistants used and their functions.

Sulphur dye: properties, method of application to cotton. Acid dye: properties, method of application to cotton.

Vat dye: properties, method of application to cotton.

Unit – IV - Pre-treatment process of dyeing

Introduction and Pre – treatment process for dyeing-process sequence in pretreatment processing- singeing –singeing process sequence, yarn singeing, desizing, Oxidative desizing scouring, Basic surfactant concepts, and bleaching.-introduction of bleaching, bleaching with sodium chlorite.

Unit – V - Printing Process

Printing Process-Historical Perspective-Methods Used for printing-Block Printing method-stencil method-machine roller printing-screen printing method-semi automated process-Finishing Process- Chemical Finishing process-Applications of Printing -different methods of printing like hand block printing, stencil printing, wax printing, screen printing, roller printing etc.

Text Books

1. K. Venkatraman, "The Chemistry of Synthetic Dyes" – Vol. III, Academic press, London, 2010.
2. Robert R Mather ,Roger H Wardman ,The Chemistry of Textile Fibers,Royal Society of Chemistry, 2nd Edition,2015.

Reference Books

1. David. R. Waring, Geoffrey Hallas, The Chemistry and Application of Dyes, Springer-Verlag New York Inc. 2012.
2. V. A. Shenai, "Technology of Textile Printing," 2nd Edition,Sevak Publisher, 2003.

CO	Course outcomes	Remarks
CO1	Importance of Natural Fibers and its applications	K3, K4
CO2	Learn the Man- made fiber and its types	K2
CO3	Understand the pre-treatment of processing of dyes	K2
CO4	Remember the theories and classification of dyes	K1
CO5	Learn the different methods of printing process and applied various fields.	K2, K3

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of COs with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER - V

Course Code	U21CHT51	ORGANIC CHEMISTRY – I	L	T	P	C
CORE-VIII			5	-	-	4
Learning Objectives	1. To develop an understanding of food components such as carbohydrates. 2. To understand the chemistry Heterocyclic compounds and their derivatives. 3. To learn the polynuclear hydrocarbons and fused ring systems.					

Unit– I - Alicyclic Compounds

a) General method of preparation and properties of cycloparaffins – Baeyer's Strain theory and its modifications.

b) Conformational analysis – Fischer's plane Projection formula – Newmann's projection formula and Sawhorse formula of ethane, 1,2 Cyclic ketones.

Polynuclear Hydrocarbons and fused ring systems

Polynuclear hydrocarbons and their derivatives. Isolated systems: Naphthalene, Anthracene and Phenanthrene: preparation, properties uses and structure. Derivatives of Naphthalene – preparation, properties and uses of Naphthylamines, naphthols and naphthaquionnes.

Unit – II - Heterocyclic Compounds

a) Molecular orbital picture and aromatic characteristics of pyrrole, furan, thiophene – Comparison between basicity of pyridine, piperidine and pyrrole

b) Pyridine -. Methods of synthesis and chemical reactions - electrophilic substitution and nucleophilic substitution reaction mechanism in pyridine derivatives.

c) Preparation and reactions of indole, quinoline and isoquinoline with special reference to Fisher indole synthesis, Skraup synthesis and Bischler-Napieralski synthesis

d) Mechanism of electrophilic substitution reactions of indole, quinoline and isoquinoline.

Unit – III - Molecular Rearrangements

a) Rearrangement to electron-deficient carbon - 1,2 shift (Wagner-Meerwein rearrangement, pinacol rearrangement, Wolff rearrangement, benzil-benzilic acid rearrangement).

b) Aromatic rearrangements from oxygen to ring carbon – Fries, Claisen and benzidine rearrangement.

c) Rearrangement to electron-deficient nitrogen – Beckmann, Schmidt, Hofmann, Lossen, Curtius rearrangement).

d) Rearrangement to electron-deficient oxygen: Baeyer-Villiger oxidation, hydroperoxide rearrangement, cumenehydroperoxide-phenol rearrangement, Dakin reaction.

Unit – IV - Carbohydrates

a) Monosaccharides – detailed study of glucose and fructose – structure and configuration – mutarotation and epimerization – Interconversion glucose and fructose – Descent and ascent of the sugar series – Estimation of Glucose.

b) Disaccharides – structure and properties of sucrose.

c) Polysaccharides – structure of starch and cellulose – applications of cellulose derivatives.

Unit – V - Natural products

a) Alkaloids: Definition, occurrence, extraction of alkaloids and general methods for determining the structure of alkaloids – Classification of alkaloids - structure and synthesis of the following alkaloids : Cocaine, papaverine, pipperine and nicotine.

b)Terpenoids: Introduction, classification occurrence, isolation – general properties – isoprene rule – General methods of determining structure, Synthesis – properties – structures of citral, geraniol, terpineol.

Text Books

1. K.S. Tewari, N.K. Vishil, S.N. Mehotra , A text book of Org. Chem., 1st edition, Vikas Publishing House Pvt Ltd., 2001.
2. Bahl and ArunBahl, Organic Chemistry, S. Chand and Sons, New Delhi, 2005.

Reference Books

1. Jerry March, Advanced Organic Chemistry, 5th Edition, John Wiley and Sons, New York, 2004
2. I.L. Finar, Organic Chemistry Vol. I, 6th Edition, Pearson Education, New Delhi, 2014.
3. R.T. Morrison &R.N. Boyd, Organic Chemistry, 7th Edition, Pearson Education, New Delhi, 2013

CO	Course outcomes	Remarks
CO1	Remember the preparation methods and analyze properties of cyclo paraffins and conformational analysis.	K1, K4
CO2	Able to understand the Molecular rearrangement and heterocyclic compounds.	K2
CO3	Understand the concept of configuration and conformational stereo isomers	K2
CO4	Learn preparation and properties of Mono, di and polysaccharides	K2
CO5	Learn Natural products like alkaloids and terpenoids	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	S	S	S	S	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHT52	INORGANIC CHEMISTRY - I	L	T	P	C
CORE-IX			5	-	-	4

Learning Objectives	1. To understand the nature of bonding in coordination compounds. 2. To understand the importance and application of coordination compounds in industry and in medicine. 3. To understand the active roles played by metal ions and coordination compounds in biological systems. 4. To understand the concept of nuclear chemistry and radiation chemistry.

Unit–I - d-Block & f-Block Elements

Chemistry of transition elements – electronic configuration – group study of titanium, vanadium, chromium, manganese and iron metals – comparative study of zinc group metals – Important uses of transition metals and their alloys. Horizontal comparison with Fe, Co, Ni groups – toxicity of Cd and Hg – oxides, mixed oxides, halides, and oxohalides of transition metals – synthesis and reactivity of vanadates, chromates, dichromate, molybdates, tungstates, tungsten bronzes, manganate, permanganate – polycations – Interstitial compounds – nitrides, carbides, hydrides, borides of Ti, V, Cr, W and their industrial uses. General characteristics of f-block elements – comparative account of lanthanides and actinides – lanthanide series – separation by ion exchange and solvent extraction methods – lanthanide contraction – actinide series – separation of actinides – oxidation states and general properties.

Unit – II - Coordination Chemistry

IUPAC nomenclature - theories of coordination compounds -Werner, Sidgwick, valence bond, Crystal Field theory. Crystal field splitting in octahedral, tetrahedral and square planar fields – factors influencing the magnitude of crystal field splitting – CFSE in weak and strong fields calculations; pairing energy. Jahn-Teller distortion. Magnetism and Colour: Orbital and spin magnetic moments, spin only moments of d^n ions and their correlation with effective magnetic moments, including orbital contribution; quenching of magnetic moment.

Unit – III - Experimental determination of stability and composition of complexes

Stability of complexes -factors affecting the stability of complexes - Stability constants of coordination compounds and their importance in inorganic analysis. Kinetic verses thermodynamic stability. Experimental determination of stability constant and composition of complexes. Isomerism, reactivity and stability: Determination of configuration of cis- and trans- isomers by chemical methods. Labile and inert complexes, substitution reaction on square planar complexes, trans effect– theories (example and applications). Reaction mechanism – substitution reactions in octahedral complexes.

Unit– IV - Bioorganic Chemistry

Metal ions in biology and their vital role in the active site, Structure and functions of Metallo proteins and enzymes.Structures and characteristic features of Hemoglobin and myoglobin – Vitamin B_{12}. Biological functions of hemoglobin and myoglobin, cytochromes and ferredoxins, carbonate bicarbonate buffering system and carbonic anhydrase. Biological nitrogen fixation, Photosynthesis: Photosystem-I.

Unit – V – Organo metallic Chemistry

Introduction - Structure and application -metal carbonyls -mono and poly nuclear carbonyls of Ni, Fe, Cr, Co and Mn -synthesis and structure -nitrosyl compounds -classification, preparation and properties -structure of nitrosyl chloride and sodium nitroprusside.

Nomenclature of organometallic compounds, 16- and 18- electron rule. Structure and bonding in transition metal carbonyls: polynuclear carbonyls, bridging and terminal carbonyls, transition metal alkyls, carbenes, and carbynes, and metallocenes.

Text Books

1. J. E. Huheey, E. A. Kieter& R. L. Keiter, Inorganic Chemistry, 5th ed., Harper Collins, New York, 2003.
2. F.A. Cotton, G. Wilkinson, Advanced Inorganic Chemistry, 6th Ed., John Wiley & Sons, 2007.

Reference Books

1. D.E. Douglas, D.H. McDaniel,& J.J. Alexander, Concepts and Models in Inorganic Chemistry, Wiley, 3rd Ed., 2006.
2. A.G. Sharpe, Inorganic Chemistry, Pearson Education, 2008.

CO	Course outcomes	Remarks
CO1	Learn about transition metal element and its properties.	K2
CO2	Known the preparation and properties of transition metal complexes	K2, K4
CO3	Understand the theories of coordination compounds	K2
CO4	Understand of hemoglobin, myoglobin and vitamins	K2
CO5	Learn photochemistry of organo metallic compounds	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of COs with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHT53	PHYSICAL CHEMISTRY –I	L	T	P	C
CORE-X			5	-	-	4
Learning Objectives	1.To understand the concepts of thermodynamics 2. To understand the physical and chemical properties of systems. 3.To understand the Carnot's Theorem 4.To Understand the Maxwell Relationship 5.To Learn the methods of determining order of the reaction					

Unit – I –Thermodynamics

Introduction: Scope and importance of thermodynamics – energy and its units – mechanical work and heat and their relation – thermodynamic systems and their characteristics – state of a system – state function and path function and their characteristics – thermodynamic functions – exact and inexact differentials.

First Law: Statement – mathematical formulation – change in constant pressure – Cp-Cv relationship – work done in isothermal, reversible expansion and compression of an ideal gas – Calculation of E, H and w for adiabatic reversible expansion. Reversible isothermal expansion of a rea gas – calculation of E, q, w and H for a VanderWaal's gas – Joule-Thomson effect ($\Delta E/\Delta V$)T value for ideal gas – temperature, calculation and significance.

Unit – II - Second law of Thermodynamics

Variation of enthalpies with temperature – Kirchoff'sequation – Hess's law of constant heat summation – statement and applications.

Bond enthalpies – definition – calculation from the thermo chemical data and applications.

Zeroth law of thermodynamics and its significance.

Second law of thermodynamics - object of the II law – different ways of stating II law and its significance.Conversion of heat into work – Carnot'stheorem and cycle – Thermodynamic efficiency – thermodynamic scale of temperature.

Unit – III - Third law of Thermodynamics

Entropy – definition and significance the concept of entropy – entropy changes in isolated systems – entropy as a thermodynamic function dependence of entropy on variables of the system. Entropy changes in ideal gas, in mixing of gases, physical transformations and in chemical reactions. Entropy and probability

Free energy functions: Helmholtz free energy (A) – definition and temperature dependence – Gibb's free energy with temperature and pressure – Gibb's-Helmholtz equation and its applications – Maxwell's relations.

Unit – IV - Partial Molar Quantities

Chemical potential – relationship between partial molar quantities – Gibb's Duhem equation – chemical potential in case of a system of ideal gases – application of the concept of chemical potential – Clausius-Claypeyron equation – derivation and its applications.

Nernst heat theorem and its application - Third law of thermodynamics – a simple treatment of the law. Temperature dependence of heat capacity and its use in the determination of absolute entropy. Exceptions to III law – residual entropy of CO,N_2O,H_2O,NO and H_2

Unit– V - Chemical Kinetics

Rate of a reaction – rate law and rate constant – order and molecularity of a reaction.
Reactions of first order and pseudo first order reaction – derivation of rate constant and half life period – catalytic decomposition of hydrogen peroxide, conversion of N-chloro acetanilide to p-chloro acetanilide, decomposition of dinitropentoxide – hydrolysis of ester by acids – inversion of cane sugar.
Reaction of II order: derivation of rate constant and half-life period – saponification of ester.
Reactions of III order: derivation of rate constant and half-life period. Reaction between FeCl3 and $SnCl_2$.
Reactions of zero order surface reactions – derivation of rate law – specific examples.
Influence of temperature on the rate of a reaction – Arrhenius rate equation and its significance – measurement of Arrhenius parameters, A and Ea.
Theory of reaction rates – Collision theory – unimolecular reactions – Lindemann – Theory of absolute reaction rates.

Text Books

1. P.W. Atkins,Physical Chemistry, 7th Ed., Oxford University press, 2010.
2. P.L. Soni, O.P. Dharmarha& U.N. Dash, Textbook of Physical Chemistry, 23rd Edition, Sultan Chand & Sons, New Delhi, 2011.

Reference Books:

1. D.A. McQuarrie, D. Simon, Physical chemistry, A Molecular Approach, Viva Books Pvt. Ltd, 2003
2. R.P. Rastogi& R.R. Misra, An Introduction to Chemical Thermodynamics, 6th Edition, Vikas Publishing House Pvt. Ltd., Noida, 2002.

CO	Course outcomes	Remarks
CO1	Learn the thermodynamic description of exact, inexact differential and state function	K2, K4
CO2	Remember the concept of Conversion of heat into work – Carnot'sTheoremand cycle	K1, K3
CO3	Learn the Gibb's-Helmholtz equation and its applications – Maxwell's relations	K2, K3
CO4	Know the statistical thermodynamics and various partition functions.	K2, K3
CO5	Study the steady state approximation Michaelis- Menten mechanism, Lindemann- mechanism, and chain reaction	K2, K3

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHP53	PRACTICAL -IV INORGANIC QUALITATIVE ANALYSIS	L	T	P	C
COREXI			-	-	5	4
Learning Objectives		1. To enable the students to develop analytical skills in inorganic qualitative analysis. 2. To appreciate the various colored chemical reactions of metal ions				

Semi micro qualitative analysis:

1. Training sessions for three classes:
   Mixture of anions containing an interfering anion and its elimination technique.
   Mixture of cations of simple radicals to familiarize with the inter group separation techniques.
2. Semi micro qualitative analysis of inorganic salt mixtures containing one interfering acid radical.
3. Simple anions: Carbonate, nitrate, sulphate, sulphide, sulphite, chloride and bromide.
4. Interfering anions: Borate, fluoride, oxalate, phosphate, arsenite and chromate.
5. Cations:
   (i) Group I cations: Lead, silver, mercurous.
   (ii) Group II cations: Mercuric, copper, cadmium, bismuth, antimony, tin.
   (iii) Group III cations: Aluminium, ferrous, ferric, chromium.
   (iv) Group IV cations: Cobalt, nickel, manganese, zinc.
   (v) Group V cations: Barium, strontium, calcium
   (vi) Group VI cations: Magnesium, ammonium.

Text Books

1. Krishna Kumar Sharma, Principles of Qualitative Analysis, Ist Edition, 2019.
2. M. Clyde, Inorganic Qualitative Analysis in the Laboratory, Academic Press, 2012

Reference Books

1. Vogel's Textbook of Quantitative Chemical Analysis, J. Mendham, R.C. Denney, J.D. Barnes and M.J.K. Thomas, 6th edition, Third Indian Reprint, Pearson Education Pvt. Ltd., New Delhi, 2003.
2. Daniel C. Harris, Quantitative Chemical Analysis, 7th edition, 2006.

CO	Course outcomes	Remarks
CO1	Identify less common metal ions.	K4
CO2	Identify the Acid radicals and Basic radicals	K4
CO3	Learn the concept of Molarity, Molality and Normality	K2
CO4	Learn the Semi micro qualitative Analysis	K2
CO5	Identify interfering anions	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	M	S	M	S
CO2	M	M	M	S	S	S	S	S	M	S
CO3	M	M	M	S	S	M	M	S	S	S
CO4	M	M	M	S	S	S	S	S	S	M
CO5	M	M	M	S	S	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHP54	PRACTICAL-V PHYSICAL CHEMISTRY	L	T	P	C
CORE- XII			-	-	5	4
Learning Objectives	1. To enable the students to acquire knowledge in physical chemistry experiments 2. To learn the applications of colligative properties, to carry out experiments based on phase rule 3. To acquire skills based on chemical kinetics experiments and to understand electrochemistry through experiments					

Experiments: (Any 8 experiments)

a) Determination of $K_f$and molecular weight of a solute by Rast method
b) Simple eutectic phase diagram
c) Compound formationphase diagram
d) Determination of CST of phenol-water system study of effect of impurities on CST
e) Determination of Partition coefficient of iodine in CCl_4 and water system
f) Determination of equilibrium constant andstrength ofpotassium iodide in $KI+I_2 \rightleftharpoons KI_3$ system.
g) Determination of rate constant and Comparison of strengths of two acids of a first order reaction by ester hydrolysis
h) Conductometry - Acid – base titration (HCl vs NaOH).
i) Conductometry – Determination of limiting molar conductance of a strong electrolyte (KCl).
j) Potentiometry – Determination of solubility product of a sparingly soluble substance.
k) Potentiometry – Redox titration of ferrous vs dichromate.
l) Verification of Beer-Lambert's law and determination of concentration of metal ions spectrophotometrically

Text Books

1. B. Viswanathan and P. S. Raghavan, Practical Physical Chemistry, Viva Books,2009.
2. O.P.Pandey, D.N.Bajpai, S.Giri, Practical Chemistry,Revised Edition,2010.

Reference Books

1. O. P. Pandey, D. N. Bajpai, and S. Giri, Practical Chemistry, S. Chand Publishing, 2013.
2. R. Sonia, S. Agrawal, & S. Mishra, Practical Chemistry, Kindle Edition, 2020.

CO	Course outcomes	Remarks
CO1	It can enable the students to acquire knowledge in physical chemistry experiments, applications of colligative properties, chemical kinetics experiments	K1, K2, K3
CO2	understand the electrochemistry through experiments	K2
CO3	Gain the knowledge of conductometric and potentiometric titrations	K2
CO4	Determination of CST of phenol-water system	K2, K4
CO5	Study the Preparation of solutions	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	M	S	S	S	S
CO2	S	M	S	S	M	M	S	S	S	S
CO3	S	S	M	S	M	M	S	M	S	S
CO4	S	S	M	S	M	M	S	S	S	S
CO5	S	S	M	M	M	M	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHE531	FORENSIC CHEMISTRY	L	T	P	C
ELECTIVE III			3	-	-	3
Learning Objectives		1. To understand the basics of Forensic Science, to impart awareness to the students on crime investigations and cyber crimes. 2. To Demonstrate the basic concepts and terminologies of forensic science 3. To Analyze and interpret forensic samples				

Unit- I - Introduction

History and introduction to forensic science- crime-types of crimes-The crime scene, physical evidence-definition- types of physical evidences- identification and comparison of physical evidences-Method of analysis in forensic science- spectrometry-microscopy.

Unit- II - Traces at Crime Scene

Fiber- collection of fiber evidence-comparison of man-made fibers- forensic examination of paint-collection and preservation of paint evidence- collection and preservation of glass evidence-comparison of glass fragments- forensic characteristics of soil- comparison of soil specimens.

Unit- III - Human Specific Physical Evidences and analysis

Hair- collection of hair evidence-morphology of hair- identification and comparison of hair – Finger prints- classifications- methods of detecting- preserving developed finger prints, foot prints and lifting- foot wear and tire impressions. Hand writing comparison- genuine and forged writing- collection of samples- detection.

Unit- IV - Forensic Characterization of samples

Blood group - forensic characterization of blood stains - paternity testing - forensic characterization of semen- collection of rape evidences- DNA analysis. heavy metal poisoning - CO-poisoning- classification of drugs- drug identification- collection and preservation of drug evidence-snake poisoning.

Unit- V - Cyber Crimes

The emergence of internet or cyber crime-common types of cyber crimes-Hacking, steeling of data, damage to personal data-abusing of personal data. Forensic investigation of cyber crime- Recovery and protection of computer crime evidences.

Text Books

1. B.B. Nanda & R.K Tiwari, Forensic Science in India : A vision for the Twenty First Centrury, select publishers, New Delhi, 2001.
2. M. K Bhasin&S.Nath, Role of Forensic Science in the New Millenium, University of Delhi, 2002.
3. S.H James & J.J Nordby, Forensic Science:An introduction to scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton, 2005.

Reference Books

1. K. Kobilinsky, Forensic Chemistry, John Wiley, 2012.
2. R. Saferstein, M.L. Hastrup and C.Hald, Fisher's Techniques of Crime scene Investigation, CRC Press, Boca Raton ,2013.

CO	Course outcomes	Remarks
CO1	Learn about the history and introduction of forensic chemistry	K2
CO2	Understand the concept of Traces at Crime Scene	K2
CO3	Understand the theories of fingerprints and classification	K2
CO4	Learn the techniques of drug identification	K2
CO5	Learn the cyber crimes	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHE532	CHEMISTRY OF MATERIALS	L	T	P	C
ELECTIVE III			3	-	-	3
Learning Objectives	1. To introduce and give an insight into the fascinating area of structure of solids and material science. This will enable the students in pursuing higher studies					

Unit-I - Fundamentals of supramolecular chemistry of soft materials

The concept and development of soft materials, Nature of supramolecular interactions for the soft materials; Noncovalent interactions, ion-ion interactions,π stacking, Cation-π-πinteractions, Ion-dipole interactions, Dipole-dipole interactions, Solvophobic interactions; van der Waals interactions, Hydrogen bonding, Multiple hydrogen bonding motifs.

Unit-II - Structure of solids

Introduction to engineering materials, Description of materials science tetrahedron, Force – interatomic distance curve, Structure - description of unit cell and space lattices, Coordination number, APF for cubic and hexagonal close packed structures, Crystal imperfections Significance of structure property correlations in all classes of engineering materials.

Unit-III - Material Characterization Techniques

Electron microscopy: Scanning electron microscopy (SEM), Instrumentation, Electron beam-specimen interaction, Specimen preparation, Energy dispersive spectroscopy (EDS) in electron microscopes; Transmission electron microscopy (TEM) - Basics of TEM, Electron sources, Specimen preparation.

Unit –IV - Preparative methods and Characterization

Solid state reactions – ceramic method, sol-gel, hydrothermal, high pressure, zone refining, CVD, Czochralski and Bridgman and Stockbarger methods.

Physical methods – thermogravimetric and differential thermal analysis and scanning electron microscopy (only introduction and application).

Unit-V - Special Materials

Superconductivity – introduction, Meissner effect – mention of Bardeen, Cooper and Schrieffer theory and Cooper pairs – examples of superconducting oxides, Chevrel phases – applications of superconducting materials.

Ionic conductors – sodium-β alumina, sodium-sulphur battery. Intercalation – layered compounds – graphitic compounds. Special applications of solidstate materials.High energy battery, lithium cells.

Text books

1. D. Helena Dodziuk, Introduction to Supramolecular Chemistry, Springer, 2007.
2 . Elaine, A, Moore, Lesley E. Smart, Solid State Chemistry: An Introduction 5th Edition., 2020

Reference books

1. A. Sheikh, Introduction to Materials Chemistry, Oxford Book Company, 2018.
2. Anthony R. West, Solid State Chemistry and its Applications-2nd Edition, 2014.

CO	Course outcomes	Remarks
CO1	Learn the fundamentals of soft materials	K2
CO2	Learn the preparative methods and characterization of materials	K2,K3
CO3	Apply the magnetic properties of the solids	K3
CO4	Study the special types of materials	K2, K3
CO5	Understand the details about the structure of solids	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHS53	CLINICAL CHEMISTRY	L	T	P	C
SBE-III			2	-	-	2

Learning Objectives	1. To understand the basics of human organ functions and to impart knowledge on clinical biochemistry and laboratory practices. 2. To Describe the basic anatomy of human body 3. To interpret laboratory results of blood and urine samples 4. To Measure total cholesterol, serum LDL and blood glucose level

Unit -I - Basics of Human Metabolism

Basics of Human Organ Functions - Plasma proteins in disease - Liver function and disease - Carbohydrate metabolism and its disorders - Disorders of detoxification and excretory mechanisms – renal function, Acid base disorders, Electrolyte and water Balance..

Unit -II - Laboratory Techniques

Introduction to Clinical Laboratories - Laboratory Work Flow cycle - Phlebotomy equipments -Identification of Blood Collection Tubes &Preparation of Blood Plasma and Serum, , Liver Function Tests - Measurement of Serum ALT &AST, Liver Function Tests.

Unit- III - Renal Function

Renal Function Tests, Measurement of Serum BUN -Renal Function Tests -Measurement of Serum Creatinine Clearance -lipid Profile, - Routine Urine Analysis & Identification of Normal Physical and Chemical Urine Constituents.

Unit- IV - Urine Analysis

Identification of Pathological Physical and Chemical Urine Constituents & Microscopic examination of Urine, Quantitative Determination of Urine Protein Proteinuria & Micro albuminuria Quantitative Determination of Urine Uric Acid Quantitative Determination of Urine Creatinine

Unit- V - Blood Analysis

Measurement of Serum Total cholesterol, Measurement of Serum LDL-C, Measurement of Serum HDL-C, Measurement of Serum TG, Diabetic Profile Tests Measurement of Blood Glucose.

Text Books

1. R. Chawla, Practical Clinical Biochemistry: Methods and Interpretations, 3rd Edn.,Medical Publishers, New Delhi, 2003.
2. B. Mohanty and S.Basu, B. I,Fundamentals of Practical Clinical Biochemistry,. publishers, New Delhi, 2006.

Reference Books

1. Michael L. Bishop, Edward P.Fody, and Larry E. Schoeff, Clinical Chemistry: Principles, Techniques, Correlations, 8th Edition, 2017.
2. D. White, N. Lawson, P. Masters and D. Mc Laughlin, Clinical Chemistry, Garland Science, 2016.

CO	Course outcomes	Remarks
CO1	Learn the Basics of Human Metabolism	K2
CO2	Under the concept of Laboratory Work Flow cycle	K2, K3
CO3	Understand the techniques of Renal Function	K2, K3, K4
CO4	Learn Quantitative Determination of Urine	K2, K3
CO5	Gain the knowledge of Blood sample Analysis	K2, K3

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	S	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER - VI

Course Code	U21CHT61	ORGANIC CHEMISTRY – II	L	T	P	C
CORE-XIII			5	-	-	4

Learning Objectives	1. To understand the basic concept of organic spectroscopy 2. To learn and understand the carbonyl compounds and its derivatives. 3. To learn the basic aspects of stereochemistry 4. To learn the tautomerism and its types

Unit-I - Carbonyl compounds and their Derivatives

a) Common methods for the synthesis of aldehydes and ketones - synthesis of aldehydes from acid chlorides, Stephen's reduction - Gattermann-Kosch and Etard reactions - synthesis of ketones from nitriles, dialkylcadmium, alkyl lithium and lithium dialkylcuprate and Friedel-Crafts and Hoesch reactions.

b) Mechanism of nucleophillic additions to carbonyl group - addition of HCN, alcohols, thiols, sodium bisulfite, Grignard reagents -condensation with ammonia and its derivatives - Aldol, Perkin, Benzoin and Knoevenagel condensations, Wittig reaction, Mannich reaction, Reformatsky reaction and Cannizaro reaction. Oxidation by Tollen's reagent, $KMnO_4$, hypohalite, SeO_2 and peracids. Reduction by H_2/Ni, H_2-Pd-C, $NaBH_4$, $LiAlH_4$, MPV, Clemmenson and Wolff-Kischner reductions. α, β unsaturated aldehydes and Ketones – preparation and reactions.

Unit-II - Nitrogen containing compounds

a) Preparation of nitroalkanes and nitroarenes - Chemical reactions of nitroalkanes and nitroarenes - reductions in acidic, neutral and alkaline media.

b) Methods of preparation of alkyl and aryl amines - Gabriel phthalimide reaction and Hofmann reaction - separation of a mixture of primary, secondary and tertiary amines - Hinsberg's and Hofmann's method - Structural features effecting basicity of amines - basicity of aliphatic and aromatic amines -reactions of amines.

c) Aryl diazonium salts - preparation, stability, reactions and synthetic transformations.

d) Amino acids - essential and nonessential - methods of preparation - zwitterions formation - isoelectric point - chemical reactions of amino acid.

Unit-III – Stereochemistry

a) Representation of molecules in saw horse, Fischer, flying-wedge and Newman formulae and their inter translations.

b) Geometrical isomerism – nomenclature of geometrical isomers – cis - trans, E-Z and syn-anti notation for C=C, C=N compounds - Methods to assign configurations - Stability of geometrical isomers and heats of hydrogenation.

c) Optical rotation – specific rotation -optical purity - enantiomers - diastereomers – epimers - notation of optical isomers - Cahn-Ingold-Prelog rules, R and S notations for optical isomers with one and two asymmetric carbon atoms - erythro and threo representations - D and L representations - Optical activity in compounds without asymmetric carbon atoms namely biphenyls, allenes and spiranes, Stereo selectivity, stereo specificity - asymmetric synthesis.

d) Conformational nomenclature: eclipsed, staggered, gauche and anti; dihedral angle, torsion angle, energy barrier of rotation - potential energy diagram. Relative stability of conformers on the basis of steric effect, dipole-dipole interaction, H-bonding - Conformational analysis of ethane, propane, n-butane.

Unit – IV – Tautomerism

Definition – condition of Tautomerism – prototropy and Anisotropy – types of Tautomerism.

i) Keto – enoltautomerism
ii) Nitro-acinitrotautomerism
iii) Nitro-isonitrotautomerism
iv) Lactam – lactimtautomerism and
v) Quinone monoxime – p-nitrophenol

Unit – V - Application of Spectroscopy to Organic Molecules

Electromagnetic spectrum – the UV spectrum – Identification of conjugation – woodwardFieser Rule – adsorption maxima.
IR Spectrum – functional group detection, finger print region – study in Hydrogen bonds.
NMR Spectrum – no of signals – equivalent and non-equivalent protons- chemical shift – peak area and proton counting – splitting of signals – spin-spin coupling.

Text Books

1. M. B. Smith &J. March , March′s Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, Wiley–Blackwell; 6th Ed., 2007.
2. P.S.Kalsi,Stereochemistry: Conformation and Mechanism, New Age Publishers,10thEdition,2019.

Reference Books

1. F.A.Carey and R.J.Sundberg, Advanced Organic Chemistry, Part A and Part B, 5thEd.,Springer, 2007.
2. GurdeepChatwal, Chemistry of Organic Natural Products, Vol 1 and 2, Goel Pub. House, 2002.

CO	Course outcomes	Remarks
CO1	Learn the application of spectroscopy of organic molecules	K2
CO2	Understand the concept of Tautomerism and reactions of free radicals	K2
CO3	Learn basic introduction of stereochemistry	K2, K3
CO4	Gain the knowledge of carbonyl compounds	K2, K3
CO5	Understand the preparation and properties of nitrogen containing compounds	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	S	S	S	S	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHT62	INORGANIC CHEMISTRY-II	L	T	P	C
CORE-XIV			5	-	-	4
Learning Objectives		• To learn about nuclear isomerism, internal conversion, detection and determination of activity by cloud chamber, determination of radio activity, application of tracers and Semi conductors.				

Unit –I - Nuclear Chemistry I

Introduction – composition of nucleus and nuclear forces – nuclear stability – mass defect – binding energy – packing fraction – N/P ratio – magic numbers – nuclear models – liquid drop – Shell and collective model. Isotopes – detection and separation – deviation of atomic weights from whole numbers – isobars, isotones and isomers – Radioactive decay and equilibrium – nuclear isomerism – internal conversion. Nuclear Q-value – threshold energy – cross sections, types of reactions – fission and fusion – modes of radioactive decay.

Unit –II - Natural and induced radioactivity

Natural and induced radioactivity – radioactive decay – half-life period – radioactive displacement law – radioactive series – Radioactive techniques – Geiger Muller and ionization counters. Natural radioactivity – Detection and measurement of radioactivity – radioactive series including neptunium series – group displacement law – Rate of disintegration and half-life period – Average life period. Artificial radioactivity – induced radioactivity – uses of radioisotopes – hazards of radiations – nuclear energy – nuclear reactors – nuclear fission and fusion – fission products and fission yields – Spallation – photonuclear and thermo nuclear reactions – energy source of the sun and stars – carbon dating – rock dating. radioactive waste disposal – applications of nuclear science in agriculture, biology and medicine.

Unit –III - Solid State Chemistry

Ionic bonding – lattice energy – Born equation and its derivation, radius ratio rules – structures of some ionic crystals – Structure of solids – comparison of X-ray and Neutron diffraction – derivation of Bragg's equation. Spinels and inverse spinels – defects in solids, non-stoichiometric compounds – Electrical, Magnetic and optical properties of solids –Solid state electrolytes – Types of magnetic behavior, dia, para, ferro, antiferro and ferrimagnetism – Hysterisis.– Solid state lasers – inorganic phosphors – ferrites.

Unit –IV - Structure of Solids

Classification of solids – amorphous and crystalline solids – Van der waals crystals – covalent crystals – Laws of crystallography – Elements of symmetry – Weiss and Miller indices – Crystal systems and Bravais lattices. Structure of ionic solids – crystal structures – Sodium chloride, Zinc blende, wurtzite, rutile, Cesium chloride, fluorite – antifluorite – Identification of simple cubic, bcc, fcc lattices and indexing of X-ray lines. Crystal defects – Schottky and Frenkel defects – F-center.

Unit –V - Material Chemistry

Ionic conductors – sodium, β- alumina, sodium-sulphur battery. Intercalation – layered compounds – graphitic compounds. Special applications of solid state materials. High energy battery, lithium cells. Introduction – techniques for synthesis of nanophase materials – sol-gel synthesis- electro deposition –inert gas condensation-mechanical alloying –properties

of nanophase materials –applications of nanophase materials, composite materials. Band theory – semiconductors – Superconductivity – introduction– examples of superconducting oxides– applications of superconducting materials.

Text Books

1. SatyaPrakash, Advanced Inorganic Chemistry, R.D.Madan, VolI, 5th Edition, S.Chand and Sons, New Delhi, 2012.
2. J.E. Huheey, Inorganic Chemistry, Pearson Education India; 4th Ed.,2006.

Reference Books

1. Attila Vértes, Sándor Nagy, ZoltánKlencsár, Rezső G. Lovas, Frank Rösch. Handbook of Nuclear Chemistry, Springer, 2011.
2. F.A. Cotton, G. Wilkinson, Advanced Inorganic Chemistry, 6th Ed., John Wiley & Sons, 2007

CO	Course outcomes	Remarks
CO1	Learn about the different types of nuclear reactions	K2, K4
CO2	Study about the Detection and Measurement of radioactivity	K2,K3,K4
CO3	Learn the structure of solids and defects in crystal structure.	K2
CO4	Learn the Band theory and Semi Conductors	K2, K3
CO5	Understand the laws of crystallography and crystal structure	K2,K4

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	S	S	S	S	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHT63	PHYSICAL CHEMISTRY -II	L	T	P	C
CORE-XV			5	-	-	4
Learning Objectives	1. To understand the inter conversion of chemical and electrical energy and to link thermodynamics with electrochemistry. 2. To apply the concepts of kinetics, catalysis and photochemistry to different chemical processes.					

Unit – I – Photochemistry

Photochemical reactions – definition – comparative study of thermal and photochemical reactions – laws of photochemistry: Lambert and Beer's laws, Grotthus – Drapper law, Stark-Einstein law – quantum efficiency and its determination – consequences of light.

Absorption by atoms and molecules – photophysical processes- fluorescence, phosphorescence and other deactivating processes. Jablonskii diagram. Photochemical processes: Kinetics of photochemical reactions.

i) Gaseous reactions: Hydrogen-chlorine reaction, decomposition of HBr, HI and photolysis of ammonia.
ii) Reactions in liquid phase (solutions) – isomeric transformation of maleic to fumaric acid – polymerization of anthracene.
iii) Photochemical equilibrium – flash photolysis – photosensitization – chemiluminescence.
iv) Radiation chemistry – application. .

Unit – II - Electrochemistry

Conductance: Definition and determination – specific, equivalent conductance with dilution and its limiting values.

Strong and weak electrolytes: theory of strong electrolytes – Debye-Huckel-Onsager equation (no derivation) ionic activity and activity co-efficient

Ostwald's dilution law and its applications

Kohlrausch's law of ionic mobilities and its applications.

Applications of conductivity measurements – degree of dissociation – solubility of a sparingly soluble salt – degree of hydrolysis – basicity of acids – conductometric titrations.

Unit– III - Ionic Equilibria

Common ion effect and solubility product – quantitative study and theirapplications. Hydrolysis – degree of hydrolysis (∞) – hydrolysis constant (Kh) –experimental determination and derivation of these values for different salt solutions – based on Kw, Ka and Kb calculation involving hydrolytic constants. pH of solutions – definition and methods of determination of pH- Buffer solution - definition – theory of buffer action and applications – Henderson equation.

Unit – IV - Electrode potentials and electrochemical cells

Electrode potentials and electrochemical cells. Single electrode potentials – oxidation and reduction potentials Thermodynamics and electromotive force (EMF) – relation between chemical and electrical energies – calculation of G, S, and H of cell reaction. Calculation of EMF.Nernst equation – standard electrode potential and its characteristics.

Types of electrodes: metal – metal ion, gas, metal – insoluble salt, redox, glass electrodes.

Chemical and voltaic cells: Definition – cell reaction and representations of electrodes and cells – EMF of cell – conventions regarding signs of EMF – calculation of cell EMF from single electrode potentials. Calculation of cell EMF with the aid of Nernst equation.Experimental determination of EMF of cells.Measurement of single electrode potentials – chemical cells with and without transference – liquid junction potential and salt bridge.

Unit – V - Commercial cells

Primary and secondary cells – Weston Cadmium cell, lead storage cell, Ni-Cd cell, fuel cell.

a) Applications of EMF measurements.
b) Determination of solubility and solubility product of sparingly soluble salts.
c) Determination of pH – using Hydrogen electrode, glass electrode, quinhydrone electrode.
d) Determination of valency of ion.
e) Potentiometer titrations – acid-base, redox, precipitation and complexometric titrations.
f) Determination of transport number. Electrolysis and polarization: Over voltage, decomposition potential, hydrogen over voltage.

Text Books

1. B.R. Puri, L.R. Sharma and M.S. Pathania, Principles of Physical Chemistry, 46th Edition, Vishal Publishing Company, New Delhi, 2013.
2. R.L. Madan, G. D. Tuli, Physical Chemistry, S. Chand, Revised edition, 2014

Reference Books

1. P.W. Atkins, Physical Chemistry, 8th Edition, Oxford University Press, New Delhi, 2006.
2. D.A. McQuarrie, D. Simon, Physical chemistry, A Molecular Approach, Viva Books Pvt. Ltd, 2003.

CO	Course outcomes	Remarks
CO1	Learn the basic ideas of photochemistry and photophysical processes	K2, K3
CO2	Learn concept of ionic activity and ionic strength	K2
CO3	Derive Nernst equation and redox system•	K3
CO4	Study of Debye Huckel theory, Kohlraush's law and Debye-Huckel equation	K2, K3
CO5	Understand the concept of commercial cell and its applications	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	S	S	S	S	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) -2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

ourse Code	U21CHT64	SPECTROSCOPY	L	T	P	C
U21CHT64			4	-	-	4

Learning Objectives	1. To help the student to develop the habit of accurate manipulation and an attitude of critical thinking. 2. To learn the basic analytical methods and appreciate what is involved in an analysis.

Unit – I - Introduction and Microwave spectroscopy

Regions of electromagnetic spectrum – parameters of electromagnetic radiation – molecular spectroscopy – Born-Oppenheimer approximation - Electronic, vibrational and rotational energy levels, and transitions in atoms and molecules.Absorption and emission spectra Microwave spectroscopy – rotational spectra of diatomic molecules (rigid rotors), frequency separation – determination of moment of inertia and bond length.

Unit – II - IR Spectroscopy

Principle – types of stretching and bending vibrations. vibrational frequency – factors influencing vibrational frequencies – instrumentation, fingerprint region, study of hydrogen bond. Raman spectroscopy – Rayleigh and Raman scattering – stokes and anti-stokes lines. Comparison of Raman and IR spectroscopy- Mutual exclusion principle, applications.

Unit – III - Electronic Spectroscopy

Beer –Lambert's law, Types of electronic transitions, chromophore, auxochrome, absorption maximum (λ_{max}) and intensity of absorption bands, factors influencing λ_{max} and intensity - instrumentation of UV-Visible spectrophotometer, Frank-Condon principle.

Unit – IV - Nuclear Magnetic Resonance Spectroscopy

Introduction – number of signals – equivalent and non-equivalent protons – position of signals – chemical shift – peak area and proton coupling. Splitting of signals – spin-spin coupling – coupling constant – NMR spectra of simple organic compounds.

Unit – V - Mass Spectroscopy

Principle, molecular ion peak, base peak, isotopic peak, metastable peak fragmentation – nitrogen rule.Mass spectrum of simple organic compounds (acetaldehyde, ethyl alcohol, methyl amine and toluene).

Text Books

1. S. Chand, Elementary Organic Spectroscopy: Principles and Chemical Applications, New Delhi, 2001.
2. V.K. Srivastava and K.K. Srivastava, Introduction to Chromatography: Theory and Practice, S. Chand and company, New Delhi, 2000.

Reference Books

1. W. Kemp, Organic Spectroscopy,3rdEdition, 2002.
2. Y. R. Sharma, Elementary Organic Spectroscopy: Principles and Chemical Applications, Revised Edition, 2013

CO	Course outcomes	Remarks
CO1	Learn rotation spectroscopy of a rigid rotor and non- rigid rotor.	K2
CO2	Understand the instrumentation and comparison of Raman and IR spectroscopy	K2
CO3	Derive the Equation of motion of spin in magnetic fields and Chemical shift	K2, K3
CO4	Study the spin-spin coupling, NMR	K2
CO5	Learn the principles of Mass spectroscopy	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	M	S	S	S
CO2	S	S	M	S	M	S	M	S	S	S
CO3	S	S	M	S	M	S	M	S	S	S
CO4	S	S	M	S	S	S	M	S	S	S
CO5	S	S	M	S	S	S	M	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHP65	PRACTICAL-VI GRAVIMETRIC ESTIMATION & ORGANIC PREPARATION	L	T	P	C
CORE-XVII			-	-	6	4
Learning Objectives		1. To enable the students to acquire the quantitative skills in gravimetric analysis and preparative skills in inorganic preparations 2. To acquire practical knowledge of estimation of inorganic compounds 3. To develop skill in single stage preparation of organic compounds 4. To understand the basic concept of preparation of solutions				

Gravimetric Analysis

1. Estimation of Ca as calcium oxalate monohydrate
2. Estimation of Ba as chromate
3. Estimation of Lead as Chromate

Organic Estimation

Preparation involving

1. Hydrolysis – Ester hydrolysis
2. Amide hydrolysis
3. Benzoylation of beta naphthol amines
4. Acetylation of an amine
5. Nitration of acetanilide
6. Oxidation: Benzoic acid from benzaldehyde

Text Books

1. O.P. Agarwal ,Advanced Practical Organic Chemistry, Krishna Prakashan Media (P) Ltd, 2014.
2. Mann & Saunders , Practical Organic Chemistry, fourth edition Pearson Education India , 2009.

Reference Books

1. V. K. Ahluwalia, P. Bhagat, and R. Agarwal, Laboratory Techniques in Organic Chemistry; I. K. International, 2005.
2. V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, 2nd Edn., 2004.

CO	Course outcomes	Remarks
CO1	Brings about the methods of gravimetric analysis, estimation of inorganic compounds	K1, K2, K3
CO2	Gain the knowledge about the preparation of organic compounds	K2, K3, K4
CO3	Learn the preparation of Standard solutions	K2
CO4	Study the molarity, molality and Normality	K1, K2, K3
CO5	Understand the Principles of Gravimetric Analysis	K2, K4

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	M	S	S	S	S
CO2	S	M	S	S	M	M	S	S	S	S
CO3	S	S	M	S	M	M	S	M	S	S
CO4	S	S	M	S	M	M	S	S	S	S
CO5	S	S	M	M	M	M	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHE641	NANOSCIENCE AND TECHNOLOGY	L	T	P	C
ELECTIVE –IV			3	-	-	3
Learning Objectives	1. To introduce some of the fundamentals and current state-of-the-art in Nano technology. 2. To get familiarized with the synthesis, characterization and applications of nanomaterials. 3. To understand the basic concept of preparation of nanotubes 4. To acquire knowledge in importance of nanomaterials in medicine					

Unit-I - Fundamentals of Nano science and Nano technology

Definitions, Relationship and Differences. Nano and Nature: NanoscopicColours (Butterfly Wings), Bioluminescence (Fireflies), Tribiology (Geckos sticky feet, lotus leaf effect). Introduction to hydrophilic and hydrophobic materials. Nanotechnology timeline, Pre-18th Century, 19th Century, 20th Century and 21st Century. Future perspectives of nanoscience and nanotechnology.

Unit-II - Carbon Nanotubes

Carbon nanotubes – synthesis and purification -filling of nanotubes mechanism of growth – transport properties – mechanical properties – physical properties – application of carbon nanotubes. Preparation methods: Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition.

Unit-III - Classification of Nanomaterials

Introduction to dimensional growth process. Classification of nanomaterials into 0D, 1D, 2D and 3D. Relationship between dimension and shape of nanomaterials (Quantum dots, Quantum wires, Carbon nanotubes, Bucky balls, Fullerenes). Introduction to size effect on electronic and optical properties (Quantum confinement).

Unit- IV - Core-shell

Nanoparticles -types of system – properties – application of core shell nanoparticles – monolayer protected metal nanoparticles method of preparation – functional metal nano particles – applications.

Nanosensors – nanoscale organization for sensors – nanosensors on optical properties – physical properties – nanobiosensors – sensors of the future nanoshells – types of nanoshells – properties -applications.

Unit-V - Nanomedicines

Various kinds of nano system in use – protocols for nanodrug – administration – nanotechnology in diagnostic application. Use of gold nano- particles in diagnostic and therapeutic application molecular nanomachines -covalent and non-covalent approaches molecular motors and machines – molecular devices – practical problems with molecular devices.

Text Books

1. T. Pradeep, Nano: The Essentials: Understanding Nanoscience and Nanotechnology, McGraw-Hill Professional Publishing, 2008.
2. Geoffrey A. Ozin and Andre C. Arsenault, Nanochemistry: A chemical approach to nanomaterials‖, RSC publishing, 2005.

Reference Books

1. J. Dutta, H.F. Tibbals and G.L. Hornyak, Introduction to Nanoscience, CRC press, Boca Raton, 2008.
2. 1.C.N.R. Rao, A. Muller and A.K. Cheetham, The Chemistry of Nanomaterials, Volume I & II‖, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 2004.

CO	Course outcomes	Remarks
CO1	Gain the Knowledge of Nanoscience and technology	K2
CO2	Understand the classification nanostructured materials and its application.	K2, K3
CO3	Understood the principles and Characterization Techniques	K2, KR
CO4	Understand the basics Electronic Nanomaterial Properties.	K2
CO5	Impart understanding on Nanoparticle based Drug Delivery	K2, K3

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	M	S	S	S	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHE642	MOLECULAR DYNAMICS	L	T	P	C
ELECTIVE –IV			3	-	-	3

Learning Objectives	After the study of this course, the student should be able to 1) understand the concept of computational chemistry 2) understand the concept of statistical analysis and significance 3) know the postulates of quantum mechanics and statistical thermodynamics 4) understand the concept of molecular modeling 5) gain the knowledge of photochemical kinetics

Unit-I - Introduction of Computational Chemistry

Theory, computation & modeling – Definition of terms; Need of approximate methods in quantum mechanics; Computable Quantities – structure, potential energy surfaces and chemical properties; Cost & Efficiency – relative CPU time, software & hardware; Classification of computational methods.

Unit–II - Density Functional Methods

Introduction to density matrices, N-reprentability & V-represetability problems, Hohenberg – Kohn theorems, Kohn-Sham orbital's; Exchange correlation functional – Thomas-Fermi-Dirac model, Local density approximation, Comparison between DFT and HF methods.

Unit–III - Basic Principles of Statistical Thermodynamics

Thermodynamic probability – macro and microstates, most probable distribution. Maxwell–Boltzmann statistics. Partition function – relation between partition function and energy. Separation of partition function – partition function for translation.
Entropy and probability. Translational entropy: Sackur-Tetrode equation. Residual entropy.

Unit–IV - Introduction to Molecular Modeling

Introduction to molecular modeling, concepts of coordinate systems (Cartesian and Z-matrix), potential energy surface, global and local minima. Force Field (Bond stretching, Angle bending, Non-bonded interactions), Basic idea about Monte Carlo and Molecular dynamics simulations.

Unit–V - Photochemical Kinetics

Kinetics of photochemical reactions between hydrogen and chlorine and bromine – rate law, comparison with thermal reactions. Bimolecular quenching – Stern- Volmer equation – photosensitization. Kinetics of fast reactions - relaxation techniques.

Text books

1. C. J. Cramer, Essentials of computational Chemistry: Theories and models, John Wiley & Sons 2002.
2. D. C. Rapaport, An Introduction to Molecular Dynamics Simulation, Springer Publisher, 2003.

Reference books

1. Kopin Liu &Xueming Yang, Modern Trends in Chemical Reaction Dynamics-(Advanced Series in Physical Chemistry), 2004.
2. Dominik Marx and JurgHutter, Ab Initio Molecular Dynamics: Basic Theory and Advanced Methods, Kindle Edition, 2012.

CO	Course outcomes	Remarks
CO1	Understand the concept of Computational Chemistry	K2, K4
CO2	Acquire the basic ideas of statistical Thermodynamics	K2
CO3	Apply the concept of statistical distribution of thermal energy	K3
CO4	Understand the basics of Molecular Modelling & DFT	K2
CO5	Explain the Photochemical activation and deactivation of molecules	K4

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHS64	ENGINEERING CHEMISTRY	L	T	P	C
SBE-IV			2	-	-	2
Learning Objectives	1. To understand the concepts of fuels and energy resources, generation of energy from various types of fuels, 2. To understand the use of chemicals in the improvement of agricultural crops 3. To learn the manufacturing processes of iron, steel, ceramics and refractories and to understand the process of surface coatings.					

Unit I - Fuels and Energy Resources

Petroleum - origin of petroleum, composition, refining of petroleum fractionation - composition of various fractions, cracking - catalytic and thermal cracking, synthetic petrol, knocking, octane and cetane numbers, anti-knocking agents, coal gas, producer gas, methane production from biomass, alcohol as fuel.

Unit-II - Corrosion and its control Corrosion

Introduction of corrosion-chemical and electrochemical - factors affecting electrochemical corrosion - sacrificial anode - impressed current cathodic protection - surface treatments and protective coatings - oil paint - emulsion paint - special paints - heat resistant, fire retardant and luminous.

Unit-III - Iron, Steel and Alloys

Manufacture of pig iron by blast furnace, wrought iron by puddling processes - steel by Bessemer's process - Heat treatment of steel. Alloys-purpose of making alloys - preparation of alloys by fusion method - electro deposition and reduction method - effects of carbon, silicon, phosphorus and sulphur - application of alloy steels.

Unit-IV - Ceramics and Refractories

Ceramics - various classes of ceramics, general properties, porous and non-porous wares, raw materials for ceramics, uses. Refractories - manufacture of refractories - properties and uses of common refractory bricks - silica bricks - fire clay bricks, magnesite bricks and dolomite bricks.

Unit-V - Pollution and its control

Causes of air and water pollution - primary and secondary pollutants - assessment of water pollution - definition and significance of DO, BOD and COD - primary and secondary treatment of sewage - air pollution - environmental impact - acid rain, greenhouse effect and global warming, ozone depletion - smog - pollution control by Cottrell precipitator, bag filter and absorption towers.

Text Books

1. K. Pushpalatha, Text book of Engineering Chemistry, published by Wiley publications 2nd edition. 2007.
2. P. C. Jain, Monica Jain, DhanpatRai, A text book of Engineering Chemistry 15th Edition Publishing Co (P) Ltd., New Delhi. 2006.

Reference Books

1. M. Karunanidhi, N. Ayyaswami, T. Ramachandran and H. Venkatraman, Applied Chemistry, Anuradha Agencies, 2002.
2. Shashi Chawla, A Text Book of Engineering Chemistry, DhanpaiRai& Co., 2017.

CO	Course outcomes	Remarks
CO1	Acquire knowledge about fuels and energy sources	K2
CO2	Learn the corrosion control techniques	K2
CO3	Learn the manufacture techniques of iron, steel and alloys	K2, K3
CO4	Learn the concept of Ceramics and Refractories	K2
CO5	Understand the concept of Pollution and its control	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

NON MAJOR ELECTIVE

Course Code	U21CHN31	COSMETIC CHEMISTRY	L	T	P	C
SEMESTER - III			2	-	-	2

Learning Objectives	1. To create awareness among the undergraduate students about the role of chemistry in day- to- day life, 2.To know more about the cosmetics natural and artificial, 3.To obtain adequate knowledge and scientific information regarding basic principles of cosmetic chemistry.

Unit-I - Natural Perfumes

Perfumes –plant and animal sources– examples –components of perfume – vehicle – characteristics of good vehicle -fixatives and its types, odoriferous compounds, extraction of essential oils by distillation, enlarge and solvent extraction methods.

Unit- II - Artificial Perfumes and flavors

Preparation and uses of methyl anthranilate, methyl salicylate, methyl cinnamate, phenyl ethanol, citronellol, vanillin, coumarin and heliotrope. Composition and preparation of rose and jasmine perfumes –manufacture of fruit flavors – fruit syrup preparation and composition of apple and pineapple flavors.

Unit-III - Hair Care Products

Shampoos – principal constituents – thickeners and foam stabilizers – perfumes – preservatives – conditioning agents – antidandruff shampoos. Hair cream – composition – hair dyes – types – constituents – dye removals

Skin Care Product

Skin cleansers – classifications – cold cream – cleansing milk – moisturizers – hand and body lotions – sun screen lotions – constituents

Unit- IV - Soaps and Detergents

Cleansing action of soap – differences between soap and detergents – ingredients and preparation of washing and bathing soap – TFM of bathing soap – composition of solid and liquid detergents – functions of ingredients in detergents.

Unit- V- Colour Cosmetics

Lipstick – constitutions – manufacturing method – lip glosses – nail polish – formulation – manufacture – face powder – constitution.

Dental Product

Oral care product – product categories – toothpaste – toothpowder – oral rinses – mouth washes.

Text Books:

1. Ramesh Kumari, Chemistry of Cosmetics, Prestige Publishers, 2018.
2. R. K. Nema, Textbook of Cosmetics, CBS, Publisher, 2017.

Reference Books

1. M. Vimaladevi, Textbook of Cosmetic, CBS Publisher, 2019.
2. Heather A. E. Benson, Michael S. Roberts, Vania Rodrigues Leite-Silva, Kenneth Walters, Cosmetic Formulation: Principles and Practice, CRC Press Publisher, 2021.

CO	Course outcomes	Remarks
CO1	acquire basic knowledge About cosmetics	K2
CO2	Choose cosmetics upon checking harmless chemical ingredients from various products	K2, K3
CO3	Judiciously use cosmetics and other related chemicals.	K2
CO4	Learn the idea about colour cosmetics	K2
CO5	Learn the preparation of dental product and bath product	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of COs with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	M	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	M	M	S	S	S	M	M
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21CHN42	APPLIED CHEMISTRY	L	T	P	C
SEMESTER -IV			2	-	-	2
Learning Objectives	1.To understand the preparation and properties of Rubber and Fibers 2. To understand the preparation and properties of Plastics and Resins. 3.To know the classification and importance of Fertilizers 4.To understand the use of chemicals in improvement of agricultural crops					

Unit – I - Elastomers

Natural rubber and synthetic rubber - Buna - N, Buna-S and neoprene. Rubber: Types-defects in natural rubber-vulcanization-synthetic rubbers- uses of neoprene, thiocol, silicone rubber and foam rubber.

Unit – II - Fibers

Definition, natural and synthetic fibers:Natural fibers (cellulosic and protenious) –Semi synthetic (Rayon) Synthetic fibers (Poly ester, Nylon and Acrylic) –Pretreatment of fibers (Sizing, Desizing, Bleaching).

Unit – III - Resins

Natural and synthetic resins – distinction between resins and plastics, action of ion exchange resins,separation of inorganic mixtures,applications,phenol- formaldehyde resins -amino resins-urea- formaldehyde and melamine-formaldehyde resins-polyurethanes -epoxy resins.

Unit – IV – Plastics

Classification- differences between thermoplastics and thermosetting polymers. Advantages of plastics-preparation, properties and uses of polythene, PVC, polystyrene, Teflon and PAN.

Unit –V – Fertilizer

Definition-characteristics of a good fertilizer- role of nitrogen, potassium and phosphorous in plant growth – natural fertilizers- chemical fertilizers: urea, muriatic of potash and triple superphosphate - mixed fertilizers – biofertilizers – advantages of biofertilizers.

Text Books

1. B. S. Chauhan, Applied Chenistry, Vayu Education India, 2013.
2. B. K. Sharma, Industrial Chemistry Krishna PrakashanMedia(p) Ltd., 2011

Reference Books

1. B.S Chauhan, Applied Chemistry,Vayu Education of India, 2013.
2. K. BagavathiSundari , “Applied Chemistry” MJP Publishers, 2006.

CO	Course outcomes	Remarks
CO1	Study the Natural and synthetic rubber composition	K2
CO2	Learn the Natural and synthetic fibers	K2
CO3	Understand the distinction between resins and plastics	K2
CO4	Remember the classification of plastics and properties	K1
CO5	Understand the importance of fertilizers	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	S	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

VALUE ADDED PROGRAMME

Course Code	U21CHV51	PHARMACEUTICAL CHEMISTRY	L	T	P	C
SEMESTER - V			30			2
Learning Objectives	1. To learn disinfectants and antiseptics. 2. To understand the import ants drugs and the mode of actions. 3. To study the function of Enzymes 4. To gain the knowledge of Body fluids					

Unit-I: Clinical Hygiene and Biochemical Analysis

Definition of health.Ryde of WHO. Sterilization of surgical instruments.Disinfectants, antiseptics, sanitation.Biochemical analysis of urine, serum and fecal matter.Treatment for specific poisons-acids, alkalis, arsenic and mercury compounds.

Unit-II- Common Drugs

Manufacture of drugs (e.g. quinine, reserpine, atopside and d – tubocurarine) from indian medicinal plants. Testing of drugs : biological variation, screening and toxicity. Use of pharmacoepia and therpeutic index. Cardiovascular drugs-nitrates, beta blockers(propranalol and atinelol) and calcium channel blockers. h) uclear medicine (Radiation therapy)

Unit-III– Enzymes

Introduction of Enzymes-Classification, specificity, Coenzymes, Cofactor, ATP, Mechanism of enzyme action and Immobilisation of enzymes.-Specific action of enzymes, factors affecting enzyme activity.

Unit-IV- Body Fluid

Blood volume, blood groups, coagulation of blood.Plasmalipoprotiens.Blood pressure. Arteriosclerosis, diseases affecting red cells: Hyperchromic and hypochromic anaemia. Blood tranfusion.Blood sugar and diabetes.

Unit-V– Biotechnology

Heredity, recombinant DNA, Genetic engineering and its possible hazards, Gene splicing, manufacture of interferon and human insulin(Humulin), Drug manufacture based on fermentation(only antibiotics)

Text Books

1. Akhil Nagar, AtulBendale, RajanikantKakade, VinodUgale, A Textbook of Pharmaceutical Inorganic Chemistry, IP Innovative Publication Pvt. Ltd., 2021.
2. Varun and PragiArora, Textbook of Pharmaceutical Organic Chemistry, S Vikas and Company (PV), 2019.

Reference Books

1. V. N. Rajasekaran, Phamaceutical Chemistry II: Theory and Practical, CBS Publisher, 2019.
2. R. Kabra, Pharmaceutical Chemistry –I, S Vikas and Company (PV), 2016.

CO	Course outcomes	Remarks
CO1	Discuss Clinical hygiene and biochemical analysis	K2
CO2	Learn the manufacturing of drugs.	K2
CO3	Understand the specific action of enzymes	K2
CO4	Remember the Blood groups and blood sugar control levels.	K1, K3
CO5	Gain the knowledge of manufacture based on fermentation	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	M	M
CO2	S	S	S	M	S	S	S	S	M	M
CO3	S	S	S	M	M	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	S	M	M	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

ALLIED CHEMISTRY

Course Code	U21PHA33	PHYSICAL SCIENCES	L	T	P	C
SEMESTER -III			5	-	-	4

Learning Objectives	1. To understand the handling of chemicals and errors in chemical analysis 2. To get knowledge in chemical bonding and hybridization 3. To acquire knowledge in volumetric analysis 4. To understand the basic concept of chemistry of Thermodynamics and Kinetics

Unit-I- Handling of Chemicals and Data Analysis

a) Storage and handling of chemicals: Handling of acids, ethers, toxic chemicals. Antidotes, threshold vapour concentration and first aid procedure.

b) Errors in chemical analysis: Accuracy, precision. Types of error-absolute and relative errors.Methods of eliminating and minimizing errors.

c) Separation techniques–Solvent extraction. Principle of adsorption and partition chromatography, column chromatography, thin layer chromatography (TLC), paper chromatography and their applications.

Unit-II - Chemical Bonding

a) Ionic Bond: Nature of Ionic bond. Structure of NaCl, KCl and CsCl. Factors influencing the formation of ionic bond.

b) Covalent Bond: Nature of covalent bond. Structure of CH_4, NH_3, H_2O based on hybridisation.

c) Coordinate Bond: Nature of coordinate bond. Coordination complexes.Werner's theory.Geometrical and optical isomerism in square planar and octahedral complexes. Mention of structure and functions of chlorophyll and hemoglobin

d) Hydrogen Bond: Theory and importance of hydrogen bonding. Types of hydrogen bonding.Hydrogen bonding in carboxylic acids, alcohol, amides, polyamides, DNA and RNA.

Unit-III - Volumetric Analysis

a) Methods of expressing concentration: normality, molarity, molality, ppm.

b) Primary and secondary standards: preparation of standard solutions

c) Principle of volumetric analysis: end point and equivalence points.

d) Strong and weak acids and bases - Ionic product of water, pH, pKa, pKb. Buffer solutions -pH of buffer solutions. Mention of Henderson equation & its significance.

Unit-IV–Kinetics

a) Chemical Kinetics: Rate, rate law, order and molecularity. Derivation of rate expressions for I and II order reactions.

b) Catalysis-Homogeneous and heterogeneous catalysis. Enzyme catalysis, enzymes in biological system and in industry.

Unit- V –Thermodynamics

a) Introduction: Scope and importance of thermodynamics- system and surrounding-isolated, closed and open systems- state of the system- intensive and extensive variables.Thermodynamic process- reversible and irreversible, isothermal and adiabatic process-

b) First law of thermodynamics- statement- definition of internal energy (E),enthalpy (H), applications of first law of thermodynamics.

The second law of thermodynamics: Limitations of first law and the need for the second law, different ways of stating II law and its significance, Spontaneous or irreversible process.

The concept of entropy – definition and physical significance of entropy.

Text Books:

1. A.Bahl and B.S. Bahl, Advanced Organic Chemistry, I Multicolor Edition, S.Chand& Company, New Delhi,2010.
2. Satya Prakash & R. D. Madan, Advanced Inorganic Chemistry, VolI, 5th Edition, S.Chand and Sons, New Delhi, 2012.

Reference Books:

1. R. Gopalan & S. Sundaram, *Allied Chemistry*, Sultan Chand and Sons Pvt Ltd., 4th Edition, 2006.
2. B.R. Puri, L.R.Sharma&M.S.Pathania, Principles of Physical Chemistry, 46thEdision, Vishal Publishing Company, New Delhi, 2013.

CO	Course outcomes	Remarks
CO1	Students can gain the knowledge on the handling of chemicals and errors in chemical analysis.	K2, K3
CO2	Learn Chemical Bonding and Hybridization	K2
CO3	Learn the calculations of preparing standard solutions	K2, K3
CO4	Understand and appreciate the advanced concepts and rate equations in chemical kinetics.	K2
CO5	Calculate change in thermodynamic properties, equilibrium constants, partial molar quantities, chemical potential	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	S	S
CO2	S	S	S	S	M	M	S	S	S	S
CO3	S	S	S	S	M	M	S	M	S	S
CO4	S	S	S	S	M	M	S	S	S	S
CO5	S	S	S	M	M	M	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOA33	LIFE SCIENCES	L	T	P	C
SEMESTER -III			5	-	-	4

Learning Objectives	1. To understand the handling of chemicals and errors in chemical analysis 2. To get knowledge in chemical bonding and hybridization 3. To acquire knowledge in volumetric analysis 4. To understand the basic concept of Biomolecules

Unit- I - Handling of Chemical and Data Analysis

a) Storage and handling of chemicals: Handling of acids, ethers, toxic chemicals. Antidotes, threshold vapour concentration and first aid procedure.

b) Errors in chemical analysis: Accuracy, precision. Types of error-absolute and relative errors.Methods of eliminating and minimizing errors.

c) Separation techniques–Solvent extraction. Principle of adsorption and partition chromatography, column chromatography, thin layer chromatography (TLC), paper chromatography and their applications.

Unit-II- Chemical Bonding

a) Ionic Bond: Nature of Ionic bond. Structure of NaCl, KCl and CsCl. Factors influencing theformation of ionic bond.

b) Covalent Bond: Nature of covalent bond. Structure of CH_4, NH_3, H_2O based onhybridization.

c) Coordinate Bond: Nature of coordinate bond. Coordination complexes.Werner's theory.Geometrical and optical isomerism in square planar and octahedral complexes. Mention of structure and functions of chlorophyll and hemoglobin

d) Hydrogen Bond: Theory and importance of hydrogen bonding. Types of hydrogen bonding.Hydrogen bonding in carboxylic acids, alcohol, amides, polyamides, DNA and RNA.

Unit-III - Volumetric Analysis

a) Methods of expressing concentration: normality, molarity, molality, ppm.

b) Primary and secondary standards: preparation of standard solutions

c) Principle of volumetric analysis: end point and equivalence points.

d) Strong and weak acids and bases - Ionic product of water, pH, pKa, pKb. Buffer solutions -pH of buffer solutions. Mention of Henderson equation & its significance.

Unit-IV–Kinetics

a) Chemical Kinetics: Rate, rate law, order and molecularity. Derivation of rate expressions for I and II order reactions.

b) Catalysis-Homogeneous and heterogeneous catalysis. Enzyme catalysis, enzymes in biological system and in industry.

Unit-V - Chemistry of Biomolecules

a) Fats – Occurrence and composition. Hydrolysis of fats.

b) Vitamins – Source, provitamin, properties and classification. Structure and functionof vitamin A, C, D, K and E

c) Hormones– Thyroxin, adrenaline and sex hormones (structure and functions only)

Text Books:

1. A.Bahl and B.S. Bahl, Advanced Organic Chemistry, I Multicolor Edition, S.Chand& Company, New Delhi,2010.
2. Satya Prakash & R. D. Madan, Advanced Inorganic Chemistry, Vol.I, 5th Edition, S.Chand and Sons, New Delhi, 2012.

Reference Books:

1. R. Gopalan & S. Sundaram, Allied Chemistry, Sultan Chand and SonsPvt Ltd., 4th Edition, 2006.
2. B.R. Puri, L.R. Sharma &M.S.Pathania, Principles of Physical Chemistry, 46thEdision, Vishal Publishing Company, New Delhi, 2013.
3. J. M. Berg, J. L. Tymoczko. and L. Stryer, L. Biochemistry, 6th Edition, 2007.

CO	Learning outcome	Remarks
CO1	Students can gain the knowledge on the handling of chemicals and errors in chemical analysis	K2, K3
CO2	Learn Chemical Bonding and analyze the Hybridization	K2,K4
CO3	Learn the calculations of preparing standard solutions	K2
CO4	Understand and appreciate the advanced concepts and rate equations in chemical kinetics.	K2
CO5	Learn the importance of Biomolecules in chemistry	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	S	S	S	S
CO2	S	S	S	S	M	M	S	S	S	S
CO3	S	S	S	S	M	M	S	M	S	S
CO4	S	S	S	S	M	M	S	S	S	S
CO5	S	S	S	M	M	M	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

ALLIED PRACTICAL

Course Code	U21PHA44	PHYSICAL SCIENCES	L	T	P	C
SEMESTER -IV			-	-	4	4
Learning Objectives		1. To enable the students to acquire knowledge in Organic Estimation 2. To understand basics and gain knowledge in organic analysis 3. At the end of the course, the students should be able to plan experimental projects and execute them.				

Acidimetry and alkalimetry: Titration acids used: hydrochloric acid, sulphuric Standard solutions prepared: sodium carbonate, sodium bicarbonate, oxalic acid.

Oxidation and reduction titration: Oxidising agents: Potassium permanganate (permanganimetry) Reducing agents: Ferrous sulphate, ferrous ammonium Sulphate, oxalic acid

Standard solutions prepared: Ferrous Sulphate, ferrous ammonium Sulphate and oxalic acid.
Iodometry titrations: titrations of liberated iodine against sodium thiosulphate using acidified potassium permanganate, potassium dichromate and copper Sulphate solutions.
Standard solutions: potassium dichromate, copper sulphate.

Text Books

1. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 2009.
2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith, A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry. 5th Edn., Pearson Education, 2005.

Reference Books

1. Mann & Saunders, Practical Organic Chemistry, 4th Edition, 2009.
2. V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, 2nd Edn., 2004.

CO	Course outcomes	Remarks
CO1	Learn the concept of Titration methods and various Titrations	K2
CO2	Understand the Acidimetry and alkalimetry titrations	K2
CO3	The preparation of standard solutions and methods of analyze the various salts	K2, K4
CO4	Understand the calculations of molarity, molality and Normality of the solutions	K2
CO5	Understand the concept of Iodometry titrations	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	M	S	S	S	M
CO2	S	M	S	S	M	M	S	S	S	M
CO3	S	S	M	S	M	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	S	M
CO5	S	S	M	M	M	M	S	S	S	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOA44	LIFE SCIENCES	L	T	P	C
SEMESTER -IV			-	-	4	4
Learning Objectives		1. To understand basics and gain knowledge on laboratory reagents and their uses in volumetric analysis. 2. At the end of the course, the students should be able to plan experimental projects and execute them.				

Acidimetry and alkalimetry: Titration acids used: hydrochloric acid, sulphuric Standard solutions prepared: sodium carbonate, sodium bicarbonate, oxalic acid.
Oxidation and reduction titration: Oxidizing agents: Potassium permanganate (permanganimetry) Reducing agents: Ferrous sulphate, ferrous ammonium Sulphate, oxalic acid
Standard solutions prepared: Ferrous Sulphate, ferrous ammonium Sulphate and oxalic acid.
Iodometry titrations: titrations of liberated iodine against sodium thiosulphate using acidified potassium permanganate, potassium dichromate and copper Sulphate solutions.
Standard solutions: potassium dichromate, copper sulphate.

Text Books

1. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 2009.
2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith, A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry. 5th Edn., Pearson Education, 2005.

Reference Books

1. Mann & Saunders, Practical Organic Chemistry, 4th Edition, 2009.
2. V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu, Basic Principles of Practical Chemistry, Sultan Chand & Sons, New Delhi, 2nd Edn., 2004.

CO	Course outcomes	Remarks
CO1	Learn the concept of Titration methods and various Titrations	K2
CO2	Understand the Acidimetry and alkalimetry titrations	K2
CO3	The preparation of standard solutions and methods of analyze the various salts	K2, K4
CO4	Understand the calculations of molarity, molality and Normality of the solutions	K2
CO5	Understand the concept of Iodometry titrations	K2

K1- Remember **K2**- Understand **K3**- Apply **K4**- Analyze **K5**-Evaluate

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	M	S	S	S	M
CO2	S	M	S	S	M	M	S	S	S	M
CO3	S	S	M	S	M	M	S	M	S	M
CO4	S	S	M	S	M	M	S	S	S	M
CO5	S	S	M	M	M	M	S	S	S	M

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

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MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL – 624 101

M.Sc. CHEMISTRY PROGRAMME

CHOICE BASED CREDIT SYSTEM(CBCS)

(For candidates admitted from the academic year 2021-2022)

DEPARTMENT OF CHEMISTRY

MOTHER TERESA WOMEN'S UNIVERSITY,KODAIKANAL

Mother Teresa Women's University, Kodaikanal
Department of Chemistry
Choice Based Credit System (CBCS)
(2021-2022 onwards)
M. Sc. Chemistry Programme

1. About the Programme

The M.Sc. Degree Programme in Chemistry offeredby Mother Teresa Women's University, Kodaikanal aims at providing advanced and in-depth knowledge in various basic and applied fields of chemistry. The core courses equip the learners with experimental and analytical skills in addition to sound theoretical knowledge in various aspects of chemistry required for employability and research.The electives add additional knowledge about applied aspects of Chemistry and implications in both academia and industry. The non-major electives introduce integration among various interdisciplinary courses. The skillbased courses equip the learners with job and research oriented computer skills.The special course of the programme is "Women empowerment" which imparts the knowledge of Gender & inclusiveness.

2. Programme Educational Objectives (PEOs)

PEO1: To provide a strong foundation in Chemistry with scientific reasoning and analytical problem solving.
PEO2: To inculcate scientific temper and research attitude and provide adequate training in synthesis, characterization and instrumentation.
PEO3: To equip students with subject related skills required for employment & entrepreneurship.
PEO4: To enable the learners to apply the knowledge acquired in frontier areas of chemistry for new research and technology.
PEO5: To enable the learners to utilize the expertise in chemical sciences and solve the problems ofenvironment, green chemistry, ecology, sustainable development, etc.

3. Eligibility

B.Sc. Chemistry degree with Mathematics/Physics /Botany /Zoology as one of the Allied subjects.

4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.
ii. **Medium of Instruction:** English
iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 90**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good

50-59	5.0 – 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

9. Programme Outcomes (POs)

On completion of this Programme the learners will

PO1: understand and appreciate the importance of chemistry as a central science by the knowledge of its diverse applications.
PO2: have sound knowledge of the fundamental and advanced concepts of applications of chemical and scientific theories.
PO3: acquire experimental skills required for employment in chemical and pharmaceutical industry.
PO4: develop analytical and problem-solving skills
PO5: acquire the ability to synthesize, separate and characterize compounds using laboratory and instrumentation techniques.
PO6: identify the major problems of the society and environment for which Chemistry has offered solutions, and get motivated to further work on it by pursuing research with social responsibility.

10. Programme Specific Outcomes (PSOs)
On completion of the M.Sc. Chemistry Program, the students will be able to

PSO1: demonstrate comprehensive knowledge and understanding of both theoretical and experimental/applied chemistry including specialized areas of Organic Chemistry, Inorganic Chemistry, Physical Chemistry, Analytical Chemistry, Medicinal Chemistry, Environmental Chemistry, Chemistry of Natural products, Nano Chemistry, and Elective subjects.

PSO2: use advanced instruments and related soft-wares for in-depth characterization of materials/chemical analysis and separation technology with the help of theoretical knowledge

PSO3: understand the importance of chemistry in societal and environmental contexts for sustainable development.

PSO4: utilize the principles of scientific enquiry and analytical thinking while solving problems and making decisions

PSO5: become skilled project managers to undertake challenging projects for societal development.

PSO6: express the subject through technical writing as well as through oral presentation.

MOTHER TERESA WOMEN'S UNIVERSITY,
KODAIKANAL – 624 101
M.Sc. Chemistry Syllabus

S. No.	Course Code	Course Title	Credits	Hours		Continuous Internal Assessment (CIA)	End Semester Exam (ESE)	Total
				L	P			
Semester I								
1	P21CHT11	Core- I Organic Chemistry-I	4	5	0	25	75	100
2	P21CHT12	Core -2 Inorganic Chemistry –I	4	5	0	25	75	100
3	P21CHT13	Core-3 Physical Chemistry-I	4	5	0	25	75	100
4	P21CHT14	Core-4 Medicinal Chemistry & Drug Design	4	5	0	25	75	100
5	P21CHP11	Core-5 -Practical 1 Organic Chemistry Practical	4	0	6	25	75	100
7	P21CSS11	Supportive Course – I (Skill) Computer Skills for Web Designing and Video Editing	2	2	0	25	75	100
		Total	**22**	**26**		**-**	**-**	**700**
Semester II								
8	P21CHT21	Core -6 Organic Chemistry-II	4	5	0	25	75	100
9	P21CHT22	Core -7 Inorganic Chemistry -II	4	4	0	25	75	100
10	P21CHT23	Core -8 Physical Chemistry-II	4	5	0	25	75	100
11	P21CHT24	Core -9 Analytical Chemistry	4	4	0	25	75	100
12	P21CHP22	Core -10 Practical 2 Inorganic	4	6	6	25	75	100

		Chemistry Practical						
13		**NME**	4	4	0	25	75	100
14	P21CHS22	**Supportive Course II (Skill)** Computational Chemistry	2	4	0	25	75	100
		Total	**26**	**30**		**-**	**-**	**700**
Semester III								
15	P21CHT31	Core -11 Organic Chemistry-III	4	5	0	25	75	100
16	P21CHT32	Core -12 Inorganic Chemistry -III	4	4	0	25	75	100
17	P21CHT33	Core -13 Physical Chemistry-III	4	5	0	25	75	100
18	P21CHT34	Core -14 Environmental Chemistry	4	4	0	25	75	100
19	P21CHT35	Core -15- Chemistry of Natural Products and Bio- Inorganic Chemistry	4	4	0	25	75	100
20	P21CHP33	Core -16 Practical -3 Physical Chemistry Practical	4	6	6	25	75	100
21	P21WSS33	**Supportive Course III**-Women Empowerment	2	2	0	25	75	100
		Total	**26**	**30**				**700**
Semester IV								
22	P21CHE411/ P21CHE412	Elective –I* Green Chemistry/ Chemistry in Everyday Life/MOOC Course$	4	4	0	25	75	100
23	P21CHE421 P21CHE422	Elective- II* Industrial Chemistry / Chemistry of Nanoscience and &	4	4	0	25	75	100

		Technology & Supramolecular Chemistry/$						
24	P21CHR41	Project	8	22		25	75	100
		Total	**16**	**30**				**200**
Total			**90**	**112**				**2300**

Non- Major Electives Offered by the Department

S No.	Course Code	Course Title	Credits	Hours L/P		Continuous Internal Assessment (CIA)	End Semester Exam (ESE)	Total
Semester I								
1	P21CHN211/ P21CHN212	Everyday Chemistry/ Agricultural Chemistry	4	4	0	25	75	100

Additional Credit Courses

1. **P21CHV11 -** Value Added Program I-Two Credits (First Semester)
2. **P21CHI21 -** Internship/Industrial Training – Two Credits- (Second Semester)
3. **P21CHO31 -** Online Courses-Two Credits- (Third Semester)
4. **P21CHV42 -** Value Added Program II-Two Credits (Fourth Semester)

*Those who have CGPA as 9, and want to do the project in industry/institution during IV semester, may opt for these two papers in III semester.

$Students can take one 4 credit course in MOOC as elective or two 2 credit course in MOOC as elective with the approval of Department committee

Cognitive Level of Course Outcomes

K1: Recall/Know **K2:** Understand **K3:** Apply **K4:** Analyze
K5 Evaluate **K6** Create

VALUE ADDED COURSE I

Course Code	P21CHV11 P21CHV42	Instrumental Methods of Chemical Analysis / Water Treatment	**L**	**T**	**P**	**C**
Credit - 2			**5**	**-**	**-**	**4**

SEMESTER - I

Course Code	P21CHT11	ORGANIC CHEMISTRY – I	L	T	P	C
CORE - I			5	-	-	4

Objectives

1. To enable students, learn the different types of reactive intermediates in organic reactions.
2. To provide understanding of the different types and mechanism of organic reactions
3. To make the students understand and appreciate the basic concepts of stereochemistry
4. To provide understanding of the concept of aromaticity and enable the students to identify aromatic, non-aromatic and anti-aromatic compounds.

Course Outcomes

Upon completing the course, the students will be able to

1. identify the different types of reactive intermediates and appreciate their importance in organic reactions – K5
2. analyze the various mechanisms of organic reactions – K4
3. understand and apply the concepts of stereochemistry -K3
4. identify aromatic, non-aromatic and anti-aromatic compounds-K2

Unit I - Reactive intermediates and Aromaticity

Carbocations, carbanions, carbenes, benzynes and nitrenes-Generation, stability and reactivity.

Aromatic character: Six-, five-, seven-, and eight- membered rings - Other systems with aromatic sextets – Huckel's theory of aromaticity, concept of homoaromaticity and antiaromaticity, Electron occupancy in MO's and aromaticity - NMR concept of aromaticity and antiaromaticity, systems with 2,4,8 and 10 electrons, systems with more than 10 electrons, alternant and non-alternant hydrocarbons (azulene type). Bonding properties of systems with (4n+2)□ □ electrons and 4n□ □ electrons,Heteroaromatic molecules. Annulenes, heteroannulenes, sydnones and fullerenes. Craig's rule, Hammond's postulate

Unit II- Substitution reactions

Nucleophilic Substitution

Aliphatic nucleophilic substitution: S_N1 and S_N2 mechanism – Kinetic and stereochemical characteristics – effects of substrate structure, nature of the nucleophile and leaving group on the rate – solvent effects – examples of S_Ni substitution – Neighbouring group participation-Anchimeric assistance

Aromatic nucleophilic substitution: Benzyne and Meisenheimer intermediates

Electrophilic Substitution

Mechanism of aliphatic electrophilic substitution reaction – S_E1, S_E2, S_Ei reaction. Mechanism of aromatic electrophilic substitution reactions – complexes – nitration, halogenation, sulphonation, Friedel Craft alkylation and acylation – Reimer Tiemann reaction. Linear free energy relationship – Hammett equation – Significance of the σ and ρ parameters; Taft equation.

Unit III- Addition and Elimination reactions

Addition reactions

Regio and stereochemistry of addition of halogens and halogens acids to carbon – carbon multiple bonds – hydroboration – addition to carbonyl bonds – mechanism of Aldol, Perkin, Stobbe, Dieckmann condensation, Reformatsky and Grignard reaction, Michael addition reaction and Mannich reaction – Formation and Synthetic application of enamines – Stork enamine reaction.

Elimination reactions

E1, E2, E1CB mechanism – structural and solvent effect on these mechanisms – orientation of double bonds (regio and stereoselectivities) – competition between substitution and elimination reaction – cis elimination, pyrolytic eliminations

Unit IV- Rearrangements

Definition – nucleophilic, electrophilic and free radical rearrangements – intramolecular and intermolecular rearrangements – migratory aptitude – Wagner – Meerwin, Benzil – Benzilic acid, Schmidt, Lossen, Curtius, Beckmann, Fries, Baeyer Villeger, Favorski, Stevens and Neber rearrangements.

Unit V - Introduction to stereochemistry

Concept of chirality: specification on configuration by Cahn, Ingold and Prelog system of notation, compounds with more than one chiral centre – calculation of number of stereo-isomers – erythro and threo nomenclature; interconversions of Sawhorse, Fisher and Newman's Projections.

The concept of prochirality: Topicity and pro-stereoisomerism – equivalent, enantiotopic and diasteriotopic ligands and faces. Atropisomerism – concept of axial chirality 'R' and 'S' nomenclature of some axially chiral molecules.
Geometrical isomers – E & Z nomenclature determination of configuration of geometrical isomers by physical and chemical methods.

Reference Books

1. M. B. Smith &J. March , March′s Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, Wiley–Blackwell; 6th Ed., 2007.
2. J.March, Advanced Organic Chemistry, 4thEdn. John Wiley, New York,1992.
3. V.K. Ahluwalia & Rakesh K. Parashar , Organic Reaction Mechanisms, V.K. Ahluwalia&Rakesh K. Parashar , Organic Reaction Mechanisms; 4rth Ed.,2011
4. P.Sykes, A Guide book to Mechanisms in Organic Chemistry,.,Perason Education, 6th Ed.,2003.
5. F.A.Carey and R.J.Sundberg, Advanced Organic Chemistry, Part A and Part B, 5thEd., Springer, 2007

Mapping of COs with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	M	S	M	M	S	M	M	S	M	S
CO2	S	S	M	S	M	M	S	M	M	S	M	S
CO3	S	S	M	S	M	M	S	M	M	S	M	S
CO4	S	S	M	S	M	M	S	M	M	S	M	S

Strongly Correlating(S) - 3 marks **Moderately Correlating (M) - 2 marks**
Weakly Correlating (W) - 1 mark **No Correlation (N) - 0 mark**

Course Code	P21CHT12	INORGANIC CHEMISTRY – I	L	T	P	C
CORE - II			5	-	-	4

Objectives:

1. To provide knowledge of basic and advanced concepts in bonding and enable the students to identify the structure and bonding of simple molecules.
2. To enable students, understand of the various types of solid-state packing and the types of chemical forces
3. To impartknowledge of the structure and bonding of main group elements and their compounds
4. To provide knowledge of polymeric inorganic compounds.

Unit I - Covalent Bonding

V.B. approach to bonding-Hitler-London, Pauling and Slater refinements, Concept of hybridization and structure of molecules, VSEPR theory shapes of molecules. M.O. approach to covalent bonding – symmetry and overlap of atomic orbitals – symmetry of molecular orbitals – sigma, pi and delta bonding – energy levels in homo and hetero nuclear diatomic systems – bond length, bond order and bond energy, Application to small molecules such as $BeCl_2$, BCl_3 and CCl_4, SF_4, ionic character in a covalent bond. The concept of multicenter bonding.

Unit II- Metallic Bonding

Drude Lorentz theorem, merits and demerits – Sommerfield theorem – band theorem – formation of Brillion Zones – conductors and insulators and semiconductors, – Hall effect – super conductors, photoconductivity. Point, line and plane defects in solids – Stoichiometric and non-stoichiometric defects – Frenkel and Schottky defects. Effect of imperfections on physical properties like electrical conductivity, thermal, optical and magnetic phenomena.

Unit III- Solid State – Structure

Cohesive energy and Medelung constants, Van der Waals forces, Close packing of atoms and ions HCP and BCC types of packing voids, radius ratio – derivation – its influence on structures. Lattice energy – Born-Lande equation - Kapustinski equation. Representative structures of AB and AB_2 types of compounds - rock salt, cesium chloride, wurtzite, zinc blende, rutile, fluorite, antifluorite, cadmium iodide and nickel arsenide. Structure of graphite and diamond. Spinels - normal and inverse types and perovskite structures.

Unit IV – Main Group Chemistry

Chemistry of boron – borane, higher boranes, carboranes, borazines and boron nitrides. Chemistry of silicon – silanes, higher silanes, multiple bonded systems, silicon nitrides, siloxanes. P-N compounds, cyclophosphazenes and cyclophosphazanes. S-N compounds – S_4N_4, $(SN)_x$.

Unit V –Interhalogens and Polymeric Inorganic Compounds

Pseudo halogens;Structure and bonding in ClF_3, BrF_3 , BrF_5 , IF_5, IF_7 etc . Oxides and oxoacids of halogens, Isopoly and heteropoly acids – Structure and bonding of 6- and 12 – isopoly andheteropoly anions. Structure of silicates - applications of Paulings rule of electrovalence - isomorphous replacements in silicates – ortho, meta and pyro silicates – one dimensional, two dimensional and three-dimensional silicates – Bonding in Noble gas compounds – $XeCl_2$, XeF_4, $XeOF_4$, XeF_6.,

Text Books

1. J.E. Huheey, Inorganic Chemistry, Pearson Education India; 4th Ed.,2006
2. J.D. Lee, Concise Inorganic Chemistry, Wiley India, 5th Ed., 2015.
3. D.E. Douglas, D.H. McDaniel, J.J. Alexander, Concepts and Models in Inorganic Chemistry, Wiley, 3rd Ed., 2006.
1. F.A. Cotton, G. Wilkinson, Advanced Inorganic Chemistry, 6th Ed., John Wiley & Sons, 2007.

6.P. Atkins, T. Overton, J. Rourke, M, Weller, F. Armstrong, Shriver&Atkins Inorganic Chemistry, Oxford University Press, 5th Ed., 2010.

Course Outcomes:

On learning the course, the students will be able to

1. understand the principles of various bonding theories and identify the structure and bonding of simple molecules -K2
2. recognize the various types of solid-state packing and the types of chemical forces-K4
3. explain the structure and bonding of main group elements and their compounds-K4
4. appreciate the existence and application of polymeric inorganic compounds-K5

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	M	S	M	M	S	M	M	S	M	S
CO2	S	S	M	S	M	M	S	M	M	S	M	S
CO3	S	S	M	S	M	M	S	M	M	S	M	S
CO4	S	S	M	S	M	M	S	M	M	S	M	S

Strongly Correlating(S) - 3 marks **Moderately Correlating (M) - 2 marks**
Weakly Correlating (W) - 1 mark **No Correlation (N) - 0 mark**

Course Code	P21CHT13	PHYSICAL CHEMISTRY - I	L	T	P	C
CORE - III			5	-	-	4

Objectives:

1. To enable the students to understand concept and laws of thermodynamics
2. To understand and appreciate the advanced concepts and rate equations in chemical kinetics.
3. To provide knowledge on the concepts and laws of electrochemistry and photochemistry
4. To enable the students to apply the knowledge gained in the above concepts

Unit I - Thermodynamics Chemical and Phase Equilibrium

The second law of thermodynamics – Entropy – thermodynamics of systems of variable compositions – partial molar quantities and their determination – chemical potential – Gibbs-Duhem equation – Activity and Fugacity- determination of fugacity, Nernst equation, Third law of thermodynamics, exceptions and applications. Chemical equilibrium - temperature dependence, Vant-Hoff equation, Non-equilibrium thermodynamics - postulates and methodology. Phase equilibrium-Application to three component system-CH_3COOH, H_2O and $CHCl_3$ system.

Unit II- Chemical Kinetics

Derivation of rate constant for opposing, consecutive and parallel reaction-steady state approximation. Chain reactions: kinetics of decomposition of N_2O_5 – Non stationary chain reaction: H_2O_2 reaction and explosion limits. Grunwald –Winstein equation on reaction rates. Concept of Linear Free Energy Relationships-derivation of Hammett equation-significance of substituent and reaction rate constants - Taft equation - thermodynamic implications of LFER. Experimental methods for the study of fast reaction-flow method-relaxation methods.

Unit III - Electrochemistry – Electrochemistry – I

Mean ion activity and activity coefficient of electrolytes in solution – Ion association - Ionic strength – Debye-Huckel theory – Debye-Huckel limiting law - its validity and limitations – Strong and weak electrolytes – Debye theory of electrolytic conductance – Debye – Huckel – Onsager equation - Verification and limitations - Electrochemical cells and applications of standard potentials. Batteries-Primary and secondary fuel cells – Corrosion and corrosion inhibition

Unit IV - Electrochemistry – II

The electrical double layer – Polarizable and non-polarizable interfaces – Structure of electrical double layer – Electrocapillary and double layer capacity measurements – Double layer models – Helmholtz, Guoy–Chapman and Stern models.

Electrokinetic phenomena: Zeta potential – Electrophoresis Electroosmosis, sedimentation potential and streaming potential, Kinetics of electrode processes – Current–potential curve – Butler–Volmer relation and its approximations – Tafel equation – Charge transfer resistance – Nernst equation from Butler–Volmer equation –Multistep processes – Symmetry factor and transfer coefficient – Electrocatalysis–Hydrogen evolution reaction as a case study.

Unit V - Photochemistry

Absorption of light by molecules, reaction paths of electronically excited molecules – de-excitation pathways, Fluorescence and Phosphoresence – Jablanski diagram – Physical properties of the electronic excited molecules – excited state dipole moments, excited state pKa and redox potentials – Stern – Volmer equation and its application – photosensitization – Chemi Luminescence – Quantum Yield and actinometry.

Reference Books

1. Peter Atkins, Julio de Paula , J. Keeler, Atkins' Physical Chemistry, Oxford University Press,International 11th Ed, 2018
2. J. Rajaram and J.C. Kuriacose,Thermodynamics, ShobhanLal& Co, 3rd Ed., 2013.
3. G.W.Castellan, Physical Chemistry, Narosa, 1996.
4. K.J. Laidler, Chemical Kinetics, 3rd Ed., Pearson Education, 2004.
5. S. Glasstone, Text book of Physical Chemistry, McMillan, 1974.
6. K.K. Rohatgi – Mukherjee, Fundamentals of Photochemistry, New Age Publishers 3rd Ed, 2017.

Course Outcomes:

On learning the course, the students will be able to

1. calculate change in thermodynamic properties, equilibrium constants, partial molar quantities, chemical potential – K5
2. identify factors affecting equilibrium constant- K4
3. understand and appreciate the advanced concepts and rate equations in chemical kinetics-K2, K5
4. understand and apply the concepts and laws of electrochemistry and photochemistry-K

Mapping of Cos with POs &PSOs:

PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	S	M	S	M	M	S	M	M	S	M	S
CO2	S	S	M	S	M	M	S	M	M	S	M	S
CO3	S	S	M	S	M	M	S	M	M	S	M	S
CO4	S	S	M	S	M	M	S	M	M	S	M	S

Strongly Correlating(S) - 3 marks **Moderately Correlating (M) - 2 marks**
Weakly Correlating (W) - 1 mark **No Correlation (N) - 0 mark**

Course Code	P21CHT14	MEDICINAL CHEMISTRY AND DRUG DESIGN	L	T	P	C
CORE - IV			5	-	-	4

Objectives:

1. To provide knowledge of the various stages of drug development and computer aided drug design.
2. To enable students, appreciate and understand the importance of bio-inorganic compounds and bio- inorganic compounds in medicine
3. To provide knowledge about the structure and function of important vitamins
4. To enable students, understand the structure and mechanism of action of drugs.

Unit I - Computer aided drug design

Stages in drug development-conventional approach-Rational drug design-Target Identification-Sequence to structure - Protein structure prediction - Homology Modeling-Active sites-Lead structure identification, Target – Substrate Docking - Scoring-molecular descriptors - High throughput screening and combinatorial chemistry-Structure-activity relationship (SAR)– Toxicity, Patents

Unit II - Medicinal Bioinorganic Chemistry

Bioinorganic Chemistry of quintessentially toxic metals. Lead, Cadmium, Mercury, Aluminum, Chromium, Iron, Copper, Plutonium. Detoxification by metal chelation. Drugs that act by binding at the metal sites of Metalloenzymes.

Chemotherapy-Chemotherapy with compounds of certain non-essential elements. Platinum complexes in Cancer therapy – Cisplatin and its mode of action – Cytotoxic compounds of other metals – Gold containing drugs as anti-rheumatic agents and their mode of action - Lithium inPschycopharmocological drugs. Molecular channels and transport processes.

Unit III - Medicinal Bioorganic Chemistry

Introduction – Study of drugs – Important terminologies in pharmaceutical chemistry – Classification and nomenclature of drugs – Antibacterial drugs – Sulpha drugs: sulphanilamide,sulphadiazine-Antibiotics: chloraphenicol, penicillin, Analgesics: morphine, heroin – Anticonvulsant: Barbiturates, oxazolindiones, streptomycin, terramycin

Unit IV- Vitamins

Classification of Vitamins, Biochemical function of vitamins, Vitamins -A, B_1, B_2, C, E and H-Sources and Deficiency diseases.Recommended dietary allowance(RDA), Structure elucidation and synthesis, Function

Unit V- Drug Action

Mechanism of action of drugs – Metabolism of drugs – Absorption of drugs, Diabetes: control of diabetes, insulin – Cancer and antineoplastic drugs: antimetabolites, plant products – Cardio vascular drugs: Antiarrhythemic drugs, antihypertension drugs

Reference Books

1. G.L. Patrick, An Introduction to Medicinal Chemistry, Oxford University, Press, 5th Ed., 2013
2. Ashutosh Kar, Medicinal Chemistry, New Age International Publishers; 7th Ed.,2018
3. J. Ghosh, Fundamental Concepts of Applied Chemistry, S. Chand and Co.,
4. New Delhi, 2006.
5. G. Thomas, Fundamentals of Medicinal Chemistry, John Wiley & Sons, 2003

Course outcomes:
On learning the course, the students will be able to

1. comprehend and apply the concept of drug design- K1, K3
2. appreciate the importance of bio-organic compounds and bio- inorganic compounds in medicine-K5
3. illustrate the structure and function of vitamins-K4
4. correlate the structure and pharmacological action of drugs-K4

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	S	S	M	M	S	S	M	M	S	M	S
CO2	S	S	S	M	M	S	S	M	M	S	M	S
CO3	S	S	S	M	M	S	S	M	M	S	M	S
CO4	S	S	S	M	M	S	S	M	M	S	M	S

Strongly Correlating(S) - 3 marks **Moderately Correlating (M) - 2 marks**
Weakly Correlating (W) - 1 mark **No Correlation (N) - 0 mark**

Course Code	P21CHP11	ORGANIC CHEMISTRY PRACTICALS	L	T	P	C
CORE -V			5	-	-	4

Objectives:

1. To develop understanding in basic chromatographic methods.
2. To learn simple extraction techniques
3. To develop skill in simple organic synthesis
4. To understand and develop the principles of quantitative and qualitative analysis of organic compounds.

1. Purification techniques of organic compounds and their spectroscopic identifications.
   a) Purification of binary mixtures by Thin Layer Chromatography (TLC) and Column chromatography
   b) Purification of tertiary mixture of amino acids by paper chromatography
   (Both experiments demonstration only)

2. Extraction of natural products such as Caffeine, Caesin.

3. Organic preparation: Any 4 preparations (involving two or more than two steps) involving the following representative reactions-
   1) Bromination
   2) Hydrolysis
   3) Nitration
   4) Condensation
   5)Oxidation

4.Qualitativeanalysis – Separation of two component mixture and identification of components by chemical methods (about 4 – 5 mixtures)

5. Quantitative Analysis
   a) Estimation of ascorbic acid
   b) Estimation of glucose

Reference Books

1. J. Mohan, Organic Analytical Chemistry: Theory and Practice; Narosa, 2003.
2. V. K. Ahluwalia, P. Bhagat, and R. Agarwal, Laboratory Techniques in Organic Chemistry; I. K. International, 2005.
3. N. S. Gnanaprakasam and G. Ramamurthy, Organic Chemistry Lab Manual; S.V.Printers, 1987.
4.Vogel's Textbook of Practical Organic Chemistry; 5th Ed., Prentice Hall, 1989

Course Outcomes

On learning the course, the students will be able to carry out (K2,K4)

1. basic chromatographic methods.
2. simple extraction techniques
3. simple organic synthesis
4. quantitative and qualitative analysis of organic compounds.

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	S	S	S	M	S	S	M	S	S	S
CO2	S	S	S	S	S	M	S	S	M	S	S	S
CO3	S	S	S	S	S	M	S	S	M	S	S	S
CO4	S	S	S	S	S	M	S	S	M	S	S	S

Strongly Correlating(S) - 3 marks **Moderately Correlating (M) - 2 marks**
Weakly Correlating (W) - 1 mark **No Correlation (N) - 0 mark**

SEMESTER – II

Course Code	P21CHT21	ORGANIC CHEMISTRY – II	L	T	P	C
CORE - VI			5	-	-	2

Objectives

1. To enable students to understand and appreciate the advanced concepts of stereochemistry and conformational analysis.
2. To provide knowledge and understanding of the various reagents in organic synthesis and important oxidation and reduction reactions.
3. To introduce the concept of asymmetric synthesis.
4. To enable students to apply the knowledge gained in the above concepts.

Unit I - Conformational analysis of acyclic and cyclic system

Definition – restricted rotation about carbon – carbon single bonds – conformations of ethane and n-butane – conformational free energy – conformational isomers and atropisomers – population of conformers – influence of dipole – dipole repulsion, van der Waals attractive force, intramolecular H-bonding on the stability of conformers.

Conformational analysis of cyclohexane systems – stability and isomerism in mono and di substituted cyclohexane – flexible conformers – conformational analysis of cyclohexane and its derivatives, cyclohexanones – alkyl ketone effect - α - halocyclohexanones – anomeric effect, Decalins.

Unit II - Dynamic stereochemistry conformation and reactivity

Conformation and reactivity in acyclic systems – stereo electronic and steric factors – simple examples illustrating E2 and cis eliminations, intramolecular rearrangements and neighbouring group participation, Curtin-Hammett principle. WinsteinElliel Equation, Steric assisted and steric hindered reactionSimple reactions illustrating stereo and stereo-electronic factors – esterfication, oxidation, nucleophilic substitution at ring carbons and elimination reactions - reactions involving intramolecular rearrangements – formation and cleavage of epoxides and neighbouring group participation – reactions of enols and enolates

Unit III - Reagents in organic synthesis

Use of the following reagents in organic synthesis and functional group transformation – Dicyclohexylcarbodiimide, 1,3 dithiane (reactive umpolung), trimethylsilyl iodide, tri-n-butyltin hydride, Woodward and Prevost hydroxylation, DDQ Wilkinson's Catalyst – Wittig reaction

Unit IV - Oxidation and Reduction

Oxidation of organic compounds with reagents based on peroxides, peracids, ozone, oxides of osmium, chromium, iodine and selenium dioxide

Reduction of organic compounds with reagents based on $LiAlH_4$, $NaBH_4$, Raney Ni hydrazine, formic acid and dissolving metals. Clemmenson reaction, Wolf Kishner reduction, Birch Reduction.

Unit V - Asymmetric Synthesis

Importance of asymmetric synthesis – problems with resolution methods – optical purity - enantiomeric excess – diastereomeric excess – chiral, substrate controlled, auxillary controlled, catalyst controlled and solvent controlled asymmetric synthesis, example for each case, synthesis of longifolene by EJ Corey method

Reference Books

1. Ernest L. Eliel , Samuel H. Wilen (Author)Stereochemistry Of Organic Compounds, Wiley; 1st Edition, 2008
2. D. Nasipuri, Stereochemistry of Organic Compounds: Principles and Applications,New Age International Pvt Ltd;4rth Ed., 2020
3. E.L.Eliel, Stereochemistry of Carbon Compounds, McGraw Hill, 1962.
4. R.E.Ireland, Organic Synthesis, Prentice Hall, 1969.
5. S.Turner, Design of Organic Synthesis, Elsevier, 1976.

Course Outcomes

On learning the course, the students will be able to.

1. evaluate the stability of various conformers of acyclic and cyclic systems using steric, electronic and stereo-electronic effects and correlate them to reactivity- K5
2. use various models for determining stereoselectivity of various organic transformation-K3
3. understand and apply the various reagents in organic synthesis and design organic synthetic reactions-K1, K3
4. apply asymmetric transformations in a logical manner for the synthesis of chiral molecules - K6

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	M	S	M	M	S	M	M	S	M	S
CO2	S	S	M	S	M	M	S	M	M	S	M	S
CO3	S	S	M	S	M	M	S	M	M	S	M	S
CO4	S	S	M	S	M	M	S	M	M	S	M	S

Strongly Correlating(S) - 3 marks **Moderately Correlating (M) - 2 marks**
Weakly Correlating (W) - 1 mark **No Correlation (N) - 0 mark**

Course Code	P21CHT22	INORGANIC CHEMISTRY – II	L	T	P	C
CORE - VII			5	-	-	4

Objectives:

1. To familiarize the bonding concepts and isomerism in coordination compounds.
2. To provide thorough understanding of the electronic spectra and reaction mechanisms of coordination compounds.
3. To enable students, understand the structure and bonding in organometallic compounds and pi- acceptor complexes.
4. To enable students, understand &appreciate the importance of organometallic compounds in catalysis.

Unit I - Chemistry of Coordination Compounds

Brief review of the general characteristics of transition elements, nomenclature of coordination complexes, Isomerism in coordination compounds, types of ligands and chelate effect, stepwise and overall formation constants-determination of stability constant by Job's continuous variation method., VB theory and CFT - Splitting of d-orbitals under different geometries – CFSE – evidence for CFSE-factors affecting CFSE – spectrochemical series – Jahn-Teller distortion-application of d-orbital splitting to explain magnetic properties, Limitations of CFT – MO theory – sigma – and pi-bonding in complexes – Nephelauxetic effect

Unit II- Electronic Spectra of Metal Complexes

Term symbols for atoms and ions – splitting of orbitals and terms in crystal fields – characteristics of d-d transitions – energy levels – Orgel and Tanabe – Sugano diagram – effect of Jahn – Teller distortion and spin-orbit coupling on absorption spectra – crystal field spectra of transition metal complexes – calculation of 10Dq and β forCo(II) (O_h and T_d) and Ni(II) (O_h) complexes- charge transfer spectra of bipyridine and related diimine systems

ORD and CD: Chirality and the special nomenclature of chiral coordination compounds - optical activity, ORD and CD – Cotton effect – absolute configurations of chiral coordination compounds.

Unit III - Inorganic Reaction Mechanism

Electron transfer reactions: Outer-sphere and inner sphere electron transfer reactions – The Marcus theory – non-complementary reactions – synthesis of coordination compounds by electron transfer reactions.

Substitution reactions Trans Effect, substitution reactions of square planar complexes of Pt(II) and other d^8 metal complexes – significance of trans-effect – substitution reactions of octahedral complexes – acid and base hydrolysis reactions – anation reactions, the template effect and macrocyclic ligands.

Unit IV– Organometallics

The 18 electron rule – applications and limitations – Isolobal concept and its usefulness Hapticity, Metal alkyl and aryls – olefin and acetylene complexes – Zeise salt – Dewar-Chatt approach to bonding in olefins & cyclobutadiene complexes, cyclopentadiene and benzene complexes of transition metals (preparation, bonding and reactions), – Fluxional molecules. Homogeneous catalysis involving organometallics – oxidative addition and reductive elimination reactions – hydrogenation, isomerization and hydroformylation of olefins – carbonylation of methanol, oxidation of olefins (Wacker process) - heterogeneous catalysis – Ziegler-Natta polymerization of propylene.

Unit V - Pi-acceptor Complexes

Synthesis, structure and bonding of mono nuclear and poly-nuclear carbonyls – nitrosyl complexes – dinitrogen complexes – metal carbonylato complexes, carbonyl hydrides and complex metal cyanides.

Reference Books

1. J.E. Huheey, Inorganic Chemistry, Pearson Education India; 4th edition, 2006
2. J.D. Lee, Concise Inorganic Chemistry, Wiley India, 5th edition, 2015.
3. D.E. Douglas, D.H. McDaniel, J.J. Alexander, Concepts and Models in Inorganic Chemistry, Wiley 3rd Ed. 2006.
4. F.A. Cotton, G. Wilkinson, Advanced Inorganic Chemistry, 6th Ed., John Wiley &
5. Sons, 2007
6. F. Purcell, J. C. Kotz, Inorganic Chemistry, Saunder, 1977.

Course Outcomes

On learning the course, the students will be able to

1. identify and analyze the bonding, structure and reactivity of selected coordination complexes-K1, K4
2. interpret their electronic spectra and magnetic properties-K5
3. connect the principles of transition metal coordination complexes in understanding functions of biological systems-K5
4. understand and correlate the bonding, structure and applications of organometallic compounds -K1, K4

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	M	S	M	S	S	S	M	S	M	S
CO2	S	S	M	S	M	S	S	S	M	S	M	S
CO3	S	S	M	S	M	S	S	S	M	S	M	S
CO4	S	S	M	S	M	S	S	S	M	S	M	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21CHT23	PHYSICAL CHEMISTRY – II	L	T	P	C
CORE -VIII			5	-	-	4

Objectives:

1. To provide a sound knowledge and understanding of the quantum chemical laws and their applications
2. To enable the students to understand and appreciate the importance of the reactions in surface and catalysis
3. To enable the students to appreciate the importance green chemistry and polymer chemistry
4. To enable the students to apply the knowledge gained in the above concepts.

Unit I-Quantum Theory – I

Planck's quantum theory – Bohr atom model - Wave – Particle duality – Uncertainty Principle – Operators and commutation relations – Sums and product of operator, commutator, linear and non-linear operator, Hermitian and Hamiltonian operator, Postulates of quantum mechanics and Schrodinger equation – eigen functions and eigen value, - Free particle – Particle in a box – degeneracy-one and three-dimensional, distortion of the box and Jahn-Teller effect, quantum numbers, zero-point energy, orthogonalisation and normalityfinite potential barrier – tunneling.

Unit II- Quantum Theory – II

Derivation of angular momentum operator, Rigid rotator-Harmonic oscillator. The hydrogen atom – space quantization of electronic orbits – angular and radial part, electron spin - Approximate methods of solving the Schrodinger equation – The perturbation and variation methods – Application to He atom - Angular momentum– spin orbit interaction – vector model of the atom – term symbols - Pauli exclusion principle Slater determinant. Atomic Structure Calculation

Unit III - Quantum Theory – III

Molecular Orbital and valence bond theory of molecules: The Born–Oppenheimer approximation, MO treatment of H_2^+, and MO and VB treatment of H_2 molecule – comparison of MO and VB methods. Bonding in homo and hetero nuclear diatomics
(HF, CO, NO) – polyatomic molecules concept of hybridization -Huckel theory of conjugated systems - application to ethylene, butadiene.

Unit IV- Surface Chemistry and Catalysis

Surface Phenomena: Physisorption and chemisorptions,solid- liquid interfaces – contact angle and wetting, Adsorption from solution, , Gibbs adsorption isotherm — solid-gas interface — Freundlich, Langmuir, Temkin, BET isotherms – surface area determination.

Homogeneous catalysis – Acid-base catalysis – Acidity function – Enzyme catalysis – Michaelis–Menten kinetics. Kinetics of bimolecular surface reactions involving adsorbed species –

Langmuir-Hinshelwood mechanism, Langmuir – Rideal mechanism – Rideal –Eley mechanism. Basic aspects of semiconductor catalysis and applications
Solar energy conversion – Photogalvanic cell – Photoelectrochemical cells – Electrolysis of water.

Unit V - Polymer Chemistry

Overview of polymers – Structure and classification of polymers – Degree of polymerization, Kinetics and mechanism of free radical and ionic polymerizations - Coordination polymerization, Zeigler–Natta catalysis Condensation – Self catalysed and Non-catalyzed polycondensation, Copolymerization – Co-polymer - Equation and significance, Molecular weight of polymers– Determination of molecular weight – Lightscattering and viscosity methods - Gel permeation chromatography.
Stereoregularity of polymers- significance of T_g and T_m

Reference Books

1. Donald A. McQuarrie, Quantum Chemistry, Viva books., 2016
2. I. N. Levine, Quantum Chemistry, Pearson Education India; 7th ed., 2016
3. A.K. Chandra, Introductory Quantum Chemistry, 4thEd,. Tata McGraw Hill, 2009.
4. F.W. Billmeyer, Jr., A Text Book of Polymer Science, WileyInterscience 3rd Ed., 1984.
5. V.R. Gowariker, N.V. Viswanathan, J. Sreedhar, Polymer Science, New Age International Publishers, 3rd Ed., 2019.

Course Outcomes

On learning the course, the students will be able to

1. solve the model problems in quantum mechanics and analyze the basis behind the postulatory method of quantum mechanics -K5
2. apply time independent perturbation theory to complex problems of molecular energy levels-K3
3. appreciate and apply the principles of Polymer Chemistry-K5
4. understand and appreciate the importance of the reactions in surface and catalysis-K2,K5

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	S	S	M	S	M	M	S	S	M	S	M	S
CO2	S	S	M	S	M	M	S	S	M	S	M	S
CO3	S	S	M	S	M	S	S	S	M	S	M	S
CO4	S	S	M	S	M	M	S	S	M	S	M	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N)

Course Code	P21CHT24	ANALYTICAL CHEMISTRY	L	T	P	C
CORE - IX			5	-	-	4

Objectives:

1. To provide a sound knowledge and understanding of the various chromatographic techniques and their applications
2. To enable students understand the different types of electroanalytical techniques.
3. To familiarize the students with spectrometric and thermal methods of analysis.
4. To enable the students to apply the knowledge gained in the above concepts.

Course Outcomes

On learning the course, the students will be able to

1. perform various chromatographic techniques for separation and analysis of compounds-K5
2. understand and apply the different types of electroanalytical techniques-K4
3. apply AAS, XRD analytical techniques for compound identification and characterization-K5
4. apply thermogravimetric techniques for characterization of compounds-K4

UnitI- Chromatography – I

Introduction to Chromotography,HPLC: Introduction – Column Packing Materials – Solvent – Detectors – Recorder – Terms and Definitions used in HPLC analysis and applications.

Gas Chromatography**:** Introduction – Retention Time – Retention Volume – Efficiency – Career Gases – Preparation of Columns – Solid Supports – Stationary Phases Detectors – Temperature Effect – Quantitative and Qualitative analysis and applications.

Unit II - Chromatography – II

Gel Permeation Chromatography: (GPC)
Introduction – Types of gels – Selection of gels – Gel Preparation – Drying of gels – Packing of the Column Application of the sample – Resolution – Detectors and Applications.

Gas Chromatography Mass Spectrometry: (GCMS)
Introduction – Separators – Carrier gas – Sample Injection – Analyzer and Applications.
Liquid Chromatography Mass Spectrometry: (LCMS)
Introduction – Ionization – Belt Interface – Instrumentation and Applications.

Unit III - Electroanalytical methods

Amperometry-Principles and applications, amperometric titration with examples-comparison with other titration methods-Basic principles of electrogravimetry
Coulometry**:** principles- coulometry at controlled potential- coulometry at constant current-coulometric titrations-advantages and applications

Cyclic Voltammetry**:** Principles and simple analytical applications – Interpretation of cyclic voltammogram.

Unit IV - Spectrometry and thermal methods

Atomic absorption spectrophotometer(AAS)- principle, instrumentations and applications-types of interferences. Flame Emission spectroscopy (FES)- theory, instrumentationand applications, Difference between AAS and FES. Thermal methods of Analysis- principle, instrumentations and applications of TG, DTA and DSC-thermograms of calcium oxalate and $CuSO_4.5H_2O$

Unit V- X-Ray diffraction

Crystal structure -Lattices and symmetries -Reciprocal lattice- Crystal symmetry- Point groups Plane groups and space group -Screw Axis and Glide planes; Diffraction of light – principles X-ray diffraction: geometry; About crystal structures and diffraction patterns, Practical aspects of X-ray diffraction, Powder X-ray diffraction, Principles and application, Interpretation and data collection.

Reference Books

1. D. A. Skoog, S. R. Crouch, F. J. Holler, Principles of Instrumental Analysis, Brooks Cole, 6th Ed., 2014
2. D. C. Harris, Quantitative Chemical Analysis, 4th Ed., W. H. Freeman, 1995
3. G. D.Christian& J. E. O'Reily, Instrumental Analysis, 2nd Ed., Allyn&Balon, 1986.
4. P.J. Wheatley, The Determination of Molecular Structure, (Unit V), Oxford University Press, 1968.

Mapping of Cos with POs &PSOs

PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	S	S	S	S	M	S	S	S	S	M	S
CO2	S	S	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	M	S	S	S	S	M	S
CO4	S	S	S	S	S	M	S	S	S	S	M	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21CHP22	INORGANIC CHEMISTRY PRACTICALS	L	T	P	C
CORE - X			-	-	5	4

Objectives:

1. To develop skill identifying less common metal ions.
2. To develop skill in estimating metal ions through complexometric titrations.
3. To develop skill in estimating metal ions through redox titrations.
4. To develop skill in estimating metal ion through spectrophotometry.

Course Outcomes

On learning the course, the students will be able to
1. identify less common metal ions -K1
2. estimate metal ions through complexometric titrations-K5
3. estimate metal ions through redox titrations-K5
4. estimate metal ion through spectrophotometry-K5

Practical – A : Qualitative Analysis

Less common metal ions – Mo, Se, Te, Ce, W, Ti, Zr, Th, U, V, Li (two metal ions in cationic and anionic forms)

Practical – B : Quantitative Analysis

a) EDTA titrations : Zn(II), Mg(II), Cu(II) and Ni(II)
b) Redox titrations : Fe(II) vs. Ce(IV) , Fe(II) vs. dichromate
NO_2^- vs. Ce(IV)
c) Spectrophotometric methods of analysis :
Fe(II) , Cu(II) .

References

1.A. I. Vogel, Text Book of Quantitative Inorganic Analysis; 6th Ed., Longman, New Delhi, 2000.

Mapping of COs with POs &PSOs:

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CO1	S	S	S	S	S	M	S	S	S	S	S	S
CO2	S	S	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21CHS22	COMPUTATIONAL CHEMISTRY	L	T	P	C
SUPPORTIVE (SKILL) - II			5	-	-	4

Objectives

1. To enable students to use chemistry softwares and internet for chemical research
2. To enable students, appreciate the importance of computational chemistry
3. To provide knowledge on the various computational chemistry methods
4. To enable students to perform basic quantum chemical calculations and understand the basics of molecular modelling

Course Outcome

At the end of this course the students will be able to

1. use chemistry softwares to analyze and present chemical and spectroscopic data-K3
2. appreciate the importance of computational chemistry-K5
3. perform basic quantum chemical calculations-K5
4. recognize the importance of molecular modelling and understand the basics-K1

Unit I - Operating systems & chemistry structure drawing softwares

General introduction to computers-different components of computer, operating systems-applications and uses of common softwares in chemistry-Origin, Chemsketch and Chemdraw

Unit II - Molecular Mechanics

General Introduction to computational chemistry – scope of computational chemistry - Methods – Molecular Mechanics – Semiempirical Methods – Ab initio method- Density Functional Theory Method – Molecular Dynamics

Unit III - Molecular Modelling

Conceptual background of molecular modelling: -molecular mechanics -Force Fields-Potential Energy functions for molecules-Application of molecular mechanics in chemistry

Unit IV- MO methods

Introduction to MO methods-ab initio methods-DFT methods - Computation of single point energies, Geometry optimization and properties.

Unit IV- Computational chemistry softwares

Computational chemistry softwares- Introduction-Different input formats-Cartesiancoordinates-Internal coordinates. Application of computational chemistry-MOPAC, GAUSSIAN

Reference Books

1. Donald A. McQuarrie, Quantum Chemistry, Viva books., 2016
2. I. N. Levine, Quantum Chemistry, Pearson Education India; 7th ed., 2016
3. F. Jensen Introduction to Computational Chemistry, Wiley-Blackwell, 2nd Ed., 2006
4. Andrew R.Leach Molecular Modelling Principles and applications, Prentice Hall, 2nd Ed., 2001
5. June Gunn Lee, Computational Materials Science: An Introduction, CRC Press, 2011

Mapping of Cos with POs &PSOs:

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CO2	S	S	M	S	M	M	S	M	M	S	S	S
CO3	S	S	M	S	M	M	S	M	M	S	S	S
CO4	S	S	M	S	M	M	S	M	M	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER - III

Course Code	P21CHT31	ORGANIC CHEMISTRY – III	L	T	P	C
CORE - XI			5	-	-	4

Objectives:

1. To provide understanding of the basic concepts of photochemistry and various organic photochemical reactions.
2. To familiarize the concept of pericyclic reactions.
3. To provide understanding of the principles and applications of spectroscopic techniques
4. To enable students to analyze organic compounds using various spectroscopic techniques.

Course Outcomes

On learning the course, the students will be able to

1. understand the basic concepts of photochemistry and various organic photochemical reactions-K2
2. illustrate the concept of pericyclic reactions-K4
3. apply NMR, IR, MS, UV-Vis spectroscopic techniques in solving structure of organic molecules and in determination of their stereochemistry-K5
4. interpret the above spectroscopic data of unknown compounds-K5

Unit I - Organic Photochemistry

Thermal versus photochemical reactions, basic concepts of organic photochemistry, Jablonski diagram – energy transfer mechanism – photochemical reactions of saturated ketones – Norrish type I and II reactions – photoreduction – Paterno -Buchi reaction – reaction of α, β unsaturated ketones – isomerisations – photochemistry of simple olefins – cis-trans isomerisation – di-π methane rearrangement – photochemical oxidations – oxidative coupling – photochemistry of arenes.

Unit II - Pericyclic reactions

Definition of pericyclic reactions – electrocyclic, cycloaddition and sigmatropic reactions – selection rules and stereochemistry for thermal and photochemical reactions – explanation on the basis of (i) FMO approach (Fukui), (ii) orbital correlation diagram approach (Woodward and Hoffmann) and (iii) aromatic transition state approach (Dewar and Zimmerman) Taking simple systems as example. Diels-Alder reaction, ene reaction, Sommelet – Hauser, Cope and Claisen rearrangements.

Unit III - Application of UV, IR and Mass Spectrometry in organic chemist

UV spectra – types of excitation or transition probability – chromophores and auxochromes – factors affecting intensity and position of absorption bands – Dienes, Polyenes and Enones – Woodward Fischer rules.

IR Spectra – Hooke's law – factors affecting vibrational frequencies – characteristic group frequencies – Finger print region.

Mass spectrometry – basic principles – molecular ion peak, parent peak, fragments, metastable peak, isotope peaks – determination of molecular weight and molecular fragment – fragment pattern of simple organic molecules – McLafforty rearrangement – Retero Diels Alder reaction.

Unit IV- Applications of NMR spectroscopy in organic structural determination

^{1}H NMR spectroscopy – origin of NMR spectra – chemical shift – number of signals – peak areas – multiplicity – geminal, vicinal and long range couplings – factors affecting chemical shifts and coupling constants, Karplus equation.Simplification of complex spectra – double resonance techniques, shift reagents –\ an elementary treatment of NOE phenomenon.

13C NMR Spectroscopy – broad band decoupling – off resonance decoupling –chemical shifts of common functional groups –γ - gauche effect-

DEPT spectra – identification of small compounds based on NMR data – 2Dtechniques: 1H–1H COSY, 1H–13C HETCOSY – NOESY.

Unit V - Organic Synthesis

Importance of synthesis – carbon-carbon bond making reactions – functional group modifications – reterosynthetic analysis – synthons and synthetic equivalents – nucleophilic, electrophilic, electroneutral and free radical synthons – retron, partial retron and super retron - Chiron – umpolung – protection and deprotection – product, chemo, regio and stereoselectivities.

One and two group disconnections – Diels Alder reactions – Robinson annulation method – 1,2- 1,3- 1,4- 1,5- and 1,6- difunctional compounds

Reference Books

1. P.M. Silverstein, F.X. Wester, Spectroscopic Identification of Organic Compounds, Wiley, 8th Ed.2015.
2. W. Kemp, Organic Spectroscopy, Macmillan, 2nd Ed., 2019.
3. J.D. Coyle, Organic Photochemistry, Wiley, 1985.
4. G.R. Chatwal, Organic Photochemistry, Himalaya Publications house, 2010.
5. C.H.Depuy and D.L. Chapman, Molecular Reactions and Photochemistry, Prentice Hall, 1975.
6. S. Sankararaman, Pericyclic Reactions - A Textbook: Reactions, Applications and Theory, Wiley-VCH; 1st edition 2005

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO2	S	S	S	S	S	M	S	S	M	S	M	S
CO3	S	S	S	S	S	M	S	S	M	S	M	S
CO4	S	S	S	S	S	M	S	S	M	S	M	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N)

Course Code	P21CHT32	INORGANIC CHEMISTRY – III	L	T	P	C
CORE - XII			5	-	-	4

Objectives:

1. To enable the students to analyze the inorganic compounds using various spectroscopic techniques.
2. To appreciate and understand the importance of nuclear reactions
3. To familiarize the important inorganic photochemical reactions.
4. To enable the students to apply the knowledge gained in the above concepts.

Course Outcomes

On learning the course, the students will be able to
1. analyze inorganic compounds using various spectroscopic techniques-K5
2. understand the principles and applications of nuclear reactions -K2
3. familiarize the important inorganic photochemical reaction-K4
4. apply the knowledge gained in the above concepts-K3

Unit I - Infrared Spectroscopy

Infrared Spectroscopy in the structural elucidation of simple molecules like N_2O, ClF_3, NO_3^-, ClO^-_4 – effect of coordination on ligand vibrations – uses of group vibrations in the structural elucidation of metal complexes of urea, thiourea, cyanide, thiocyanate, nitrate, sulphate and dimethyl sulfoxide

Unit II- NMR Spectroscopy

Examples for different spin systems – chemical shifts and coupling constants (spin-spin coupling) involving different nuclei (^1H, ^{19}F, ^{31}P, ^{13}C) interpretation and applications to inorganic compounds- NMR spectra of P_4S_3,H_3PO_3,H_3PO_2 and HPF_2. ^{19}F NMR spectra of ClF_3, BrF_3 and equimolar mixture of TiF_6 and TiF_4 in ethanol – Effect of quadrupolar nuclei on the ^1H NMR spectra, Satellite spectra.

Systems with chemical exchange - study of fluxional behavior of molecules NMR of paramagnetic molecules – isotropic shifts contact and pseudo-contact interactions – Lanthanide shift reagents.

Unit III- EPR Spectroscopy

Theory of EPR spectroscopy - Spin densities and McConnell relationship –presentation of the spectrum-hyperfine splitting, Applications of ESR to some simple systems such as CH_3, p-

benzosemiquinone, Xe_2^+ - Factors affecting the magnitude of g and A tensors in metal species - Zero-field splitting and Kramers degeneracy – Spectra of VO(II), Mn(II), Fe(III), Co(II), Ni(II) and Cu(II) complexes

Mossbauer Spectroscopy

Theory-Doppler effect - isomer shift-quadruple splitting-magnetic hyperfine splitting-application of MB spectroscopy to inorganic compounds

Unit IV - Nuclear Chemistry

Properties of nucleus – different types of nuclear forces – liquid drop model, shell model of nucleus – nuclear reactions induced by charged particles – Q value – nuclear reaction cross section, significance and determination – theory of nuclear fission – reactor and its components – production of feed materials for nuclear reactors – disposal of radioactive wastes – nuclear fusion, stellar energy. Application of radioisotopes in agriculture, industry and medicine – neutron activation analysis – hot atom chemistry.

Unit V - Inorganic Photochemistry

Elementary ideas on the photosystems I and II - Photochemistry of Cr(III), Co(III) and Ru(II) - coordination compounds – photoaquation – photoanation – photoisomerisation – photo redox reactions – charge transfer photo chemistry – photosensitization – solar energy conversiuon – photogalvanic cell – splitting of water to evolve hydrogen and oxygen – photochemistry of Pt(II) and Pt(IV) complexes.

Reference Books

1. R.S. Drago, Physical Methods in Inorganic Chemistry, 3rd Ed., Wiley Eastern Company, 2012
2. Colin N. Barnwell, E. M. McCash, Fundamentals of Molecular Spectroscopy, McGraw Hill Education, 4rth Ed., 2017
1. K.K. Rohatgi-Mukherjee, Fundamentals of Photochemistry, New Age Publishers, 3rd Ed 2017.
4. E.A.V. Ebsworth, Structural Methods in Inorganic Chemistry ELBS, , 3rd Ed.,1987.
5. H. J. Arniker, Nuclear Chemistry Through Problems, New Age International Private Ltd, 2016
6. R.S. Drago, Physical Methods in Chemistry, W. B. Saunders Company, 1992.

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO2	S	S	M	S	M	S	S	S	M	S	M	S
CO3	S	S	M	S	M	S	S	S	M	S	M	S
CO4	S	S	M	S	M	S	S	S	M	S	M	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N)

Course Code	P21CHT33	PHYSICAL CHEMISTRY – III	L	T	P	C
CORE - XIII			5	-	-	4

Objectives:

1. To provide a sound knowledge and understanding of the concepts and applications of group theory.
2. To familiarize the theories behind various spectroscopic techniques
3. To provide knowledge and understanding of statistical thermodynamics and its applications.
4. To enable the students to apply the knowledge gained in the above concepts.

Course Outcomes

On learning the course, the students will be able to

1. determine the symmetry operations of any small and medium-sized molecule and apply point group theory to the study of hybridization and spectroscopy- K4, K5
2. apply knowledge of the theories behind spectroscopic techniques for analysis-K3
3. apply the concepts of statistical thermodynamics for the study of equilibrium reactions-K3
4. apply the concepts of statistical thermodynamics for the study of reaction rates-K3

Unit I - Group Theory: Concepts

Elements of symmetry – point group classification of molecules – definition and theorems of group – properties of group with examples - symmetry operations as elements of group – group multiplication table – similarity transformations – sub groups – classes – representation of groups - reducible and irreducible representations – Great orthogonality theorem (derivation and proof excluded) – character table for H_2O and NH_3 molecules – format and significance – direct products and simplified procedure for generating and factoring total representations. Symmetry adapted linear combinations – projection operators.

Unit II- Group Theory: Applications

Molecular vibrations and their symmetry types in typical molecules – IR and Raman activity – bonding with central atom and formation of hybrid atomic orbitals in molecules such a BF_3, $(PtCl_4)_2CH_4$ – simplification of MO calculations – naphthalene, benzene – symmetries of molecular orbitals and electronic configurations – group theoretical selection rules – vanishing matrix elements selection rules for electronic transitions – electronic spectra of the carbonyl chromophore.

Unit III- Spectroscopy – I

General features of spectrum – Experimental techniques – Intensities of spectral lines and linewidths - Rotational spectra - Vibrational spectra – Rotation–Vibration spectra of diatomic and polyatomic molecules – Fermi resonance – Basic concepts of FTIR – Raman spectroscopy –

Rotational Raman and vibrational Raman – Resonance Raman and Laser Raman – Electronic spectra of diatomic molecules – Franck-Condon principle – Vibrational and rotational fine structure – Fortrat diagram – Predissociation.

Unit IV - Spectroscopy – II

NMR – nuclear spins in a magnetic field – Zeeman effect – Larmor precession – Resonance phenomenon – Block equations – Spin - lattice and spin-spin relaxation times – Nuclear shielding and chemical shift – Spin-spin coupling – Basic principles of FT NMR – Inversion recovery and CPMG sequenced for T_1 and T_2 measurements – NMR instrumentation.

ESR – Electronic ZeemanEffect – ESR spectrum of hydrogen atom (first order treatment) - g factors – Hyperfine constants – ESR of organic radicals in solution – McConnell's relation – ESR instrumentation.

Unit V - Statistical Thermodynamics

Thermodynamics probability and entropy – Maxwell-Boltzman, Bose-Einstein and Fermi-Dirac statistics and applications, - partition function and entropies for translational, rotational, vibrational and electronic motions of monoatomic and diatomic molecules – calculations of thermodynamic functions and equilibrium constants – specific heat of solids – Einstein and Debye theories.

Reference Books

1. F.A. Cotton, Chemical Applications of group Theory, 3rd Ed., Wiley Eastern, 2004.
2. R.L. Carter, Molecular Symmetry and Group Theory John Wiley, 1998.
3. C.N. Banwell, E. McCash, Fundamentals of molecular Spectroscopy, 4th Ed., TMH, 2008.
4. B.P. Straughan, S.Walker Spectroscopy Vol.3, Chapman Hall, 1976.
5. G.M. Barrow, Introduction to Molecular Spectroscopy, McGraw Hill, 1964.
6. P.K. Ghosh, Introduction to Photoelectron Spectroscopy, John Wiley, 1989.
7. P.W. Atkins, Physical Chemistry, 7th Ed., Oxford University press, 2002.

Mapping of Cos with POs &PSOs:

PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	S	M	S	M	M	S	M	M	S	M	S
CO2	S	S	M	S	M	M	S	M	M	S	M	S
CO3	S	S	M	S	M	M	S	M	M	S	M	S
CO4	S	S	M	S	M	M	S	M	M	S	M	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N)

Course Code	P21CHT34	ENVIRONMENTAL CHEMISTRY	L	T	P	C
CORE - XIV			5	-	-	4

Objectives:

1.To provide an overview of water, air, soil, radioactiveand noise pollution
2.To insist the need for protecting environment and prevent pollution
3. To impart knowledge on the analysis of pollution
4.To provide knowledge on prevention of pollution and its control measures.

Corse outcomes:

At the end of the course, students will be able to:

1. explain the cause, consequence and cure of various types pollution-K1
2. identify the effect of metals and metallic compounds on human health-K4
3. assess the implication of climate change-K5
4. analyze and suggest methods to control air and water pollution-K4, K6

Unit I - Water Pollution

Types of Water Pollution- ground water and surface water pollution - Sources and harmful effects-sources and effects of major water pollutants-Inorganic pollutants and toxic metals-Oxygen demanding wastes-Organic pollutants-Plant nutrients-detergents-suspended matter-radioactive wastes-Sediments-Thermal pollutants –oilspills– examples

Unit II - Air Pollution

Atmosphere structure-functions and photochemical reactions-sources of air pollution-Natural and manmade-classification and effects of air pollutants -oxides of carbon nitrogen and sulphurhydrocarbon as pollutant- reactions of hydrocarbons and effects - particulate pollutants sources and effects of organic and Inorganic particulates - Greenhouse effect-impact on global climate-control measures-role of CFC's -ozone holes-effects of ozone depletion-smog componentsof photochemical smog-effects of photochemical smog.

Unit III- Soil pollution

Pesticides, classification and mode of action -toxic effects of chlorinated hydrocarbons, organophosphorous compounds and carbamates - alternatives to chemical pesticides-(pheromones, Juvenile harmones, chemo sterilization)
Soil pollutants-sources and effects of industrial wastes-urban wastes-radioactive pollutants-agricultural wastes-solid waste management in cities, soil pollution control measures.

Unit IV - Metal Toxicology and Nuclear Pollution

Effects of metals and metallic compounds toxicology and health risks of iron, arsenic, cadmium, chromium, lead, mercury and nickel.

Nuclear pollution-sources-effects of ionizing and non-ionizing radiation - genetic and somatic effects-effects of Cesium-137, Krypton-85 Iodine-131 and Strontium-90 - storage of nuclear wastes-disposal of nuclear wastes-nuclear disasters and their management-some major nuclear accidents.

Unit V - Analysis and Control

Sampling of polluted water - preservation-main quality characteristics of wateralkalinity, hardness, total solids- TDS - DO, BOD, COD, TOC, fluoride and chloride. Defluoridation techniques-Iron removal-sampling of gaseous pollutants and particulates–adsorption - absorption - scrubbing – cold trapping – filtration - cyclone separator – gravity settling - electrostatic precipitators - thermal precipitators - analysis of CO by gas chromatography, NO by chemiluminescence and SO_2 by spectrophotometer.

References

1. A.K. De Environmental Chemistry, A.K. De, New Age InternationalPublishers 9th Edition, 2018.
2.B.K. Sharma Environmental Chemistry, Goel Publishers, 2001.
3.Environmental Chemistry, M.S. Sethi, Sri SaiPrintographers, 1994.
4.Text book of Environmental Chemistry, C.D. Tyagi and M.Mehra, Anmol Publishers, 1996.
5.Fundamentals of Environmental Pollution, K. Kannan, S. Chand & Co., 1997.
6.AsimK.Das, Environmental Chemistry with Green Chemistry, Books & Allied (P) Ltd, Kolkata, 2012.

Mapping of Cos with POs &PSOs:

PO/ PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO2	S	M	M	M	M	S	S	M	S	S	S	S
CO3	S	M	M	M	M	S	S	M	S	S	S	S
CO4	S	M	M	M	M	S	S	M	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21CHT35	CHEMISTRY OF NATURAL PRODUCTS AND BIOINORGANIC CHEMISTRY	L	T	P	C
CORE -XV			5	-	-	4

Objectives

1. To enable the students to understand the structure of organic natural products.
2. To provide knowledge of the structures of metalloproteins and metalloenzymes.
3. To familiarize the importance of natural product and bio-inorganic compounds.
4. To enable the students to know and appreciate the importance of chemistry of nature.

Course Outcomes

On learning the course, the students will be able to

1. understand and illustrate the structure of organic natural products -K2, K5
2. illustrate the structures of metalloproteins and metalloenzymes-K5
3. appreciate the importance of natural products and bio-inorganic compounds-K5
4. know and appreciate the importance of chemistry of nature-K1, K5

Unit I - Proteins, peptides, Nucleic acid, Fats and Lipids

Structure and properties of amino acids and proteins, Zwitterions and purification of proteins

Nucleic acids – nucleotides and nucleosides – structure of purine and pyrimidine bases; Phosphodiester bond, double helical structure of DNA. Structure of RNA (tRNA)

Fatty acids - structure and classification, lipids classification and function (Simple, compound and derived lipids)

Unit II - Terpenoids

Classification of terpenoids with examples – isoprene rules – General methods of structural determination of terpenes – structure and synthesis of alpha-pinene, cadinene, zingeberene and abietic acid

UnitIII -Alkaloids

General methods of structure analysis of alkaloids – Hoffmann, Emde and von Braun degradations – Structure and synthesis of quinine, papavarine, atropine, narcotine, reserpine and lysergic acid.

UnitIV– Steroids

Types of steroids – structure, stereochemistry and synthesis of cholesterol – Structural features of bile acids – Sex harmones – androsterone, testerosterone, estrone, estriol, estradiol, progesterone - Structure of ergosterol.

Circular birefringence, optical rotary dispersion, circular dichroism – Cotton effect curves – octant rule – axial haloketone rule - Applications of chiroptical properties in configurational assignments.

Unit V - Bioinorganic Chemistry

Metal ions in biological systems: heme proteins, hemoglobin, myoglobin, hemerythrin, hemocyanin, ferritin, transferrin, cytochromes and vitamin B12; Iron-sulphur proteins: rubredoxin, ferredoxin and model systems. Classification of copper proteins and examples - Electron transfer (Cu, Zn) – Blue copper proteins

Metalloenzymes: active sites, carboxy peptidase, carbonic anhydrase, superoxide dimutase, xanthine oxidase, peroxidase and catalase; photosynthesis, water oxidation, nitrogen fixation, nitrogenase; ion pump, metallodrugs.

Reference Books

1. I.L. Finar, Organic Chemistry, Vol.II, ELBS 1985
2. S.J. Lippard, J.M. Berg, Principles of Bioinorganic Chemistry, Panima Publishing Company, 1977.
3. Gurdeep R Chatwal,Organic Chemistry Of Natural Products, Volume I , Himalaya Publishing House, 2009
4. L. Stryer, Biochemistry, 4th Ed., W. L. Freeman and Co, New York, 1995.
5. D. L. Nelson, M. M. Cox, Lehninger Principles of Biochemistry, 5th Ed.

Mapping of Cos with POs &PSOs:

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
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CO2	S	M	M	M	M	S	S	M	M	S	M	S
CO3	S	M	M	M	M	S	S	M	M	S	M	S
CO4	S	M	M	M	M	S	S	M	M	S	M	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21CHP33	PHYSICAL CHEMISTRY PRACTICALS	L	T	P	C
CORE - XVI			-	-	6	4

Objectives:

1. To develop skill in carrying out kinetics experiments
2. To develop skill in carrying out experiments related to distribution law and study phase diagrams.
3. To impart skill in analysis through conductometry.
4. To develop skill analysis through potentiometry

Course Outcomes

On learning the course, the students will be able to

- explain the principle behind the experiments-K1
- plan and perform experiments-K5
- interpret experimental results-K5
- perform estimation through conductometry and potentiometry-K5

<u>Any 14 experiments out of the following experiments (to be decided by the course teacher):</u>

1. Kinetics – Acid Hydrolysis of Ester – Comparison of strength of acids.
2. Kinetics – Acid Hydrolysis of Ester – Determination of Energy of Activation (E_a).
3. Kinetics – Saponification of Ester – Determination of E_a by conductometry.
4. Kinetics – Persulphate – Iodide Reaction – Determination of order, effect of Ionic strength on rate constant.
5. Adsorption – oxalic Acid\Acetic Acid on charcoal using Freundlich isotherm.
6. Conductometry – Acid – alkali titrations.
7. Conductometry – precipitation titrations.
8. Conductometry - Displacement titrations.
9. Conductometry – Determination of dissociation constant of weak acids.
10. Conductometry – Solubility product of sparingly soluble silver salts.
11. Verification of Onsager equation – conductivity method.
12. Determination of degree of hydrolysis and hydrolysis constant of a substance.
13. Potentiometric titrations – Acid alkali titrations.
14. Potentiometric titrations – Precipitation titration.
15. Potentiometric titrations – Redox Titrations.
16. Potentiometry – Determination of dissociation constant of week acids.
17. Potentiometry- Determination of solubility product and pKa

Reference Books

1. B.P. Levitt, Ed., Findlay`s practical Physical Chemistry, 9th Ed., Longman, 1985.
2. J.N. Gurtu, R. Kapoor, Advanced Experimental Chemistry, Vol.I, S.Chand& Co., 1987.
3. B. Viswanathan and P. S. Raghavan, Practical Physical Chemistry, Viva Books,2009.

Mapping of Cos with POs &PSOs:

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CO2	S	S	S	S	M	M	S	S	S	S	S	S
CO3	S	S	S	S	M	M	S	S	S	S	S	S
CO4	S	S	S	S	M	M	S	S	S	S	S	S

Strongly Correlating(S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER - IV

Course Code	P21CHE411	GREEN CHEMISTRY	L	T	P	C
ELECTIVE-I			5	-	-	4

Objectives

1.To enable the students to learn the principles and concepts of Green Chemistry
2. To familiarize the concept of green catalysis
3. To equip the students with knowledge about, environmentally benign greener synthesis and greener methods for isolation of bioactive compounds
4. To create a responsibility and awareness about chemicals and solvents used in thepredation and synthesis

Course Outcome:

On learning the course, the students will be able to
1. gainpreliminary knowledge and exposure about greener context in chemistry -K1
2. understand the role of catalysts in greener organic transformation-K2
3. gain knowledge about the designing greener organic synthesis-K3
4. gain knowledge on instrumentation, principle and application of conventional and greener techniques used in extraction and separation of phytoconstituents-K1

Unit I - Introduction to Green Chemistry

Definition, origin, history, needs, goals, twelve principles of green chemistry planning a green synthesis in a chemical laboratory – evaluating the type of reaction involved – rearrangement, addition, substitution, elimination and pericyclic reactions.
Selection of appropriate solvent – aqueous phase reaction – reactions in ionic liquids –organic synthesis in solid state – solid supported organic synthesis – selection ofstarting materials – use of protecting group – use of catalyst – use of microwaves and sonication.

UnitII - Designing of Green Synthesis

Green synthesis, designing, choice of starting materials, choice of reagents, choice of catalysts, bio catalysts, polymer supported catalysts, choice of solvents, synthesis involving basic principles of green chemistry.

Unit III - Phase-Transfer Catalyst Reactions

Phase-transfer catalyst reactions – Heck reaction – Michael addition reaction –oxidation of toluene to benzoic acid – Reimer-Tiemann reaction – Baker-Venkataramansynthesis – Williamson ether synthesis – Dozen reaction.

Unit IV - Sonication Reactions

Sonication reactions – Barbier reaction – Reformatsky reaction – Simmons-Smith reaction – Strecker synthesis – Ullmann coupling reaction – Wurtz reaction –Bouveault reaction. examples synthesis of adipic acid, methylmethacrylate, paracetamol ultrasound assisted reactions, esterification, reduction, coupling reactions.

Unit V - Extraction of Bioactive Compounds by Green Approaches

Instrumentation, principle and application of conventional and green techniques used in extraction and separation of phytoconstituents: hydro extraction, wet steam and dry extraction, head space extraction, super critical fluid extraction, pressurized liquid extraction, Microwave assisted methods, Ultrasonication assisted extraction and simulated moving bed technology.

References

1. V. K. Ahluwalia, Green Chemistry; 2nd Ed., Ane Books Pvt Ltd., New Delhi, 2016.
2. P. T. Anastas and J. C. Warner, Green chemistry Theory and Practice; Oxford University Press, New York, 2005
3. V. K. Ahluwalia and K. Agarwal, Organic Synthesis, Special Techniques; 2nd Ed.,2006.
4. R. A,Sheldon, I.Arends, UIF, Hanefeld.Green Chemistry and Catalysis (Wiley –VCH) 2007.

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CO2	S	S	M	S	M	M	S	S	S	S	M	S
CO3	S	S	M	S	M	M	S	S	S	S	M	S
CO4	S	S	M	S	M	M	S	S	S	S	M	S

Strongly correlating :S Moderately Correlating : M
Weakly correlating :W No correlation :N

Course Code	P21CHE412	CHEMISTRY IN EVERYDAY LIFE	L	T	P	C
ELECTIVE - II			5	-	-	4

Objectives

1.To provide knowledge and understanding on Dairy Chemistry
2. Toprovide information on the various chemicals in food, nutrition and food adulteration
3.To inculcate the basic knowledge of minerals, cosmetics and cleansing agents.
4.To learn about the basic chemicals, petrochemicals, polymers, dyes, paints and building materials

Course Outcomes

On learning the course, the students will be able to

1. appreciate the central role of chemistry in our society -K5
2. comprehend the role of chemicals in Food & Nutrition-K2
3.illustratethe role of chemistry in food production-K5
4. understand and explain the role of chemistry in petrochemical, polymer, and cosmetic Industry-K1

Unit I- Dairy chemistry

General composition of milk – constituents of milk lipids, proteins, carbohydrates, vitamins and minerals. Physical properties of milk – colour, odour, acidity, specific gravity, viscosity and conductivity. Factors affecting the composition of milk – pasteurization, homogenization, toning, standardization, reconstitution of milk - adulteration of milk.

Unit II - Chemicals in food:

1. Table salt, sugar, baking powder, baking soda, Preservatives, artificial sweetening agents -common examples
2. Nutrition: Carbohydrates, Proteins, Fats, Minerals and Vitamins –definitions, sources and their physiological importance -balanced diet
3. Food Adulteration:
Adulterants in milk, ghee, oil, coffee, tea, asafetida, chili powder, pulses and turmeric powder -identification. Colorchemicals used in food - soft drinks and its healthhazards

Unit III - Mineral metabolism:
Calcium – source, daily requirement, blood calcium,hypocalcemia, phosphorus – functions of phosphate, requirement, source, normal serum level, functions.
Sodium – normal level of sodium, excretion of sodium, restriction of sodium in diet, hypernatremia.

Cosmetics:

Talcum Powder, Tooth pastes, Shampoos, Nail Polish, , Perfumes -General formulations –possible hazards of cosmetics use

Cleansing agents:

Soaps and detergents, cleansing action, bleaching and stain removal

Unit IV- Chemistry and Industry-I

1. Chemicals in food production:

Fertilizers such as urea, NPK and Super phosphates -uses and hazards Pesticides –definition and examples Fertilizers from natural sources

2. Petrochemicals:

Generations and composition of petrochemicals, Rocket propellants

3. Polymers and Plastics:

Polythene, polyester, PVC, bakelite, resins; Teflon and nylon -their applications Biodegradable polymers and Biopolymers

Unit V - Chemistry and Industry-II

1. Dyes, Paints and Pigments:

Composition, Classification and Applications; Process of dying.

2 Building Materials:

Cement and its manufacture, Mortar, Concrete and R.C.CManufacture of glass, Ceramics

3. Rubber:Natural Rubber-Synthetic rubbers-Vulcanization-definition and its applications.

References

1.Carl H Snyder, The Extraordinary Chemistry of Everyday Things, 4th edition,2003
2.Alfred Vivian,EverydayChemistry,HardpressPublishing,2012
3. John Emsley Chemistry at Home: Exploring the Ingredients in Everyday Products,Royal Society of Chemistry; Illustrated edition, 2015
4.Kirpal Singh, Chemistry in Daily Life: PHI, 3rd Ed., 2010
5. Peter Varelis , Laurence Melton , FereidoonShahidi, Encyclopedia of Food Chemistry ,Elsevier 2019

Mapping of Cos with POs &PSOs:

PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	S	S	S	S	M	S	M	S	S	M	S
CO2	S	S	S	S	S	M	S	M	S	S	M	S
CO3	S	S	S	S	S	M	S	M	S	S	M	S
CO4	S	S	S	S	S	M	S	M	S	S	M	S

Strongly correlating :S Moderately Correlating : M
Weakly correlating :W No correlation :N

Course Code	P21CHE421	INDUSTRIAL CHEMISTRY	L	T	P	C
ELECTIVE-1II			5	-	-	4

Objectives

1. To enable students to gain knowledge on various industrial wastes& their treatment.
2.To enable studentsunderstandthe chemistry behind petroleum and petrochemicals.
3. To make students aware of the chemistry involved and the different industrial processes involved increment industry &paperindustry
4.To make the students understand the processes involved in the production of soaps, detergents and perfumes.

Course Outcomes

At the end of the course, the students will be able to

1.understand the hazards of various industrial wastes and the ways to treat them-K2
2.comprehend and apply the chemistry behind petroleum and petrochemicals-K3
3.explain the constituents, properties and production of cement-K4
4.explain the involved in the production of soaps, detergents and perfumes-K1

Comment [SJK1]:

Unit I - Basic Ideas and Industrial Wastes

Basics idea about Unit operation – flow chart – chemical conversion – batchversuscontinuous processing – chemical process selection – design – chemicalprocess control.
Types of industrial wastes – treatment of wastes or effluent with organicimpurities – treatment of wastes or effluent with inorganic impurities –treatment of some important chemical wastes.

Unit II - Petroleum and Petrochemicals

Introduction – saturated hydrocarbons from natural gas – uses of saturatedhydrocarbons – unsaturated hydrocarbons – acetylene, ethylene, propylene,butylene – aromatic hydrocarbons – toluene and xylene.Preparation of rectified spirit from beat – methylated spirit – preparation ofabsolute alcohol from rectified spirit – petrochemicals in India.

Unit III- Manufacture of Cement

Introduction – types of cement – high alumina cement, water proof cement, slag cement, acid resisting cement, white cement, coloured cement, Pozzolanacement.Setting of cement – properties of cement – testing of cement – uses of cement –concrete – cement industries in India.

Unit IV - Pulp and Paper and Manufacture of Paper

Introduction – manufacture of pulp – types of pulp – sulphate or craft pulp,soda pulp, Rag pulp – beating, refining, filling, sizing and colouring.Calendaring – uses – paper industries in India.

Unit V- Soaps, Detergents and Perfumes

Introduction – types of soaps – hard and soft soaps – manufacture of soap (hotand continuous process only) – cleansing action of soap – detergents – surfaceactive agents – biodegradability of surfactants, amphoteric detergents.Introduction – production of natural perfumes – flower perfumes – jasmine,rose and lily – production of synthetic perfumes – muscone and nitro-musks.

References

1. Mark Anthony Benvenuto, Industrial Chemistry, Walter de Gruyter, 2013
2. B.K. Sharma, Industrial Chemistry,KrishanPrakashan; 17th Ed., 2014
3. John A. Tyrell, Fundamentals of Industrial Chemistry: Pharmaceuticals, Polymers, and Business, Wiley, 2014
4. M. Ali, Bassam El Ali, Handbook of Industrial Chemistry, McGraw-Hill Education; 1st Ed., 2005
5. J. A. Kent, Riegel's Handbook of Industrial Chemistry, CBS Publishers & Distributors, 1997

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CO2	S	S	S	S	S	M	S	M	S	S	S	S
CO3	S	S	S	S	S	M	S	M	S	S	S	S
CO4	S	S	S	S	S	M	S	M	S	S	S	S

Strongly correlating :S Moderately Correlating : M
Weakly correlating :W No correlation :N

Course Code	P21CHE422	CHEMISTRY OF NANOSCIENCE AND TECHNOLOGY & SUPRAMOLECULAR CHEMISTRY	L	T	P	C
ELECTIVE-1V			5	-	-	4

Objectives:

1.To enable students to understand and appreciate the importance of nanomaterials
2. To impart knowledge on synthetic methods & characterization of nanomaterials.
3. To enable students gain understanding on carbon-basednanomaterials&nano devices
4. To introduce the concept of supramolecular chemistry

Course outcomes

At the end of the course, the students will be able to

1.appreciate the the influence of dimensionality of the object at nanoscale on their Properties -K5
2. apply basic synthetic methods of nanomaterials-K3
3. appreciate enhanced sensitivity of nanomaterial-based sensors and their novel applications in industry-K5
4. appreciate the importance of supramolecular chemistry-K5

Unit I - Basics of Nanoscience and Nanotechnology

Definition of Nano dimensional materials, Classification of Nanomaterials – Significance of surface to volume ratio, Size effects - unique properties due to Nano size, quantum dots Importance of Nanomaterials - - Simple examples of unique properties of nanosized materials

Elementary aspects of bio-nanotechnology - Some important recent discoveries in nanoscience and technology, Applications of Nanomaterials

Unit II- Synthesis of Nanomaterials

Introduction – top-down vs bottom-up technique – Lithographic process and its limitations – Non-lithographic techniques : Sputtering, Chemical Vapour Deposition, Pulsed Laser Deposition, Sol-Gel technique-nucleation and growth processes, Electrodeposition, Scanning Probe Microscopy – hydrothermal synthesis,solvothermal synthesis – microwave irradiation–precipitation technologies– reverse micelle synthesis – polymer-mediated synthesis –protein microtubule-mediated synthesis – synthesis of nanomaterials usingmicroorganisms and other biological agents – sonochemical synthesis – hydrodynamiccavitation.Biosynthesis of Nanomaterials. Inorganic nanomaterials – typical examples – nano TiO2/ZnO/CdO/CdS

Unit III - Carbon-based Nanomaterials and Bio-nanomaterials

Carbon: Bonding in Carbon compounds, Discovery of Cubane, Fullerenes: synthesis, chemical reactions and properties, superconductivity in C60 - larger and smaller fullerenes

Carbon Nanotubes: Structure of Single-Walled Carbon nanotubes, physical properties of Single-Walled Carbon nanotubes, synthesis of Carbon nanotubes, growth mechanisms, chemical modification of Carbon nanotubes

Unit IV- Characterization of Nanoscale Materials& Nanodevices

Principles of Atomic Force Microscopy (AFM) – Transmission Electron Microscopy(TEM)Resolution and Scanning Electron Microscopy (SEM)

Nanodevices

DNA as a nanomaterial – DNA – knots and junctions, DNA – nanomechanical devicedesigned by Seeman.

Force measurements in simple protein molecules and polymerase – DNA complexes– molecular recognition and DNA based sensor.

Unit V - Supramolecular Chemistry

Introduction to Supramolecular Chemistry – definitions – concepts – molecular forces - covalent bonding, ion – ion, ion – dipole, dipole – dipole, hydrogen bonding, cation – π, π-π interactions, van der Waals forces, hydrophobic and solvent effects – Common motifs in Supramolecular Chemistry – Host/Guest Chemistry, cation, anion and neutral molecule binding. Molecular receptors and design principles. Principles of molecular association and organization – SAMs, micelles, vesicles and cell membrane –Molecular channels and transport processes - Supramolecular reactivity and catalysis- Molecular devices and Nanotechnology

References

1. C. N. R. Rao, A. Muller and A. K. Cheetham (Eds), The Chemistry ofNanomaterials: Vol. 1 and 2; Wiley-VCH;Germany, Weinheim, 2004.
2. T. Pradeep, Nano: The Essentials in Understanding Nanoscience andNanotechnology; Tata McGraw Hill, New York, 2007.
3. H. Fujita (Ed.), Micromachines as Tools in Nanotechnology; Springer-Verlag,Berlin, 2003.
4. T. Tang and P. Sheng (Eds), Nanoscience and Technology, Novel Structures andPhenomena; Taylor andFrancis, New York, 2003.
5. A.Nabok, Organic and Inorganic Nanostructures; Artech House, Boston, 2005.
6. E. A. Rietman, Molecular Engineering of Nanosystems; Springer-Verlag, New York,2001.
7. Core Concepts in Supramolecular Chemistry and Nanochemistryby Jonathan W. Steed, David R. Turner, and KarlWallaceWiley, 2007.
8. Supramolecular Chemistry (Oxford Chemistry Primers, 74) by Paul D. Beer, Philip A. Gale, and David K. Smith, Oxford Science Publications,1999.

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CO3	S	S	S	S	S	S	S	M	S	S	M	S
CO4	S	S	S	S	S	S	S	M	S	S	M	S

Strongly correlating :S Moderately Correlating : M
Weakly correlating :W No correlation :N

Course Code	P21CHR41	PROJECT	L	T	P	C
Project Work			5	-	-	4

Objectives

1.To impart skills in synthesizing new compounds
2.To enable students to learn and apply characterization techniques including Spectroscopy
3.To familiarize various sources of literature survey
4.To provide knowledge on scientific writing and enable students to present their findings as dissertation

On learning the course, the students will be able to

Course Outcomes

1. analyze the existing problems for which research can provide solutions and Select the problem for research-K4
2. know the various chemical publishers, journals and perform literature survey-K1
3. synthesize new chemical compounds through various methods-K6
4. characterize the compounds using various analytical and spectroscopical studies-K5

Mapping of Cos with POs &PSOs:

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CO3	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S

S trongl y correl ating :S Mode rately Correlating : M
Weakly correlating :W No correlation :N

Course Code	P21CHV11	INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS	L	T	P	C
VALUE ADDED PROGRAMMES			5	-	-	4

Objectives:

1. To develop knowledge in instrumental methods of chemical analysis,
2. To understand the principles of various separation techniques and learn to apply them
3. To understand basic principles and instrumentation spectrochemical, electrochemical, polarimetric, thermal and radiometric techniques
4. To learn to record UV- Visible, FT-IR spectra and Powder X-ray diffraction pattern

Corse Outcomes:
At the end of the course, students will be able to:

1. describe and adopt suitable separation techniques □
2. identify and assess quantitatively using various spectrochemical and electrochemical methods and what technique should be used for the analysis to solve a particular problem □
3. predict the physical and chemical principles upon which the analytical measurement is based.

Unit I - Separation Techniques

Solvent extraction-ion-exchange method-principle of chromatography-column, thin layer, liquid and gas chromatography- columns, adsorbents, methods, Rf values, McReynold's constants and their uses – HPTLC, HPLC techniques –adsorbents, columns, detection methods, estimations, preparative column –GC-MS techniques – methods, principles and uses.

UnitII - Spectrochemical Techniques –I

UV-Visible Spectroscopy Principle, instrumentation and simple applications- interpretation (quantification, mixtures, absorption vs. fluorescence and the use of time, photoacoustic, fluorescent tags), recording the spectrum**IR spectroscopy -** Principle – Hooke's law – factors affecting vibrational frequencies – characteristic group frequencies – Finger print region., instrumentation and simple applications, recording the spectrum

Unit III - Spectrochemical Techniques –II

Mass spectroscopy: Mass spectrometry – basic principles – molecular ion peak, parent peak, fragments, metastable peak, isotope peaks – determination of molecular weight and molecular fragment – fragment pattern of simple organic molecules – Mclafforty rearrangement – Retero Diels Alder reaction**,** instrumentation**^{1}H NMR spectroscopy** – origin of NMR spectra – chemical shift – number of signals – peak areas – multiplicity – geminal, vicinal and long range couplings – factors affecting chemical shifts and coupling constants, **^{13}C NMR spectroscopy**: Broadband and Off resonance decoupling, comparison of ^{1}H and ^{13}C NMR – factors affecting intensity of signals – chemical shifts - γ - gauche effect **2D Techniques**: ^{1}H-^{1}H COSY ,^{1}H-^{13}C COSY.

Unit IV - Electroanalytical Techniques

Amperometry-Principles and applications, amperometric titration with examples-Basic principles of electrogravimetry

Cyclic Voltammetry**:** Principles and simple analytical applications – Interpretation of cyclic voltammogram.

Unit V - Basics of Crystallography and X-ray diffraction

The periodic table of the elements and interatomic bonds , crystal structure -Lattices and symmetries -Reciprocal lattice- Crystal symmetry- Point groups Plane groups and space group - Screw Axis and Glide planes ; Diffraction of light – principles X-ray diffraction: geometry; About crystal structures and diffraction patterns, Practical aspects of X-ray diffraction, Powder X-ray diffraction, Principles and application, Interpretation and data collection.

References

1. Instrumental methods of chemical analysis, G. Chatwal and S. Anand, Himalaya Publishing House, New Delhi, 1999.
2. H.W. Willard, L.I. Merrit, J.A. Dean and P.A. Settle, Instrumental Methods of Analysis, CBS Publishers, 7th Edn., 1996.

Course Code	P21CHV42	WATER TREATMENT	L	T	P	C
VALUE ADDED PROGRAMMES			5	-	-	4

Objectives

1. To give an in-depth understanding of water quality parameters, ground water and surface water pollution and its control measures.
2. Toprovideknowledge on water treatment methods, sewage and industrial effluent treatment methods and water resources management.
3. To provide understanding of the various water the pollutants and their effect on environment and on human health
4. To provide understanding of water treatment methods for domestic and industrial purposes

Course Outcomes:

At the end of the course, students will be able to

1. understand and protect different sources of water
2. identify water pollutants and their effect on environment and human health
3. describe the analytical methods to determine water quality parameter
4. propose water treatment methods for domestic and industrial purpose

Unit I - Water Sources

Sources of water supply: Rain: hydrological cycle, acid rain, artificial rain, rain water harvesting. Surface water: impounding reservoir, river and tanks – their characteristics and impurities. Ground water; wells and springs. Water borne diseases/substances affecting the portability of water.

Unit II - Impurities in water

Effects of impurities in natural waters: colour taste and odour, turbidity and sediment and microorganism. Dissolved mineral matter – hardness types – estimation (EDTA method) – methods of softening – boiling, addition of lime – addition of sodium carbonate – ion exchange method.

UnitIII - Disinfection of Water

Clarification of water: sedimentation and filtration. Coagulation of water electrochemical coagulation – flocculants – sterilization and disinfection of water: chemical methods and physical methods.

UnitIV - Demineralization & Water Treatment

Demineralization of water – ion exchange process – desalination of sea water: electrodialysis method, reverse osmosis methods.

Water analysis: physical examination – chemical examination bacteriological examination – BOD, COD.

Unit V- Analysis and Control

Sampling of polluted water - preservation-main quality characteristics of wateralkalinity, hardness, total solids- TDS - DO, BOD, COD, TOC, fluoride and chloride. Defluoridation techniques-Iron removal-sampling of gaseous pollutants and particulates–adsorption - absorption - scrubbing – cold trapping – filtration - cyclone separator – gravity settling - electrostatic precipitators - thermal precipitators - analysis of CO by gas chromatography, NO by chemiluminescence and SO_2 by spectrophotometer

Reference Books

1.Environmental Chemistry by B.K. Sharma and H. Kaur, Goel Publishing House.1996.
2.Environmental Chemistry, A. K. De, 5th Edn., New Age International Publisher, 2005.
3.Environmental Chemistry, B. K. Sharma, 11th Edn., Krishna Prakashan media Limited,2007
4.Chemical and Biological Methods for Water Pollution Studies, R.K. Trivedy and P.K.Goel, Environmental Publications, 1986.
5. Engineering Chemistry, P.C. Jain and Monica Jain, DhanpatRai and Sons, 1993.

Course Code	P21CHN211	EVERYDAY CHEMISTRY	L	T	P	C
NON-MAJOR ELECTIVE			5	-	-	4

Objectives

1.To enable students understand and appreciate the chemistry behind DairyIndustry
2. To provide knowledge on the various chemicals in food and food adulteration
3. To inculcate the basic knowledge of minerals, cosmetics and cleansing agents.
4. To enable students gain basic knowledge on petrochemicals, polymers, dyes, paints and building materials

Course Outcomes

On learning the course, the students will be able to
1.appreciate the central role of chemistry in our society
2. comprehendthe role of chemicals in Food & Nutrition
3.realize the role of chemistry in food production.
4.understand andexplain the role ofchemistry in petrochemical, polymer and cosmetic Industry

Unit I- Dairy Chemistry

General composition of milk – constituents of milk lipids, proteins, carbohydrates, vitamins and minerals. Physical properties of milk – color, odour, acidity, specific gravity, viscosity and conductivity. Factors affecting the composition of milk – pasteurization, homogenization, toning, standardization, reconstitution of milk - adulteration of milk.

Unit II- Chemicals in food:

Table salt, sugar, baking powder, baking soda, Preservatives, artificial sweetening agents - common examplesNutrition: Carbohydrates, Proteins, Fats, Minerals and Vitamins –definitions, sources and their physiological importance -balanced diet
Food Adulteration: Adulterants in milk, ghee, oil, coffee, tea, asafoetida, chili powder, pulses and turmeric powder -identification. Colourchemicals used in food - soft drinks and its health hazards.

Unit III- Mineral metabolism:
Calcium – source, daily requirement, blood calcium, hypocalcemia, phosphorus – functions of phosphate, requirement, source, normal serum level, functions.
Sodium – normal level of sodium, excretion of sodium, restriction of sodium in diet, hypernatremia.

Cosmetics:

Talcum Powder, Tooth pastes, Shampoos, Nail Polish, Perfumes -General formulations –possible hazards of cosmetics useCleansing agents:Soaps and detergents, cleansing action, bleaching and stain removal

Unit IV - Chemistry and Industry-I

Chemicals in food production: Fertilizers such as urea, NPK and Super phosphates -uses and hazards Pesticides –definition and examples Fertilizers from natural sources
Petrochemicals: Generations and composition of petrochemicals, Rocket propellants
Polymers and Plastics: Polythene, polyester, PVC, bakelite, resins; Teflon and nylon -their applications Biodegradable polymers and Biopolymers

Unit V- Chemistry and Industry-II

Dyes, Paints and Pigments: Composition, Classification and Applications; Process of dying. Building Materials: Cement and its manufacture, Mortar, Concrete and R.C.C Manufacture of glass, Ceramics Rubber: Natural Rubber-Synthetic rubbers-Vulcanization -definition and its applications

Reference books

1. Carl H Snyder, The Extraordinary Chemistry of Everyday Things, 4th edition 2003
2. Alfred Vivian,Everyday Chemistry,Hardpress Publishing,2012
3. John Emsley Chemistry at Home: Exploring the Ingredients in Everyday Products, Royal Society of Chemistry; Illustrated edition, 2015
4. Kirpal Singh, Chemistry in Daily Life: PHI, 3rd Ed., 2010
5. H-D. Belitz Werner Grosch Peter SchieberleFood Chemistry, Springer; 4th revised and extended Ed., 2009

PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	S	S	S	S	M	S	S	S	S	M	S
CO2	S	S	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	M	S	S	S	S	M	S
CO4	S	S	S	S	S	M	S	S	S	S	M	S

Mapping of Cos with POs &PSOs:

Strongly correlating :S Moderately Correlating : M
Weakly correlating :W No correlation :N

Course Code	P21CHN212	AGRICULTURAL CHEMISTRY	L	T	P	C
NON-MAJOR ELECTIVE			5	-	-	4

Objectives:

1.To enable students understand the chemical composition of soil
2.To provide knowledge on the chemistry behind fertilizers
3.To enable students know and understand the chemistry behind pesticides
4. To enable students analyze and find a suitable method to promote agriculture.

Course Outcomes:

At the completion of the course the students will

1.have Acquired knowledge on the chemical composition of soil
2.be able to understand the chemistry behind fertilizers and pesticides
3.be able to appreciate the chemistry behind agricultural methods
4.be able to find and suggest suitable methods to promote agriculture.

Unit I - Soil Chemistry

Soil analysis. composition of soil: organic and inorganic constituents. Soil acidity : buffering capacity of soils. Absorption of cations and anions: availability of soil nutrients to plants

Unit II – Fertilizers

Difference between fertilizer and manure – Superiority of manure over fertilizers, Peat and organic manures (composts). Role of humus. Effluent form gobar gas plants. Use of fertilizers: urea, DAP, Super phosphate, Gypsum, NPK-mixed fertilizers, Optimal addition of fertilizers to obtain estimated yields.

Unit III - Pesticides,Fungicides, Herbicides And Weedicides

Pesticides: Classification on the basis of mode of action, types of pests and Chemical nature with examples – safety measures while using pesticides. 2.4 Fungicides, Herbicides, Acaricides, Rodenticides, Repellants, Fumigants, Defoliants (Definitions and Examples).

Unit IV- Plant Growth Regulators

3-Indole acetic acid,naphthalene acetic acid, Ethepon (2-chloroethyl phosphoric acid): Alar (succinin acid-2, 2-dimethyhydrzine :) their function. Plant hormones: Gibberlin, Cyclocel, Phosphon, dwarfing compound (CCC: 2-Chlorethyltrimethyl ammonium chloride). Defoliants

Unit V- Insecticides

Basic and newer formulations of insecticides, contact insecticides, fumigants, manufacture and uses of insecticides. DDT, BHC, pyrethrin mention of aldrin, dieldrin, endrin and pentachlorophenol Handling hazards of insecticides – Symptoms of poisoning, first aid and antidotes

Reference books

1. Joseph Scudder Chamberlain Organic Agricultural Chemistry (the Chemistry of Plants and Animals); A Textbook of General Agricultural Chemistry or Elementary Bio-Chemistry for Use in Colleges, AndesitePress, 2015
2. H. ParameshwarHegde, Textbook of Agro-Chemistry, Discovery Publishing Pvt.Ltd, 2009
3. G.T. Austin: Shreve's Chemical Process Industries, 5th edition, Mc-Graw-Hill, 1984
4. B.A. Yagodin (Ed). Agricultural Chemistry, 2 Volumes, Mir Publishers (Moscow), 1976

Mapping of Cos with POs &PSOs:

PO/ PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	S	S	S	S	S	M	S	S	S	S	M	S
CO2	S	S	S	S	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	M	S	S	S	S	M	S
CO4	S	S	S	S	S	M	S	S	S	S	M	S

Strongly correlating :S Moderately Correlating : M
Weakly correlating :W No correlation :N

Department of Zoology

MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL - 624 101
Tamil Nadu.

Curriculum Framework and Syllabus for

B.Sc. ZOOLOGY

(For the candidates to be admitted from the academic year 2021-2022 onwards)

(UNDER CHOICE BASED CREDIT SYSTEM- CBCS)

Mother Teresa Women's University, Kodaikanal
Department of Biotechnology
Choice Based Credit System (CBCS)
(2021-2022 onwards)
B.Sc. Zoology

1. About the Programme

B.Sc Zoology is a 3-year undergraduate programme which deals with the study of animals. The syllabus covers the basic understanding of Invertebrates, Chordates, Physiological process, Ecology, Developmental and Cell Biology etc. This undergraduate programme is generally, divided into six semesters. The programme incorporates core papers, electives and practicals. The delivery methods involve theoretical classes, lab work and hands-on practical training, outdoor tours etc. The students completing this programme generally go for higher education to build a career in academics, public and private sectors.

2. Programme Educational Objectives (PEOs)

PEO1	To provide quality education in a branch of Biological science i.e, Zoology and encourage the students for self employment in applied branches of Zoology
PEO2	To facilitate higher education and research in Zoology
PEO3	To take appropriate steps towards conservation of resources, endemic and endangered animal species
PEO4	To apply knowledge to solve the issues related to animal sciences and provide consultancy
PEO5	To develop the ability for the upliftment of society

3. Eligibility:

i. Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Examination, Govt. of Tamil Nadu or any other Examination accepted by the syndicate as equivalent there to with at least one of the following subject Biology/Zoology

ii. Candidate should have secured atleast 55% in the above subject and above in the aggregate.

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	**10**	**25**	**10**	**25**
External	**30**	**75**	**30**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance less than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

B.Sc- ZOOLOGY CURRICULUM

Sl. No.	Course Code	Title of the Course	Credits	Hours		Maximum Marks		
				L	P	INT	EXT	Total
I-SEMESTER								
1.	U21LTA11	Part-I-Tamil- I	3	6	-	25	75	100
2.	U21LEN11	Part-II -English –I	3	6	-	25	75	100
3.	U21ZOT11	Core- I- Invertebrata – I	4	5	-	25	75	100
4.	U21ZOP12	Core- II– Practical - Invertebrate –I	4	-	6	25	75	100
5.	U21BOA11	**Allied- I** – Botany	4	5	-	25	75	100
6.	U21EVS11	Environmental Studies	2	2	-	25	75	100
7.	U21PEPS11	Professional English –I	4	6	-	25	75	100
		Total	**24**	**36**		**-**	**-**	**700**
II- SEMESTER								
8.	U21LTA22	Part-I-Tamil- II	3	6	-	25	75	100
9.	U2LEN22	Part-II -English –II	3	6	-	25	75	100
10.	U21ZOT21	Core- III- Invertebrata II	4	5	-	25	75	100
11.	U21ZOP22	Core – IV- Practical - Invertebrata II	4	-	5	25	75	100
12.	U21BOA22	**Allied- II** –Practical- Botany	4	-	5	25	75	100
13.	U21VAE21	Value Education	3	3	-	25	75	100
14.	U21PEPS22	Professional English- II	4	6	-	25	75	100
		Total	**25**	**30**		**-**	**-**	**700**
III- SEMESTER								
15.	U21LTA33	Part I-Tamil III	3	6	-	25	75	100
16.	U21LEN33	Part-II -English III	3	6	-	25	75	100
17.	U21ZOT31	Core- V- Basics of Cell and Molecular Biology	4	5	-	25	75	100
18.	U21CHA33	**Allied III-** Chemistry	4	5	-	25	75	100
19.	U21ZOE311/ U21ZOE312	**Elective-I**-Wildlife Biology/ Animal Behaviour	3	4	-	25	75	100
20.	U21MSS31	**Skill Based Elective-I**-Managerial Skill	2	2	-	25	75	100
21.		**Non-Major Elective-I**	2	2	-	25	75	100
22.	U21PEPS33	Professional English- III	4	6	-	25	75	100
		Total	**25**	**31**	**5**	**-**	**-**	**800**
IV- SEMESTER								
23.	U21LTA44	Part-I-Tamil IV	3	6	-	25	75	100
24.	U21LEN44	Part-II -English IV	3	6	-	25	75	100
25.	U21ZOT41	Core-VI- Chordata	4	4	-	25	75	100
26.	U21ZOP42	Core-VII-Practical - Chordata	4	-	4	25	75	100

27.	U21CHA44	**Allied- IV**- Practical- Chemistry	4	-	4	25	75	100
28.	U21ZOE411/ U21ZOE412	**Elective-II**-Animal Handling & Guidelines/Insect Vectors and Disease	3	3	-	25	75	100
29.	U21CSS421	**Skill Based Elective-II**-Computer skills for Office management	2	2	-	25	75	100
30.		**Non -Major Elective II**	2	2	-	25	75	100
31.	U21PEPS44	Professional English- IV	4	6	-	25	75	100
		Total	**29**	**37**		**-**	**-**	**900**
		V- SEMESTER						
32.	U21ZOT51	Core -VIII –Fundamental of Animal physiology	4	5	-	25	75	100
33.	U21ZOT52	Core -IX– Genetics and Biostatistics	4	5	-	25	75	100
34.	U21ZOT53	Core-X- Basics Biochemistry	4	5	-	25	75	100
35.	U21ZOT54	Core-XI- Fundamental concepts of Developmental Biology	4	5	-	25	75	100
36.	U21ZOP55	Core -XII – Practical - Animal physiology, Developmental Biology, Genetics and Biostatistics, Biochemistry	4	-	5	25	75	100
37.	U21ZOE521/ U21ZOE522	**Elective-III** – Cancer Biology/ Parasitology	3	3	-	25	75	100
38.	U21ZOS531/ U21ZOS532	**Skill Based Elective-III-** Poultry Farming/ Sericulture	2	2	-	25	75	100
		Total	**25**	**30**		**-**	**-**	**700**
		VI- SEMESTER						
39.	U21ZOT61	Core XIII –Genetic Engineering and Biotechnology	4	5	-	25	75	100
40.	U21ZOT62	Core XIV – Microbiology and Immunology	4	5	-	25	75	100
41.	U21ZOT63	Core-XV- Evolution	4	5	-	25	75	100
42.	U21ZOT64	Core XVI – Environmental Biology	4	5	-	25	75	100
43.	U21ZOP65	Core-XVII – Practical - Environmental Biology, Microbiology & Immunology Genetic Engineering& Biotechnology	4	-	5	25	75	100
44.	U21ZOE641/ U21ZOE642	**Elective –IV** – Bioinformatics / Geoinformatics	3	3	-	25	75	100
45.	U21ZOE641/ U21ZOE642	**Skill Based Elective –IV** – Aquaculture/ Ornithology	2	2	-	25	75	100
46.	U21EAS61	Extension Activities (NSS/NCC/RRC/YRC/Physical Education)	3	-	-	100		100
		Total	**28**	**30**		**-**	**-**	**800**
		Grand Total	**156**	**205**				**4600**

Non Major Elective - NME

The candidates, who have joined the UG programme, can also undergo Non Major Elective offered by other Departments.

NME	Code	Title
NME I	U21ZON311/U21ZON312	Public Health and Hygiene /Ornamental fish culture
NME II	U21ZON421/ U21ZON422	Vermicomposting/Apiculture

Additional Credit Courses (Two credit courses)

1. **U21ZOO31**: Online Course – III Semester
2. **U21ZOI41**: Internship – IV Semester
3. **U21ZOV51** : Value added course – V Semester (First Aid and Safety Methods)

Programme Outcomes (POs)

On completion of B.Sc., Zoology Programme, the students will be able

PO1	to understand the broad essential information about animals especially classification, structure, development, adaptations and evolution.
PO2	to get an exposure to the advanced field like genetic engineering, biotechnology and bioinformatics and analyze the relationship between organisms and environment.
PO3	to acquire the anatomical and functional knowledge about microbes, animals and human.
PO4	to develop practical and applied knowledge of lab techniques in different spheres of zoology.
PO5	to produce intellectually sound in life science for accomplishing scientific transformation.
PO6	to involve in scientific research activities for the betterment of Society.
PO7	to analyze and apply the acquired knowledge of biological science in different fields by integrating the functional levels for progressive growth.
PO8	to mould in self employment skills in order to develop entrepreneurship for their future well being.

Programme Specific Outcomes (PSOs)

Upon completion of B.Sc., Zoology Degree Programme the graduates will be able to

PSO1	understand the Physiology, Developmental biology , Evolution of animals and their adaptive importance.
PSO2	acquire the functional knowledge about Cell, Microbial Pathology, Genetic interaction there by realizing the role of health, immunity and vaccines.
PSO3	gain knowledge about the applications in Sericulture, Aquaculture, Apiculture, Vermiculture, Poultry farming, there by imparting skills for source of income and self employment.
PSO4	expose to the Practical's in Zoology and learn to apply in day today life with statistical tools.
PSO5	develop knowledge on biological domain and make awareness in the society.

SEMESTER – I

Course Code	U21ZOT11	INVERTEBRATA – I	L	T	P	C
CORE	I		5	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning Objective	➢ To know the various forms of invertebrate animals present in the world. ➢ To distinguish various animals of invertebrates ➢ To acquire knowledge on classification, structural and functional aspects of invertebrates ➢ To learn the general rules on animal classification. ➢ To gain an overall understanding of the origin of life, diverse forms of organisms to which the taxon classified.					
Unit I	**Introduction to principles of Taxonomy:**					
Protozoa, Metazoa, Radiata, Bilateria, Acoelomata, Pseudocoelomata and coelomata. General characters and classification upto class level with Few examples. Protozoa**:** Type study: Paramecium – General organization, Cyclosis, contractile vacuoles and reproduction. General Topic: Life history, Pathogenicity and control Measures of Entamoeba and Plasmodium.						
Unit II	**Porifera:**					
Type Study: Sycon – Histology, Spicules, Gemmules, Parenchymula larva. General Topic: Canal system in sponges.						
Unit III	**Colenterata**					
Type Study: Obelia – general organization and Metagenesis. General Topic: Corals and Coral Reef						
Unit IV	**Platyhelminthes**					
Type Study: Fasciola hepatica – external morphology, digestive, Excretory and reproductive systems and Life history General Topic: Parasitic adaptation – Platyhelminth Worms						
Unit V	**Aschelminthes**					
Type Study: Ascaris – Sexual dimormphism – reproductive systems and Life cycle. General Topic: Human nematode parasites – Ancylostoma, Enterobius, Wuchereria						
Textbook	1. Agarwal, V.K. Invertebrate Zoology. S. Chand & Co. New Delhi. 2013. 2. Arumugam, Invertebrate Zoology Saras publication, 2014.					

References	1. P.S. Dhami and J.K. Dhami. Invertebrate Zoology –R.Cahnd & Co. New Delhi. (2010) 2. Jordan, E.K. and P.S.Verma. Invertebrate Zoology, 12th Edition.S.Chand & Co.Ltd. Ram Nagar, New Delhi 2011. 3. Kotpal, R.I., Protozoa, Porifera, Coelenterata, Annelida, Arthropoda, Mollusca, Echinodermata, Rastogi Publications, Meerut,2005.
E-references	1. https://biologydictionary.net/invertebrate 2. http://rcastilho.pt/DA/ewExternalFiles/Invertebrates_Cap_33_Cambell.pdf 3. file:///C:/Users/ACER/Downloads/invertebrates_3-4_unit_guide%20(1).pdf
Course Outcome	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand the principles of Taxonomy and apply the knowledge for classification of animals	**K3**
CO2	acquired the functional knowledge about Porifera and canal system in sponges	**K2**
CO3	understand the Colenterata , Corals and Coral Reef	**K2**
CO4	learn about the platyhelminthes and parasitic adaptation – platyhelminth worms	**K1**
CO5	get knowledge on life cycle of Ascaris and Human nematode parasites	**K3**

Mapping of COs with POs & PSOs:

CO	PO					PSO						
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
CO1	S	S	M	M	M	S	S	M	N	N	M	M
CO2	S	S	M	M	M	S	M	M	M	S	S	M
CO3	S	S	M	M	M	S	S	M	M	M	M	M
CO4	S	S	M	M	M	S	M	M	M	M	S	S
CO5	S	M	M	S	S	S	M	M	S	M	M	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOP12	INVERTEBRATA (Practical)	L	T	P	C
CORE	II		-	-	6	4
Cognitive Level	K2:Understand K3:Apply K5:Analyse					
Learning Objective	➢ To learn the taxonomy and general characters of animal kingdom ➢ To develop knowledge about morphology and anatomy of higher invertebrates ➢ To get familiar with scientific method of identifying the organisms ➢ To dissect and explain the internal anatomy of selected animals ➢ To analyze the importance of mouth parts of various insects					
	I. Mounting & identification • Paramecium • Examination of pond water collected from different places for diversity in protista • Study of whole mount of Euglena, Amoeba and Paramecium, Classify giving reasons up to order, salient features and its biological significance • Entamoeba , Volvox, Plasmodium life cycle, Trypanosome, Leishmania, Noctulica • Sycon , Hyalonema, Euplectella, Spongilla, Cliona • Obelia, Physalia, Millepora, Aurelia, Metridium, • Ctenoplana – Pleurobranchia, Velamen • Fasciola hepatica, Taenia solium and their life cycles, Planarian, Schistosoma • Ascaris lumbricoides male , female and its life stages , Enterobius, Wuchereria, Dracunculus, Trichinella **Relate structure and functions** • Sponge – Spicules • Sponge – Gemmule • Taenia – Scolex **Draw labelled sketch -** Sycon (T.S), T.S.of Planaria, T.S. of Fasciola hepatica, T.S of Taenia solium, T.S of Ascaris (Male & Female) To submit a Project Report on any related topics on life cycles/coral/ coral reefs.					
Textbook	1. Lal, S.S , A Text Book of Practical Zoology: Rastogi, Meerut.2014. 2. Verma, PS. A Manual of Practical Zoology-Invertebrares, S Chand Publications, New Delhi, (2010).					

References Book	1. Kotpal, R.L., Agarwal, S,K. and Khetarpal, R.P.R., Modern Text Book of Zoology, 2. Rastogi Publications, Meerut, 2005.
E.Refernces	1. https://www.uou.ac.in/sites/default/files/slm/BSCZO-104.pdf 2. http://www.zoologyresources.com/uploadfiles/books/dc64b77d8769325515d17c945e461b45.pdf (Invertebrates and chordatas)
Course Outcome	**Upon completion of this course, the students will be**

	CO	**Course Outcomes**	**Knowledge Level**
	CO1	to know the mounting of Euglena, Amoeba and Paramecium	**K2**
	CO2	compare and distinguish the morphological features of invertebrates	**K2**
	CO3	identify the organisms	**K3**
	CO4	gain knowledge about internal structure of organisms	**K2**
	CO5	Analyze the life cycles of invertebrates	**K5**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	M	S	S	S	M	S
CO2	S	S	S	S	M	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S	S	M	S
CO4	M	S	S	S	S	S	M	S	M	S	S	M	S
CO5	S	S	S	S	S	S	S	M	S	S	S	S	M
CO5	S	S	S	S	S	S	S	M	S	M	S	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark No Correlation (N) - 0 mark

Course Code	U21BOA11	BOTANY	L	T	P	C
Allied	I		5	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning Objective	➢ To understand the taxonomy aspects of plants ➢ To learn the structure, reproduction & classification of lower plants ➢ To identify the plants as either monocotyledons or dicotyledons ➢ To gain knowledge for water absorption mechanism and photosynthesis					
Unit I	**Characteristics of Algae and Fungi:**					
Classification of Algae, Structure and Reproduction of Algae- Oscillatoria, *Sargassum*. Economic importance of Algae. General characters of fungi, life cycle of Puccinia, Economic importance of Fungi .						
Unit II	**Cryptogams and phanerogams:**					
Structure and life cycle of Bryophyte - *Funaria* Structure and life cycle of Pteridophyte -*Lycopodium* Structure and life cycle of Gymnosperm- *Gnetum*						
Unit III	**Plant anatomy:**					
Types of tissues and Meristems. Primary structure, of Dicot and monocot stem, root . Structure of mature Anther and ovule, Fertilization and Dicot embryo.						
Unit IV						
General Outline of Benthem &Hooker's classification, Merits & Demerits. Floral Characters and Economic importance of Rubiaceae, Caesalpinaceae, Asclepidaceae and Poaceae.						
Unit V	**Plant physiology:**					
Absorption of water and minerals, Transpiration- movement and loss of water in plants; Stomatal physiology, Photosynthesis; Photosynthetic pigments, light and Dark reaction(C3 cycle only). Photorespiration.						
Text Books	1. Pandey, P.B. College Botany - 1: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. Chand Publishing, New Delhi. 2014. 2. Bilgrami, K.S. A Textbook of Algae. CBS Publisher & Distributors, New Delhi, ISBN: 978-8123900490. 2010.					
Reference Books	1. Sharma, P. D. Microbiology, Rastogi& Co., Meerut. 2011. 2. Alexopoulos, C.J., C.M. Mims and M. BlackMell. Introductory Mycology. IV Edition. Miley India (P) Ltd., Daryaganj, New Delhi. 2007. 3. Vashishta, Sinha A.K, Adarsh Kumar.Bryophytes, S.Chand & Company ltd., New Delhi. 2011.					

E-References	1. http://herba.msu.ru/shipunov/school/biol_154/textbook/intro_botany.pdf 2. http://www.survivorlibrary.com/library/strasburgers_text-book_of_botany_1921.pdf 3. https://biolympiads.com/wp-content/uploads/2018/09/1-Botany Basics.pdf		
Course out come	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	acquire knowledge of classification of algae and fungi and its economic importance.	**K1**
	CO2	know the lifecycle of bryophtes, pteridophytes and gymnossperm.	**K2**
	CO3	compare and differentiate the dicot and monocot plants	**K3**
	CO4	identify the Rubiaceae, Caesalpinaceae, Asclepidaceae and Poaceae family by using floral characters	**K3**
	CO5	understand the transpiration, water absorption and photosynthesis	**K2**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	S	S	M	S	M	M	M	S
CO2	S	S	S	S	M	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S	S	M	S
CO4	S	S	S	S	S	S	M	S	M	S	S	M	S
CO5	S	S	S	S	S	S	S	M	S	S	S	S	M
CO5	S	S	S	S	S	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

SEMESTER-II

Course Code	U21ZOT21	INVERTEBRATA - II	L	T	P	C
CORE	III		5	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To understand the systemic and morphological features of invertebrates animals ➢ To identify the simple features of invertebrates ➢ To understand the evolutionary sequence of invertebrates ➢ To acquire knowledge on the general characteristics and classification up to classes of each phylum:. ➢ To acquire knowledge regarding the economic value, affinities of invertebrates					
Unit I	**Annelida:**					
Type Study: Nereis – External morphology, digestive system, Nephridia, Nervous and reproductive system. General topic: Metamerism in Annelids						
Unit II	**Arthropoda:**					
Type Study: Prawn – Penaeus – External Morphology, appendages, digestive system, Excretory system, reproductive system and Development						
Unit III	**Peripatus:**					
General Topic: Social life of beneficial insects Peripatus and its affinities						
Unit IV	**Mollusca:**					
Type Study: Pila – External morphology, Digestive System, Respiratory system, Osphradium and Reproductive system. General Topic: Torsion in Gastropoda, Economic importance of Mollusca						
Unit V	**Echinodermata:**					
Type Study: Starfish – External morphology, Digestive System, nervous system and Reproductive system and development. Pedicellaria, Water vascular system General Topic: Larval forms in Echinodermata						
Text Books	1. Ekambaranatha Ayyar M and Ananthakrishnan.T.N,Manual of Zoology vol.I, S.Viswanathan pvt.Ltd.,Madras, (2001). 2. Agarwal, V.K. ,Invertebrate Zoology. S. Chand & Co. New Delhi, (2010).					

Reference Books	1. P.S. Dhami and J.K. Dhami,R.Chand & Co. Invertebrate Zoology – New Delhi, (2003). 2. Jordan, E.K. and P.S.Verma. Invertebrate Zoology, 12th Edition.S.Chand & Co.Ltd., Ram Nagar, New Delhi, 2010. 3. Kotpal, R.I., Protozoa, Porifera, Coelenterata, Annelida, Arthropoda, Mollusca, Echinodermata, Rastogi Publications, Meerut ,2005. 4. Manual of Zoology Vol. I (Invertibrata). Parts I & II. Ayyar, E.K. and T.N. Ananthakrishnan, S. Viswanathan (Printers and Publishers) Pvt Ltd. Madras. 1992.		
E-References link	https://nptel.ac.in/courses/102/106/102106035/		
Course out come	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	understand the morphological features of invertebrates animals	K1
	CO2	learn about the external features, digestive system, excretory system, reproductive system of the invertebrates	K2
	CO3	learn the social life of beneficial insects and able to apply apiculture, sericulture etc	K3
	CO4	understand the morphology, digestive system, respiratory system, osphradium and reproductive system of mollusca	K2
	CO5	gain knowledge on morphology, digestive system, nervous system and reproductive system and development of echinodermata	K2

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	S	S	S	S	M	S	S
CO2	S	M	S	S	S	M	S	S	S	M	S	S	S
CO3	S	S	S	S	M	S	S	S	S	S	S	M	M
CO4	S	S	S	S	M	S	M	S	S	S	M	S	S
CO5	S	S	M	S	S	S	S	M	S	S	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOP22	INVERTEBRATA – II (Practical)	L	T	P	C
CORE	IV		-	-	5	4
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To understand the structural organization of setae and appendages ➢ To correlate the mouth parts of insects to their feeding habit ➢ To mount the important parts of Invertebrate animals. ➢ To analyze the structural organization of the different systems in Earthworm, Prawn, Pila and Starfish. ➢ To apply the knowledge of classification for the identification of specimens of biological importance					
	Mounting & identification • Earthworm - Body and Penial setae • Honey bee / Mosquito mouth parts • Appendages of prawn • Earthworm –digestive system • Earthworm-Nervous system. • **.Cockroach:** • Salivary apparatus and trachea of cockroach • Digestive system • Nervous system • Male Reproductive system • Female Reproductive system • **Pila** - Digestive system, Radula • Starfish- Water vascular system. • **Relate structure and function:** • Neanthes – Parapodium • Penaeus – Petasma • Pila -Osphradium • Starfish - Tube feet **Classify giving reasons up to order, salient features and its biological significance** • Annelids - Aphrodite, Nereis, Chaetopterus, Arenicola, Hirudinaria • Arthropods - Limulus, Palaemon, Balanus, Eupagurus, Scolopendra, Peripatus, Silkworm – Life History Stages, • Termite and Honey bee – members and castes of colony • Molluscs – Pila, Dentalium, Patella, Chiton, Solen Sepia, Octopus, Nautilus. • Echinoderms - Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and Antedon					

Text books	1. Arumugam, Practical Zoology-Invertebrares, Saras publications. 2015 2. Verma, PS..A Manual of Practical Zoology-Invertebrares, S Chand Publications, New Delhi. 2010. 3. Lal, S.S , A Text Book of Practical Zoology: Rastogi, Meerut.2014.
Reference books	1. Kotpal, R.L., Agarwal, S,K. and Khetarpal, R.P.R., Modern Text Book of Zoology, Rastogi Publications, Meerut. 2005,
E-references	1. http://assets.vmou.ac.in/MBO10.pdf 2. http://www.agrifs.ir/sites/default/files/A%20text%20book%20of%20practical%20botany%201%20%7BAshok%20Bendre%7D%20%5B8171339239%5D%20%281984%29.pdf
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	mount the important parts of invertebrate animals.	K2
CO2	demonstrate the internal anatomy of Invertebrate animals.	K2
CO3	examine the various characteristic features and adaptations of higher invertebrates.	K3
CO4	understand the functional features of higher invertebrates.	K2
CO5	learn the biological significance of mollusca and echinoderms	K2

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	S	S	M	S	S	S	S	M
CO2	S	S	S	S	M	S	M	S	M	S	M	S	S
CO3	S	S	S	S	S	M	S	S	S	S	S	M	M
CO4	M	S	S	S	S	S	S	M	S	M	S	S	S
CO5	S	S	S	S	S	S	S	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21BOA22	BOTANY (PRACTICAL)	L	T	P	C
ALLIED	II		-	-	5	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To learn sectioning and mounting skills ➢ To observe the morphological feature for understanding the taxonomy ➢ To know the structure, reproduction & classification of lower plants ➢ To identify the plants as either monocotyledons or dicotyledons ➢ To gain knowledge on internal structure of plants by sectioning					
	Algae Oscillatoria (Harmogonia) Sargassum (Morphology) Fungi - Puccinia (T.S of Wheat leaf uredospore Teleutospore) Bryophytes - Funnaria (Habit) Pteridophyte – Lycopodium (Morphology,T.s of Stem, L.S. of cone) Gymnosperm - Gentum (morphology, T.S. of Stem showing secondary growth, Gentum , male cone, Female cone. **Taxonomy** Identification and description of the families those are included in the theory 1. Rubiaceae 2. Caesalpinaceae 3. Asclepidaceae & 4. Poaceae **Anatomy** Study of Apical meristem (shoot apex) Tissues - Parenchyma, Collenchymas, Sclerenchyma, T.S of Dicot stem **Embryology** T.S of mature Anther, structure of Dicot Embryo, Structure of Ovule **Plant physiology** Experiments to demonstrate i. Osmosis -Thistle funnel experiment ii. Evolution of oxygen during photosynthesis iii. Ganongs's light screen experiment.					

Reference Books	1. Sivakumar, K. Algae- A Practical Approach. MJP Publishers, Chennai, India. 2016. 2. Gupta, V.K., Tuohy, M.G., Ayyachamy, M., Turner, K.M. and O'Donovan, A. Laboratory Protocols in Fungal Biology: Current Methods in Fungal Biology. Springer, London, UK. 2013. 3. Chmielewski, J. G. and Krayesky, D. General Botany laboratory Manual. AuthorHouse, Bloomington, USA. 2013. 4. Bendre, A. M. A Text Book Of Practical Botany – Rastogi Publications, Meerut, India. 2010.
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	identify and differentiate algae, Fungi, Bryophytes and Pteridophytes	**K3**
CO2	identify and classify the rubiaceae, caesalpinaceae , asclepidaceae & poaceae family plants	**K3**
CO3	Observe the various plant tissues and differentiate Monocot and Dicot plants through sectioning	**K2**
CO4	understand the parts of plant embryo	**K2**
CO5	get practical knowledge on thistle funnel experiment and other physiological experiments	**K1**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	M	S	S	M	S	S	S	M	S
CO2	S	S	S	S	M	S	S	S	S	M	S	S	M
CO3	S	S	S	S	S	M	S	M	S	S	S	M	S
CO4	S	S	S	S	S	S	M	S	M	S	S	M	S
CO5	S	S	S	S	S	S	S	M	S	S	S	S	M
CO5	S	M	M	S	S	S	S	M	S	M	S	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

SEMESTER-III

Course Code	U21ZOT31	BASICS OF CELL AND MOLECULAR BIOLOGY	L	T	P	C
CORE	V		5	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply K5: Analyse					
Learning objective	➢ To learn the ultra structure and functions of cells and cellular organelles and the molecular mechanisms involved in various cellular processes. ➢ To remember and understand the structural and functional aspects of nuclear components and cell cycle events ➢ To analyze the structure, replications and transcriptions of DNA ➢ To know the different molecular and biologic techniques ➢ To differentiate prokaryotic and eukaryotic protein synthesis mechanism.					
Unit I	**Introduction to Cell:**					
Cell type – prokaryotic and eukaryotic Microscopy: Detailed study of Compound, X – ray diffraction, Phase contrast microscope. Polarsing microscope, Cytological Techniques: Fixation- processing- staining methods of DNA, RNA, Protein, Lipids and Polysaccharides- Ultracentrifugation.						
Unit II	**Structure and functions of cell organelles:**					
Ultra structure and functions of plasma membrane. Mitochondria, Golgi apparatus, Endoplasmic reticulum and Ribosomes. Lysosomes, Centrioles, nucleus and nucleolus, Chromosomes – Structure and types. Cell Divisions – mitosis and mitotic apparatus, meiosis and Synaptonemal complex.						
Unit III	**Molecular Genetics:**					
DNA as genetic material – Transformations – Conjugations – Transductions - DNA Structure, DNA repair mechanisms – direct reversal, Excisions repair, SOS repair, recombination's, types and replications Fine structure of gene - cistrons, recons and muton Mutations – Physical and Chemical Stages - Molecular basis of mutations. Sickle cell anemia, Inborn errors of Metabolisms: Phenylketonuria – Alkaptonuria – Albinism.						
Unit IV	**Central dogma of Molecular Biology:**					
Central dogma of Molecular Biology - Protein biosynthesis – Transcriptions - Types of DNA, Different types of RNA – sRNA, tRNA, rRNA, Processing of the precursor of SRNA, Processing of RNA Molecules						
Unit V	**Proteins synthesis:**					
Genetic code, Proteins synthesis - Transcriptions is prokaryotes,Translations, Ribosome, Polyribosome, Steps in proteins synthesis. The lac operon; Positive and Negative control. PCR- Sanger's DNA Sequencing Method. Gene bank and libraries. Human Genome Project.						

Text Books	1. Powar, C.B., Cell Biology, Himalayas Publishing House, Bombay.2011 2. Berry .A.K. A Text book of Cell Biology, Emkay-Publications,Delhi,2012 3. Arumugam.N.Cell Biology. Saras Publication, (2014).		
Reference Books	1. Gupta, M.L. and Jangir, M.L., , Cell Biology Fundamentals and Application, Student Edition, Jothpur.2012 2. DeRobertis, E.D.P. and DeRobertis, E.M.E., 2010, Cell and Molecular Biology VIII Ed. Lea and Febger, Philadelphia. 3. Jeyanthi, G.P ,Molecular biology, MJP Publishers, Chennai. 2009,		
E-references	1. http://compbio.case.edu/koyuturk/teaching/eecs600/slides/Molecular_and_Systems_Biology.pdf 2. file:///C:/Users/ACER/Downloads/Full.pdf 3. https://www.fmed.uniba.sk/uploads/media/Introduction_to_Medical_and_Molecular_Biology.pdf		
Course out come	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	differentiate and analyse the structure of prokaryotic and eukaryotic cells, macromolecules, and membranes	**K5**
	CO2	know how these cellular components are used to generate and utilize energy in cells and cell division	**K2**
	CO3	know the structure and functions of cell divisions, physiological changes and alterations of cell functions brought about by mutations.	**K1**
	CO4	analyse the central dogma of life	**K5**
	CO5	understand genetic role in protein synthesis mechanism.	**K2**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	S	M	S	S	S	M	M
CO2	S	M	S	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) -1 mark

No Correlation (N) - 0 mark

Course Code	U21CHA33	CHEMISTRY	L	T	P	C
ALLIED	III		5	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To understand the handling of chemicals and errors in chemical analysis ➢ To get knowledge in chemical bonding and hybridization ➢ To acquire knowledge in volumetric analysis ➢ To understand the basic concept of chemistry of Thermodynamics and Kinetics					
Unit I	**Handling of chemicals and Data analysis**					
a) Storage and handling of chemicals: Handling of acids, ethers, toxic and poisonous chemicals. Antidotes, threshold vapour concentration and first aid procedure. b) Errors in chemical analysis: Accuracy, precision. Types of error-absolute and relative errors.Methods of eliminating and minimizing errors. c) Separation techniques–Solvent extraction. Principle of adsorption and partition chromatography, column chromatography, thin layer chromatography (TLC), paper chromatography and their applications.						
Unit II	**Chemical bonding**					
a) Ionic Bond: Nature of Ionic bond. Structure of NaCl, KCl and CsCl. Factors influencing the formation of ionic bond. b) Covalent Bond: Nature of covalent bond. Structure of CH_4, NH_3, H_2O based on hybridization. c) Coordinate Bond: Nature of coordinate bond. Coordination complexes. Werner'stheory. Geometrical and optical isomerism in square planar and octahedral complexes. Mention of structure and functions of chlorophyll and hemoglobin. d) Hydrogen Bond: Theory and importance of hydrogen bonding. Types of hydrogenbonding. Hydrogen bonding in carboxylic acids, alcohol, amides, polyamides, DNA and RNA. e) van der Waal's forces: Dipole – dipole and dipole - induced dipole interactions.						

Unit III	**Volumetric analysis**
a) Methods of expressing concentration: normality, molarity, molality, ppm. b) Primary and secondary standards: preparation of standard solutions c) Principle of volumetric analysis: end point and equivalence points. d) Strong and weak acids and bases - Ionic product of water, pH, pKa, pKb. Buffer solutions -pH of buffer solutions. Mention of Henderson equation & its significance.	
Unit IV	**Kinetics & Thermodynamics**
Chemical Kinetics: Rate, rate law, order and molecularity. Derivation of rate expressions for I and II order reactions. **Catalysis**-Homogeneous and heterogeneous catalysis. Enzyme catalysis, enzymes in biological system and in industry. **Thermodynamics:** Introduction, Scope and importance of thermodynamics- system and surrounding-isolated, closed and open systems- state of the system- intensive and extensive variables. Thermodynamic process- reversible and irreversible, isothermal and adiabatic process- First law of thermodynamics- statement- definition of internal energy (E), enthalpy (H), applications of first law of thermodynamics.	
Unit V	**Chemistry of Biomolecules**
a) Fats – Occurrence and composition. Hydrolysis of fats. b) Vitamins – Source, provitamin, properties and classification. Structure and function of vitamin A, C, D, K and E c) Hormones – Thyroxin, adrenaline and sex hormones (structure and functions only)	
Text Books	1.R. Gopalan, S. Sundaram, *Allied Chemistry*, Sultan Chand and Sons, 1995.
Reference Book	1.U. Sathyanarayana, *Biochemistry*, Books and allied (p) Ltd, 1999. 2.B.R.Puri and L.R.Sharma, *Principles of physical chemistry*, ShobanLalNagin Chand and Co. 33rd ed., 1992.
Course out come	Upon completion of this course, the students will be able to

	CO	**Course Outcomes**	**Knowledge Level**
	CO1	gain the knowledge on the handling of chemicals and errors in chemical analysis	K1
	CO2	learn chemical bonding and hybridization	K2

	CO3	learn the calculations of preparing standard solutions	K2
	CO4	understand and appreciate the advanced concepts and rate equations in chemical kinetics.	K2
	CO5	calculate the change in thermodynamic properties, equilibrium constants, partial molar quantities, chemical potential	K3

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	M	S	S	M	S	M	M	M	S
CO2	S	M	S	S	M	S	S	S	S	S	S	S	S
CO3	S	S	M	S	S	M	S	S	S	S	M	M	M
CO4	M	S	S	S	S	M	M	S	M	S	S	M	S
CO5	S	M	S	S	S	S	S	M	S	S	S	S	M
CO5	S	S	S	S	S	S	S	M	S	M	S	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOE311	WILD LIFE BIOLOGY	L	T	P	C
Elective	I		4	-	-	3
Cognitive Level	K2:Understand K3:Apply K5:Analyse					
Learning objective	➢ To understand the Principles of wild life management ➢ To learn the technique of making survey in forest. ➢ To understand the importance of Biological food chain and its managements ➢ To learn the laws and ethics of wildlife act and also wild life organization ➢ To understand the animal behaviour in natural habitat.					
Unit I	**Introduction to Wild life:**					
Wild life -wealth of India and threatened wildlife- threats to survival of Red panda, Musk deer, and great Indian Bustard Olive Ridley turtle. Values of wildlife Principles of wild life management						
Unit II	**Wild life senses:**					
Wild life senses technique - objective direct and indirect methods with reference to Herpeto fauna, birds and mammal. Project Tiger Elephant & Snow.						
Unit III	**Wild life conservation:**					
Wild life conservation approaches and limitations management of rare and endangered species. Control and management of over abundant wild life population. Ecological monitoring and animal species and restoration programmes						
Unit IV	**Wild life laws ethics:**					
Wild life laws ethics, Wild life Protection Act in India. Endangered fauna, mammals, Birds and reptiles in India. Introduction to Organization- The World Conservation Union. (IUCN) World Wildlife Fund (WWF) Indian Board for Wildlife (IBWL).						
Unit V	**Animal behaviours:**					
Animal behaviours – Aggressive behaviour, Altruism- communication and signaling, mating behaviour social system of mammals. Insect socio- biology the man behaviours and its genitive traits						

Text Books	1. Arumugam NA and Natarajan P. Animal Behaviour – Ethology, Saras Publication Nagercoil,Tamilnadu, 2011. 2. Ridley M. Animal Behaviour - A concise Introduction , Blackwell Scientific Publications, Oxford. (2003).
Reference Books	1. David McFarland. Animal Behaviour, Pitman Publishing Limited, London, UK. 2001. 2. Manning A and Dawkins MS. An Introduction to Animal Behaviour, 6th edition, Cambridge University Press, UK. 2005. 3. Wallace R A. The Ecology and Evolution of Animal Behaviour, Goodyear Publishing Company Inc., Santa Monica, California. 1979
E-References	1. http://swayam.gov.in/nd1_noc20_bt04/ preview 2. http://nd1.iitkgp.ac.in
Course outcome	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	values and apply the principles of wild life for wild life management	**K3**
CO2	improve the awareness of wild life senses	**K2**
CO3	gain the knowledge on wild life conservation approaches	**K2**
CO4	acquire the knowledge of ethics and wild life and apply for the protection of wild life	**K3**
CO5	analyse the Animal behaviors, Insect socio-biology and its genetic traits	**K5**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES(PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	S	S	S	S	S	S	M	S	S	M	S	M
CO2	S	S	M	S	S	S	S	M	S	M	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S	S	S
CO5	M	S	S	S	S	M	S	M	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOE312	ANIMAL BEHAVIOUR	L	T	P	C
Elective	II		4	-	-	3
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To know about basic concepts of animal behaviour ➢ To understand the pattern of behaviour of animals ➢ To understand the importance of society and social insects ➢ To learn the sexual behaviour of animals ➢ To distinguish different type of biological rhythms.					
Unit I	**Introduction to Ethology:**					
Origin and history of Ethology : Brief Profiles of Karl 1 Von Frish, Ivan, Pavlov, Kornrad Lorenz, Nilco Tinbergen, Proximate and ultimate causes of behaviour. Methods and recording the behaviours.						
Unit II	**Stereotyped behaviors:**					
Stereotyped behaviors- Individual behaviours patterns. Instinct Vs. Learnt behavior Associative learning, classical and operant conditioning Habituation, Imprinting.						
Unit III	**Social Behaviors**					
Social Behaviors- concepts & society: communication and the senses Altruism: Insects Society with honey bee as example foraging in honey bee and advantages of the waggle dance.						
Unit IV	**Sexual behaviour**					
Sexual behaviour- Asymmetry of sex, sexual dimorphism, mate choice, intra, sexual selection, inter- sexual selection, sexual Conflict in parental care.						
Unit V	**Biological Rhythm :**					
Type and characters short and long term Rhythms: circadian rhythm, tidal rhythm lunar rhythms photoperiod and regulation seasonal reproduction in vertebrates						
Text Books	1. Dewsbur, D.A Comparative animal behavior. McGraw Hill Book Company. 2001. 2. Alcock, J. Animals Behaviour: An evolutionary approach. Sinauer Assoc., Sunderland, Mass. 2015.					

Reference Book	1. Bradbury, J,W., and S.L Vehrencamp. Principles and animals communication sinauer Assoc., Sunderland, Mass, USA.1999. 2. Eibl –Eibesfeldt, I.Ethology: the biology of behavior. Holt, Rinehart & Mc Graw Hill 16. 1970 3. Drickamer , L.C. S.H. Vessey and E.M. Jakob Animals Behavior. Mc Graw Hill. 2002.
E-references	1. http://nd1.iitkgp.ac.in/ 2. http://www.swayamprabha.gov.in/index.php/program/archive/9 3. http://www.mooc-list.com/tage/animals- behaviour 4. http://unaab.edu.ng/funaab-ocw/attachments/Animal%20Behaviour%201.pdf 5. https://www.ewingdigital.com/text_content/115885834145eafdbf6969b2.pdf
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand different type of animal behavior and its significance.	**K2**
CO2	get an insight to the students about the stereotyped behaviors	**K2**
CO3	know the social behaviour	**K2**
CO4	understand the sexual behavior	**K2**
CO5	understand the type and characters of short and long term rhythms: circadian rhythm,	**K2**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	M	S	M	S	S	S	M
CO2	S	M	S	S	S	M	M	S	M	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	M	S	M	S	M	S	S	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZON3I1	PUBLIC HEALTH AND HYGIENE	L	T	P	C
NME	I		2	-	-	2
Cognitive Level	K1: Recall K2: Understand K3: Apply					
Learning objective	➢ To gain awareness on Public Health and Hygiene ➢ To create knowledge on Health Education and hazards. ➢ To identify the communicable diseases and their control measures ➢ To learn about non-Communicable diseases and their preventive measures ➢ To comprehend the health education of India					
Unit I	**Scope of Public health and Hygiene:**					
Scope of Public health and Hygiene – nutrition and health – classification of foods – Nutritional deficiencies - Vitamin deficiencies.						
Unit II	**Environment and Health hazards:**					
Environment and Health hazards – Environmental degradation – Pollution and associated health hazards.						
Unit III	**Communicable diseases:**					
Communicable diseases and their control measures such as Measles, Polio, Chikungunya, Rabies, Plauge, Leprosy, AIDS and Corona.						
Unit IV	**Non-Communicable diseases:**					
Non-Communicable diseases and their preventive measures such as Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health.						
Unit V	**Health Education in India:**					
Health Education in India – WHO Programmes – Government and Voluntary Organizations and their health services – Precautions, First Aid and awareness on sporadic diseases.						
Text Books	1. Park and Park,: Text Book of Preventive and Social Medicine – Banarsidas Bhanot Publ. Jodhpur – India. 2010 2. Dubey, R.C and Maheswari, D.K.: Text Book of Microbiology – S. Chand & Co. Publ. New Delhi – India. 2007 3. Park, J.E. and Park, K. Textbook of Community Health for Nurses.2010					

Reference Books	1. Jatin V. Modi and Renjith S. Chawan. Essentials of Public Health and Sanitation –Part I- IV .Murray, C. J. L. and A.D. Lopez. The Global Burden Of Disease. World Health Organization.1996. 2. Verma, S. Medical Zoology, Rastogi publ. – Meerut – India .1998 3. Singh, H.S. and Rastogi, P. : Parasitology, Rastogi Publ. India.2009
E-Reference link	1. http://oms.bdu.ac.in/ec/admin/contents/316_16SNMEZO2_2020052104361175.pdf 2. http://keralamarinelife.in/Journals/Vol21/03%20Madhumita%20Mukherjee.pdf 3. https://content.kopykitab.com/ebooks/2013/11/2328/sample/sample_2328.pdf
Course outcome	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	communicate awareness on public health and Hygiene	**K3**
CO2	gather knowledge on health education and hazards.	**K2**
CO3	identify the communicable diseases and their control measures	**K3**
CO4	learn about non-Communicable diseases and their preventive measures	**K1**
CO5	Control communicable diseases by using appropriate disease control measures	**K3**

Mapping of COs with POs & PSOs:

CO	Pos								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	M	S	M	S	S	S
CO4	S	S	S	S	S	S	M	S	S	S	S	S	M
CO5	S	S	S	S	S	M	S	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Course Code	U21ZON312	ORNAMENTAL FISH CULTURE	L	T	P	C
NME	II		2	-	-	2
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Evaluate					
Learning objective	➢ To know the importance and scope of ornamental fish culture ➢ To be familiar with popular ornamental fishes ➢ To learn the breeding behavior, feeding, Aquarium design and fish keeping techniques ➢ To acquire thorough knowledge on the common infections and treatment ➢ To become self employed citizen/ entrepreneur					
Unit I	**Scope of ornamental fish culture:**					
Importance and scope of ornamental fish culture – Economic potential, commercial and aesthetic value of ornamental fish culture, trends in ornamental fish farming in the world and in India. Taxonomy of important freshwater and marine ornamental fish of indigenous and exotic species.						
Unit II	**Popular ornamental fishes:**					
Beta, Colisa, Macropodus, Trichogaster leeri, T. italics microlepis, Zebra fish. Gold fish varieties: Koi, Puntius, tetra, Glass fish, cichilids, angel fish, molly, guppy. Marine species: Hippocampus, scat, Biology, habits and patterns of reproduction of Gold fish and Zebra fish.						
Unit III	**Fish farms:**					
Fish farms - mass production of fancy fishes, preparations for breeding – breeding behaviour of chosen fishes: carp, fighter fish – induced breeding – food and feeding – live feeds: rotifers, tubifex and artificial feeds.						
Unit IV	**Disease management:**					
Common bacterial, viral, fungal, protozoan and crustacean infections - treatment and control.						
Unit V	**Aquarium design, Construction and preparation:**					
Size, shape, substrate, ornamental aquatic plants. Construction and functions of Bio-filters; aerators – accessories for fish tanks – hood and 30 light, nets, suction tube and maintenance of water quality: controlling ammonia build up, pH, feeding regimes						
Text Books	1. Jameson, J.D. Alangara Meen Valarpu (in Tamil). National Book House, New Delhi. 2005.					

Reference Books	1. Baradach, JE, JH Ryther and WO Mc Larney. Aquaculture. The Farming and Husbandry of Freshwater and Marine Organisms. Wiley Interscience, New York. 1972. 2. Jameson, J.D. and R.Santhanam. Manual of ornamental fisheries and farming technology. Fisheries College and Research Institute, Thoothukudi. 1996. 3. Mitchell Beazley, The complete guide to tropical aquarium fish care. Read and Consumes Book Ltd., London. 1998.
E-Reference	http://oms.bdu.ac.in/ec/admin/contents/316_16SNMEZO2_2020052104361175.pdf http://keralamarinelife.in/Journals/Vol21/03%20Madhumita%20Mukherjee.pdf https://content.kopykitab.com/ebooks/2013/11/2328/sample/sample_2328.pdf
Course outcome	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	know the importance and scope of ornamental fish culture	**K1**
CO2	list out the popular ornamental fishes and its marketing	**K2**
CO3	practice Aquarium fish culture	**K3**
CO4	identify the common infections disease of fish and management	**K3**
CO5	design aquarium to become potential entrepreneur	**K4**

Mapping of COs with POs &PSOs:

CO	Pos								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	M	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	M	S	S	S	M	S
CO3	S	S	S	S	S	S	S	M	S	M	S	S	S
CO4	S	S	S	S	S	S	M	S	S	S	S	S	M
CO5	S	S	S	S	S	M	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

SEMESTER IV

Course Code	U21ZOT41	CHORDATA	L	T	P	C
CORE	VI		4	-	-	4
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To understand the systemic and functional morphology of various forms of vertebrates ➢ To discuss the affinities and adaptations of chordates to different modes of life. ➢ To understand the origin and evolutionary relationship in different subphylum of chordates ➢ Make the student to enlighten the concept of diversity, adaptations, organization and taxonomic status of Chordates. ➢ Student can be able to Characteristics and Outline of Classification of Origin of Chordata.					
Unit I	**General characters and Classification of Chordata:**					
up to orders with a few examples Affinities and systematic position of cephalochordate, Hemichordates and Urochordata.						
Unit II	**Pisces:**					
Type Study: Shark -External morphology, Digestive System, Respiratory system, nervous, excretory and Reproductive system. General Topic: Accessory respiratory organs in Fishes						
Unit III	**Amphibia**					
Type Study: Frog- External morphology, Digestive System, Respiratory system,circulatory, nervous, excretory, Reproductive system and metamorphosis. General Topic: Parental care in Amphibia						
Unit IV	**Reptilia**					
Type Study: Calotes versicolor – External morphology, Digestive System, Respiratory, circulatory, nervous, excretory, pectoral and pelvic Girdle only General Topic: South Indian Poisonous and non- Poisonous snakes. Identification – Poison apparatus, biting mechanism, Nature of venom, first aid and treatment.						
Unit V	**Aves**					
Type study – Pigeon External morphology, Digestive System, Respiratory system, circulatory, nervous, excretory, exoskeleton and flight mechanism General Topic: Migration of birds **Mammalia:** Type Study – Rabbit External morphology, Digestive System, Respiratory system, circulatory,						

nervous, excretory, Reproductive system. General Topic: Dentition in Mammals, Adaptation of Aquatic mammals			
Text Books	1. T.N. Ranganathan .Chordata Zoology, Rainbow printers, Palayamkottai.1996.		
References	1. A Manual of Zoology, volume II – Chordata. Parts I & II. M.Ekambatanatha Ayyar, T.N. Anantha Krishnan, S.Viswanathan (Printers and Publishers) Pvt.Ltd, Madras. 1992. 2. Chordate Zoology, Jordan E. L & Verma P. S., S. Chand & Company Ltd. 1998.		
E-references	1.https://www.britannica.com/animal/chordate 2. https://www.uou.ac.in/sites/default/files/slm/BSCZO-201.pdf 3. http://assets.vmou.ac.in/MZO06.pdf 4. study-note-animal-kingdom-part-02-01%20(2).pdf		
Course out come	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	understand the General characters and classification of Chordata	**K2**
	CO2	learn about the morphology, digestive System, respiratory system, nervous, excretory and reproductive system of shark	**K2**
	CO3	know the parental care in amphibia	**K2**
	CO4	understand the internal organ of Reptilia, differentiate and snake venom	**K3**
	CO5	gather knowledge on migration of birds, dentition in mammals and adaptation of aquatic mammals	**K2**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFICOUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	S	M	M	N	S	S	S	S	S	M	S	S
CO2	S	M	S	S	M	M	M	S	M	M	S	S	S
CO3	M	S	S	S	M	S	S	S	S	S	S	M	M
CO4	S	S	S	M	M	S	M	S	M	M	M	S	S
CO5	S	M	M	S	S	S	M	M	S	S	M	N	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOP42	CHORDATA (Practical)	L	T	P	C
CORE	VII		-	-	4	4
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To learn the skills in mounting of scales and parasitic identification in pisces ➢ To develop practical knowledge on identification and classification of chordates ➢ To understand the systemic and functional Morphology of various groups of vertebrates ➢ To learn the biodiversity, habitat, adaptations organizations of chordates ➢ To interpret the affinities, evolutionary relationships and their economic importance					
	I. Mounting & identifications Placoid , Cycloid, Ctenoid, Ganoid scales of Pisces Two parasites identifications in any fish digestive tract. Mounting of Weberian ossicles Feathers identifications - Quill feather, down feathers **II. Diagram and description of** Frog and Calotes - Arterial System, venous system, Brain – dorsal and ventral view digestive and urinogenital system of Tilapia, Virtual dissection of brain and pituitary in frog **III. Draw and classify giving reasons:** Amphioxus, Ascidia, Balanglossus, Tornaria larva. Petromyzon Scoliodon, Trygon, Narcine, Clarias, Gambusia, Echeneis, Hippocampus (M Exocoetus, Anabas, Protopterus, Rana, Alytes, Hyla, Salamander, Ichthyophis, Axolotal larva Calotes, Draco, Varanus, Naja naja, Vipera russellii, Enhydrina, lycodon , C King fisher, Psittacula, Columba, Duck , Sparrow, Myna Ornithorhynchus, Rattus, Pteropus, Oryctolagus, Loris. Whale. Porpoise. **IV Draw labelled Diagram** **OSTEOLOGY** – Pigeon synsacrum, Frog and Rabbit- skull of frog. Pectoral and Pelvic girdle Bones of fore limb and hind limb **Dentition** –- Rabbit and Man					

A record of lab work should be maintained and submitted at the time of the practical examinations Study tour to different habitat for one day for species collection & exposing the students to ecosystem and animal farms is compulsory.			
Text Books	1. Lal, S.S , A Text Book of Practical Zoology: Rastogi, Meerut.2014. 2. Arumugam N. A manual of Practical Chordates, Saras Publication, Nagercoil,2015		
References Books	1. Verma PS.*Chordate Zoology*, S Chand Publishers, New Delhi, (2013).		
Course out come	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	practice the techniques of mounting and identifications of different cells and feathers	K2
	CO2	identify the poisonous animals like snake	K3
	CO3	analyse the various types of animal cells and Molecular structures with their characteristic features and detailed functions	K3
	CO4	understand the techniques of various internal systems present in the chordates.	K2
	CO5	gain the knowledge on the structure, functions of selected organisms through the observations of both living and preserved specimens.	K2

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES(PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	M	S	S	S	S	S	M
CO2	S	S	M	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	M	S	S	S	M	S	M	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S	M	S	S
CO5	S	S	S	S	S	S	M	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21CHA44	CHEMISTRY (Practical)	L	T	P	C
ALLIED	IV		-	-	4	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To enable the students to acquire knowledge in Organic Estimation ➢ To understand basics and gain knowledge in organic analysis					
Unit I	**Acidimetry and alkalimetry**:Titration acids used: hydrochloric acid, sulphuric Standard solutions prepared: sodium carbonate, sodiumbicarbonate, oxalic acid. **Oxidation and reduction titration:** Oxidising agents: Potassium permanganate (permanganimetry). Reducing agents: Ferrous sulphate, ferrous ammonium Sulphate, oxalic acid **Standard solutions prepared:** Ferrous Sulphate, ferrous ammonium Sulphate and oxalic acid. **Iodometry titrations**: titrations of liberated iodine against sodium thiosulphate using acidified potassium permanganate, potassium dichromate and copper Sulphate solutions. Standard solutions: potassium dichromate, copper sulphate.					
Text Books	1.Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996. 2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith, A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry. 5th Edn., Pearson Education, 2005.					
Reference Books	1.N.S. Gnanapragasam and G. Ramamurthy, Organic Chemistry – Lab manual, S. Viswanathan Co. Pvt., 1998. 2. Practical Chemistry by A.O. Thomas, Scientific Book Centre, Cannanore, 2003. 3.Basic Principles of Practical Chemistry, V. Venkateswaran, R.Veeraswamy, A. R. Kulandaivelu, Sultan Chand & Sons, New Delhi, 2nd Edn., 2004.					
Course out come	Upon completion of this course, the students will be able to					

	CO	Course Outcomes	Knowledge Level
	CO1	understand the acidimetry and alkalimetry titrations	**K1**
	CO2	learn titrations the concept of oxidation and reduction	**K2**

	CO3	prepare the standard solutions for analysis	**K3**
	CO4	learn the calculations of molarity, molality and normality of the solutions	**K2**
	CO5	gain hands on skill in iodometry titrations	**K3**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	M	M	S	M	S	M	M	M	S
CO2	S	S	M	S	M	S	M	S	S	M	S	S	M
CO3	S	S	S	S	S	M	S	S	S	S	M	M	S
CO4	S	S	S	S	S	M	M	S	M	S	S	M	S
CO5	S	S	S	S	M	S	S	M	S	M	M	S	M
CO5	S	S	S	M	S	S	M	M	S	M	S	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOE411	ANIMAL HANDLING & GUIDELINES	L	T	P	C
Elective	II		3	-	-	3
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objectives	• To demonstrate competency in handling a variety of livestock and laboratory animal species. • To understand the importance of animal handling and ethical animal care					
Unit I	**Animal Handling and Restraining:**					
Animal Handling and Restraining – safe animal handling techniques for different animals and situations, Working safely with animals,Sanitation and cleanliness- Injection and Biopsy collection , briefing about setting up breeding cage and weaning. Emergency situations: such as animal escapes, animal chokes						
Unit II	**Animal Safety:**					
Procedure room usage SOP- Biosafety Cabinet- Anesthesia Setup- Euthanasia Setup and Animal discard bin, Procedure Room trolley- First Aid Kit and emergency situations -Animal bites, Needle prick and Inj. Splash.						
Unit IV	**Animal care:**					
Animal care and technical personnel, physical relationship of animal facilities to laboratories, Parasites and Pests of Companion Animals - Common Diagnostic and Therapeutic Procedures and Terms. Emergency exit plan (natural calamities/ fire accidents/or any other)						
Unit IV	**Animal Breeding:**					
Mice, Rats, Rabbits-Breeds-uses- Behaviour-Anatomical and physiological features-Breeding and reproduction-husbandry-techniques						
Unit V	**Guidelines:**					
In-vivo Animal Handling Guidelines for Handling of animal, CPCSEA Guidelines, Maintenance of animal, Animal house, Laboratory, Administration of drugs, Routes of administration, dissection procedures, Safety procedures. Toxicity & Research- Guidelines for toxicity-cytotoxicity -Ethical clearance -ethical issues						
Text Books	Animal Handling and Physical Restraint, ISBN 9780367028329, CRC Press-2019.					
Reference Books	1. Livestock Management (LSM) Vocational Higher Secondary Education (VHSE) , State Council of Educational Research and Training (SCERT), KERALA 2016. 2. The Animals (Scientific Procedures) Act (Amendment) Order 1993". August 23, 1993. Retrieved February 22, 2013. 3. National Research Council,Guide for the Care and Use of Laboratory Animals, Publisher National Academic Press,2010 4. Karen Hrapkiewicz, Lesley A. Colby, Patricia Denison.A Clinical Laboratory Animal Medicine: An Introduction, Publisher Wiley–Blackwell,2013					

E-Reference	https://scert.kerala.gov.in/wp-content/uploads/2020/06/13-live%20stock%20management.pdf		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	learn the animal handling skill	**K1**
	CO2	know the SOP of animal handling and safety	**K2**
	CO3	understand and practice the safe animal transport	**K3**
	CO4	know about the handling of animal during natural calamities, common diagnostic procedure	**K2**
	CO5	gain knowledge about CPCSEA guidelines	**K2**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	S	S	S	M	S	M	S	M	S	M
CO2	M	S	S	S	S	S	S	S	S	M	S	S	S
CO3	S	S	M	S	S	M	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	S	S	M	S	M	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOE412	INSECT VECTORS AND DISEASES	L	T	P	C
Elective	II		3	-	-	3
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objectives	• To comprehend the various insect vectors and disease spreading mechanism • To learn the various diseases caused by the insect vector and its control measures					
Unit I	**Introduction to Insects:**					
General Features of Insects, Morphological features, Head – Eyes, Types of antennae, Mouth parts - feeding habits						
Unit II	**Concept of Vectors:**					
Concept of Vectors - Brief introduction of Carrier and Vectors (mechanical and biological vector),Reservoirs, Host-vector relationship, Vectorial capacity, Adaptations as vectors, Host Specificity						
Unit III	**Insects as Vectors:**					
Insects as Vectors - Classification of insects up to orders, detailed features of orders with insects as vectors – Diptera, Siphonaptera, Siphunculata, Hemiptera- Dipteran as Disease Vectors - Dipterans as important insect vectors – Mosquitoes, Sand fly, Houseflies						
Unit IV	**Study of mosquito:**					
Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis; Control of mosquitoes Study of sand fly-borne diseases –Visceral Leishmaniasis, Cutaneous Leishmaniasis, Phlebotomus fever; Control of Sand fly Study of house fly as important mechanical vector, Myiasis, Control of house fly.						
Unit V	**Siphonaptera:**					
Siphonaptera as Disease Vectors Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases Plague, Typhus fever; Control of fleas - Siphunculata as Disease Vectors-Human louse (Head, Body and Pubic louse) as important insect vectors; Study of louse-borne diseases – Typhus fever, Relapsing fever.						
Text Books	1. Imms, A.D. . A General Text Book of Entomology. Chapman & Hall, UK.1977. 2. Chapman, R.F. . The Insects: Structure and Function. IV Edition, Cambridge University Press, UK.1998					

Reference Books	1. Pedigo L.P. Entomology and Pest Management. Prentice Hall Publication.2002. 2. Mathews, G. Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases. Wiley-Blackwell-2011
E-Reference	https://www.who.int/tdr/diseases-topics/vectors/en/#:~:text=Mosquitoes%20are%20the%20best%20known,%2C%20Chikungunya%2C%20Rift%20Valley%20fever.
Course outcome	Upon completion of this course, the students will be able to

CO	**Course Outcomes**	**Knowledge Level**
CO1	understand the general features of insects	**K1**
CO2	know the concept of vectors	**K2**
CO3	classify the insects vectors	**K3**
CO4	know about mosquito borne diseases	**K2**
CO5	gain knowledge about Siphonaptera as Disease Vectors	**K2**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	S	S	S	M	S	M	S	M	S	M
CO2	S	S	S	S	S	S	S	S	S	M	S	S	S
CO3	S	S	M	S	M	M	S	M	S	S	S	M	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	S	S	M	S	M	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZON421	VERMICOMPOSTING	L	T	P	C
NME	I		2	-	-	2
Cognitive Level	K1: Recall K2: Understand K3: Apply K5: Analyse					
Learning objective	➢ To get the thorough knowledge on making vermicompost and vermiculture. ➢ To learn about South Indian and North Indian species used in Vermicomposting and Culture techniques of earthworms ➢ To study the vermicompost production ➢ To encourage the self employment practice and save the human being by the way of minimizing the use of chemical fertilizers. ➢ To understand the interaction of earthworms with other organisms					
Unit I	**Taxonomy of Earthworm:**					
Earthworm taxonomy – Morphological and anatomical – Classification of earthworms – Food habits – Digestive system – Excretion – Reproduction and Life cycle – Earthworm as farmer‟s friend.						
Unit II	**Types of earthworm:**					
Types of earthworm – Exotic and native species – South Indian and North Indian species used in Vermicomposting – Collection and Preservation of earthworms for vermicomposting – Culture techniques of earthworms						
Unit III	**Vermicompost production:**					
Vermicompost production – Requirements – Different methods of Vermicomposting – Heap method – Pot method and Tray method – changes during Vemicomposting.						
Unit IV	**Role of Earthworms in soil fertility:**					
Role of Earthworms in soil fertility – Use of Vermicompost for crop production – Use of earthworms in land improvement and land reclamation – Economics of Vermicompost and vermiwash production. Earthworms as animal feed – Medicinal value of earthworm meal – Role of Earthworms in Solid Waste, Sewage and faecal waste management and Vermifilters. Earthworms as bioreactors.						
Unit V	**Interaction of earthworms:**					
Interaction of earthworms with other organisms – Influence of chemical inputs on earthworm activities – Large scale manufacture of Vermicompost, packaging of vermicompost and its marketing – Financial supporting – Government and NGOs for vermiculture work						

Text Books	1. Sreenivasan Ettammal, Handbook of Vermicomposting Technology the Western India technology, Council for Advancement of People's Action and Rural Technology, New Delhi, India. 40 pp. 1997. 2. Vermicology: The Biology of Earthworms, (Ismail, S.A.) Orient Longman. 92pp. 1997. 3. Ismail, S.A Mannpuzhu: Valarppum, Tozhilnutpamum, Payankalum. Orient Longman. 115pp. 2001. 4. Alvares,C., Shiva,V., Ismail, S.A., Vijayalakshmi, K., Mathen, K., and Declercq, B The Organic Farming Reader, ARISE and Other India Press, India. 1999. 298 pp. 5. Ismail, S.A The Earthworm Book, Other India Press, Goa. 2005.
Reference Books	1. Talashilkar.S.C. and A A K Dosani, Earthworms in Agriculture ISBN 10: 8177542494 / ISBN 13: 9788177542493, Agrobios, Jodhpur, 2005 2. S.C. Talashikar and Dosani, Earthworm in Agriculture –, Agrobios Publications, Near Nasarani Cinema, Jodhpur, 342 002. 2010. 3. Ismail. SA , "Vermicology: Biology of Earthworms", Orient Longman Ltd, Chennai, India. 1997.Hall Publication.
E-Reference	1. https://clarkcountycomposts.org/images/class_3_-_red_worm_composting.pdf 2. https://www.free-ebooks.net/academic-science/Handbook-of-Vermicomposting/pdf?dl&preview 3. file:///C:/Users/ACER/Downloads/5c55d33672e19.pdf 4. https://www.uvm.edu/sites/default/files/Extension-Master-Gardener/compostingwithworms.pdf 5. https://ag.tennessee.edu/EPP/Redbook/Apiculture%20(Beekeeping).pdf 6. https://drive.google.com/file/d/1rpz8Qhqyy6UoOOVpLjIVDZP3ZXqjNBte/view 7. http://studymaterial.unipune.ac.in:8080/jspui/bitstream/123456789/7420/1/Apiculture.pdf
Course outcome	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	gain knowledge about taxonomy of earthworms	**K2**
CO2	know the types of earthworms and species used in vermicomposting	**K2**
CO3	understand and analyse the different methods of vermicomposting	**K3**
CO4	apply the knowledge on earthworms in soil fertility.	**K5**
CO5	gather information about influence of chemical inputs on earthworm activities and Large scale manufacture of Vermicompost	**K1,K2**

Mapping of COs with POs &PSOs:

CO	Pos								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	M	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	S	S	S	S	M	S	M	S	S	S
CO4	S	S	S	S	S	S	M	S	S	S	S	S	M
CO5	S	S	S	S	S	M	S	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

Course Code	U21ZON422	APICULTURE	L	T	P	C
NME	II		2	-	-	2
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To gain knowledge about the honey bees, its life style and social behaviour. ➢ To learn apiculture, and recognize the list of honey bees ➢ To know the economic importance of bee products ➢ To understand the biological features of honey bee and economic importance and get self employment.					
Unit I	**Introduction to Apiculture**					
Introduction to Apiculture – Scope of Apiculture. Honey bee – Classification, types of honey bees – *Apis dorsata, Apis florae, Apis indica* and Dammer bee, Bee colony- function of members – Different kinds of cells, Bee hive and its architecture, communication in bees.						
Unit II	**Bee colony**					
Bee colony- function of members – Different kinds of cells, Bee hive and its architecture, communication in bees.						
Unit III	**Apis indica**					
Apis indica – social life in Indian honey bee. Morphology of Queen, Drones and Workers.						
Unit IV	**Bee keeping**					
Bee keeping – methods of bee keeping in India – Primitive hives – wall type, movable type, bamboo hive. Modern hives – longs troth frame hive, Newtons hive. Appliances use in bee keeping.						
Unit V	**Economic importance of bee products**					
Economic importance of bee products – chemical composition, Nutritive value and medicinal uses of honey, bee wax, bee venom and disease of honey bees.						
Text Book	1. Dr. N. Arumugam, Applied Zoology Saras Publication, Nagerkovil, 2014. 2. Ravindranathan. K. R, A text book of Economic Zoology Dominant Publishers and distributors, New Delhi.2005.					

Reference Book	1. M. S. Nalina sundari, Entomology M. J. P Publications, Chennai, 2006. 2. Sharma P.L & Singh S. Hand book of Bee Keeping, Agrobius Publ, India, 2001. 3. Ravindranathan K. R. A text book of Economic Zoology. Dominent Publishing & distributors, New Delhi, 2005
E-references	1.http:// www.fao.org>docrep>pdf 2.http:// www.uaex.edu>special-programs>bee keeping
Course out come	**Upon completion of this course, the students will be able to**

CO	Course Outcomes	Knowledge Level
CO1	comprehend the scope of apiculture and honey bees classification	**K2**
CO2	learn bee colony and different kinds of cells	**K2**
CO3	acquire the knowledge Apis indica and morphology of queen, drones and workers	**K2**
CO4	understand biological features of bee keeping	**K2**
CO5	know the nutritive value and economic importance to become potential entrepreneur	**K3**

Mapping of COs with POs & PSOs:

CO	PO								PSO				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	S	S	S	M	S	S	S	M	S	S	M	M
CO2	S	S	S	M	S	S	M	S	S	M	M	S	S
CO3	S	S	M	S	S	S	S	S	S	M	S	S	M
CO4	S	S	S	S	S	S	S	S	M	M	S	S	M
CO5	S	S	M	S	S	S	M	S	S	M	S	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

SEMESTER-V

Course Code	U21ZOT51	FUNDAMENTALS OF ANIMAL PHYSIOLOGY	L	T	P	C
CORE	VIII		5	-	-	4
Cognitive Level	K1:Recall K2:Understand K4:Evaluate					
Learning objective	➢ To learn the digestion, respiration and circulatory system ➢ To study the structure and function of internal organs ➢ To know the excretory mechanism and its significance ➢ To get knowledge about the nerve, muscle and receptors of human body. ➢ To aware of hormonal roles in reproductive process.					
Unit I	**Physiology of Digestion**					
Structural organization and functions of gastrointestinal tract Mechanical and chemical digestion of food; Absorptions of food Hormonal control of secretion of enzymes in Gastrointestinal tract.						
Unit II	**Respiration Circulation**					
Respiration – Types of respiratory organs – Respiratory pigments – transport and exchange of gases control of respiration – biological oxidation anaerobiosis respiratory quotient. Structure and function of human Heart, haemodynamics, ECG, Blood pressure						
Unit III	**Excretion:**					
Structure of kidney and its functional unit; Mechanism of urine formation; 10 Regulation of water balance; Regulation of acid-base balance. Origin and Types of Nitrogenous wastes – Ammonotelism, Ureotelism and Uricotelism						
Unit IV	**Receptors and effectors:**					
Structure of neuron, resting membrane potential, conduction of action potential across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and, Neuromuscular junction; Reflex action and its types - reflex arc. Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanus						
Unit V	**Endocrine System and Reproductive Physiology:**					
Types of endocrine glands – pituitary, thyroid, parathyroid, adrenal and sex glands – their secretions and physiological role, Human reproductive cycle and the role of hormones.						
References	1. Text Book of Medical Physiology, Elsevier Inc. Hall, J.E., 2013,					

Text Books	1. Animal Physiology- P.S Verma, B.S.Tyagi, V.K. Agarwal, II edt, 1978, S.Chand & Company Ltd. Ram Nagar, New Delhi – 110 055. 2.General comparative physiology by Hoar, S. William, 3rd edt, 1987, Prentice Hall of India Pvt. Ltd. New Delhi, 18 BN-0-87692-337-6.
E-References	Animal Physiology : https://www.classcentral.com/course/swayam-animal-physiology-12894 Animal Physiology : https://swayam.gov.in/nd1_noc20_bt42/preview Respiration in the Human Body: https://www.classcentral.com/course/edx-respiration-in-the-human-body-3050
Course out come	Upon completion of this course, the students can able to

CO	Course Outcomes	Knowledge Level
CO1	know the physiological process of digestion respiration and circulation and diseases associated with them.	**K1**
CO2	attain knowledge on respiratory organ and blood circulation systems	**K2**
CO3	comprehend he structure and function of of excretory system	**K4**
CO4	interpret the association between the nerve coordination and muscle physiology.	**K4**
CO5	gain a deep knowledge on endocrine and reproductive system	**K2**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	M	S	S	S	S	M	M	S	S	M
CO2	S	S	S	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	M	M	S	S	S
CO5	S	S	S	M	S	S	M	S	S	M	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOT52	GENETICS & BIOSTATISTICS	L	T	P	C
CORE	IX		5	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To study the basic concept of gene interaction ➢ To learn sex chromosome, syndromes and gene transformation ➢ To get thorough knowledge on gene transformation ➢ To know the biological data collection, tabulation and sampling methods ➢ To acquire the knowledge of biological data and statistical tool for excellent presentation					
Unit I	**Mendel's Experiments:**					
Mendel's Experiments. Interaction of genes -- Epistasis, Complementary and supplementary. Multiple alleles – Blood groups - inheritance. Polygenic inheritance – Inheritance of skin colour.						
Unit II	**Linkage & Crossing over in Drosophila:**					
Linkage & Crossing over in Drosophila. Chromosomal maps. Sex chromosomes and sex chromatins Sex determination in Man Sex linked inheritance, sex influenced genes and sex limited genes. Extra – chromosomal inheritance.						
Unit III	**Bacterial transformation**					
Bacterial transformation – Conjugation -- Transduction – Gene regulation – Genetic Code Bacteriophages – Structure and Replication.						
Unit IV	**Population Genetics**					
Population Genetics – Hardy Weinberg law. Syndromes: Down, Klinefelter, Turner. Inbreeding, Out breeding and Heterosis. Eugenics, Euthenics and Genetic Counselling.						
Unit V	**Statistical Methods**					
Statistical Methods- Collection of data; Sampling methods, presentation of data; Frequency analysis, parts of a table frequency distribution. frequency polygon, frequency polycurve, Histogram, bar charts, pie diagrams.– Chi square analysis. Probability. Analysis of data; measure of central value calculation of mean, mode, median, standard deviation and standard error. Coefficient of Variation.						
Text Books	1.Genetics by P.K. Gupta, Rastogi Publications, 3rd edt, ISBN-81-7133-842-9, Meerut ,. 2015 2.Ramakrishnan P. Biostatistics ,Saras Publication Nagercoil, Tamilnadu. 2015.					

References Books	1. Gardner Eldon, J., D. Peter Snustad**.** . Principles of Genetics, 8th Edition. John Wiley & Sons.2012. 2. Genetics by Verma P.S. and Agarwal V.K., revised edt, ISBN-81-219-3114-2. S. Chand & Co. New Delhi –2010, 3. Primrose SB and Twyman R. Principles of Gene Manipulation and Genomics, John Wiley & Sons, London, UK. 2006 4. Pandey M. Biostatistics Basic and Advanced, Publishers Viva Books, New Delhi .2015.
E-references	1. http://www.maths.lth.se/matstat/kurser/statgen/book/StatisticsInGenetics-20031125.pdf 2. http://www.bionica.info/biblioteca/AnonimoxxxIntroductionMolecularGenetics.pdf
Course out come	Upon completion of this course, the students will be able to

	CO	**Course Outcomes**	**Knowledge Level**
	CO1	know the basic concepts of genetics, multiple alleles and polygenic inheritance	**K1**
	CO2	acquire thorough knowledge on linkage & crossing over in Drosophila	**K2**
	CO3	learn the types and mechanism bacterial transformation	**K2**
	CO4	know the population genetics, Eugenics, Euthenics and Genetic counseling.	**K2**
	CO5	understand the hypothesis testing, significance of correlation and application of this tool in biology.	**K3**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	S	S	S	M	S	M	S	M	S	M
CO2	M	S	S	S	S	S	S	S	S	M	S	S	S
CO3	S	S	M	S	S	M	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	S	S	M	S	M	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOT53	BASICS BIOCHEMISTRY	L	T	P	C
CORE	X		5	-	-	4
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To know the structure and properties of biomolecules. ➢ To understand the role of carbohydrates, Protein and lipids ➢ To study the different metabolic cycles ➢ To know the importance of enzymes, vitamins ➢ To understand the role of nucleic acids & vitamins					
Unit I	**Introduction to Biomolecules:**					
Bimolecules - Introduction and bonding –Strong and weak bonds– pH and buffers. Acid-Base balance,Buffer concept and significance– Henderson – Hassel Bach equation. Metabolism- Anabplism, catabolism.						
Unit II	**Carbohydrates**					
Carbohydrates – Classification structure, Biological importance, carbohydrate metabolism – Glycolysis, TCA, Cycle, Glycogenesis, glycogenolysis gluconeogenesis, HMP Shunt pathway						
Unit III	**Amino acids:**					
Structure and properties of Amino acids – Zwitterions. Protein classification. Properties and importance's – Level of Organization – Primary, Secondary, Ramachandran Plot, tertiary and quaternary structure of protein						
Unit IV	**Lipids**					
Classification, properties and biological importance, Biosynthesis of cholesterol and B-Oxidation of lipids. Enzymes- Classification and mechanism of action, Factors affecting enzyme action, enzyme inhibition						
Unit V	**Nucleic acids**					
Nucleoproteins & nucleosides, Nucleotides, chemical structure of DNA & RNA Their importance Role of Vitamins in biological system.						

Text Books	1. Ambika Shanmugam, Fundamentals of Biochemistry for Medical students, Published by the Author, Madras. 2012, 2. Rastogi, S.C. Biochemistry, 3rd Edition Tata Mc Graw Hill Edition, New Delhi. 2010.
Reference Books	1. Harpers Illustrated Biochemistry, 30th Edition The McGraw- Hill Education,2011. 2. Nelson, D.L., Leninger, A.L. and Cox, M.M.., Lehninger Principles of Biochemistry, W.H. Freeman Co.,2012. 3. Deb, AC. Fundamental of Biochemistry, 10th Edition New Central Book Agency. Pvt.Ltd ,Kolkata, 2011.
E-References	1. http://swayam.gov.in / nd1.noc19_bt19/preview 2. http://www.swayam.gov.in/nd1_noc20_bt11/ Preview 3. http://ndl.iitkgp.ac.in/
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	gain basic knowledge on biomolecules	**K2**
CO2	understand the biological importance and metabolism of carbohydrate	**K2**
CO3	get thorough knowledge on the metabolism and importance of aminoacids	**K2**
CO4	know the classification, properties and biological importance of lipids	**K2**
CO5	illustrate the structure of DNA & RNA their importance	**K3**

Mapping of COs with POs & PSOs

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES(PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	M	M	S	M	S	S	M	M
CO2	S	S	S	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	M	S	M	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOT54	FUNDAMENTAL CONCEPTS OF DEVELOPMENTAL BIOLOGY	L	T	P	C
CORE	XI		5	-	-	4
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To know the various stages involved in the embryo development ➢ To study the process of fertilization and its development like organogenesis ➢ To enlighten about the embryo formation and development ➢ To learn the organogenesis process of C.elegans ➢ To understand the teratogenesis and stem cell therapy					
Unit I	**Introduction to Developmental Biology:**					
Definition, History of Developmental Biology - Theories of Preformation – epigenesis – Von Baer's law and biogenetic theory. Gametogenesis – Spermatogenesis and Oogenesis. Structure of egg and sperm of Amphioxus, frog, Chick and rabbit.						
Unit II	**Fertilization:**					
Fertilization, Physicochemical, Cytological and Biochemical aspects of fertilization, Cleavage and its pattern in Vertebrates; Morula – Types of blastula. Gastrulation morphogenetic, Movements – Neurula. Organogenesis – Development of heart, brain, and eye in chick.						
Unit III	**Embryonic adaptation:**					
Foetal membranes in Chick – placenta in mammals. Experimental embryology: Organizer Concept – field and gradients - amphibian metamorphosis and its hormonal. Control. Regeneration in planarians and Amphibian.						
Unit IV	**Late Development in invertebrate /vertebrate models** :					
Organogenesis- development of ectodermal organs, mesodermal organs, endodermal organs, vulval formation in C.elegans						
Unit V	**Medical implications:**					
Germ cell specification& migration , Medical implications of developmental biology - genetic errors/ teratogenesis/ stem cell therapy etc						
Text Book	1. Developmental Biology - Arumugam N. Saras Publicaion – kottar. 2007. 2. Modern Experimental Zoology by Preeti Guptha and Mridula Chaturvedi. 2000.					

References	1. Modern Experimental Zoology by Preeti Guptha and Mridula Chaturvedi. 2010. 2. An introduction to embryology, – Balinsky B.I- W.B.Saunders Co.., Philadelphia, 2008 3. Strickberger, Evolution, Jones and Barlett Publishers Inc., London, 2010.
E-References	1. https://mobot-biodiversity-jc.weebly.com/uploads/1/8/6/0/18603232/the_evolutionary_biology_of_species_by_t_g_barraclough_2019.pdf 2. http://bgc.org.in/pdf/study-material/developmental-biology-7th-ed-sf-gilbert.pdf 3. https://www.blackwellpublishing.com/ridley/EVOC20.pdf
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand the history of developmental biology and gametogenesis, spermatogenesis and oogenesis process	**K2**
CO2	learn the fertilization, physicochemical, cytological and biochemical aspects of fertilization, cleavage and its pattern in vertebrates	**K2**
CO3	illustrate the process of embryonic adaptation	**K3**
CO4	know the organogenesis process of C.elegans	**K2**
CO5	Gain knowledge on teratogenesis and stem cell therapy	**K2**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	M	S	S	S	S	M
CO2	S	S	M	S	S	S	S	M	S	S	S	S	S
CO3	S	S	M	S	S	S	M	M	S	S	S	S	S
CO4	S	M	M	M	S	S	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	M	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOP55	ANIMAL PHYSIOLOGY, DEVELOPMENTAL BIOLOGY, GENETICS & BIOSTATISTICS AND BASICS BIOCHEMISTRY(Practical)	L	T	P	C
CORE	XII		-	-	5	4
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To understand various stages involved in cell division ➢ To observe and learn the structure of Giant chromosomes ➢ To gain knowledge about different stages of frog embryo ➢ To learn the significance of living fossils ➢ To understand mendelian genetics and statistical tool					
	ANIMAL PHYSIOLOGY **Mounting Estimation and Observations** • Preparation of human blood smear • ABO blood grouping • Counting of different types of blood cells using haemocytometer - Demonstration of. W.B.C. & R.B.C. count • Differential leukocyte count • **Blood** Analysis – Hb Estimation (Sahli's Sethod) • Use of Kymograph unit, • Demonstration of blood pressure in Sphygmomanometer. , Respirometer. • Survey of Digestive enzymes in cockroach. • Estimations of excretory products of fish, bird and mammal and detections of ammonia, urea and uric acid. • Urine Analysis – Detections of Albumins, Sugar and Deposits. • Observations & Study of mantoux test, widal test **DEVELOPMENTAL BIOLOGY:** 1. Chick blastoderm mounting 2. Observation of chick blastoderm i. 24 hrs ii. 72 hrs iii.. 96 hrs 3. Placental types – Diffuse, Cotyledonary, Discoidal and Zonary **EVOLUTION** 1.Variation – Finger Prints. 2 .Vestigial Organ. 3.Examples of evolutionary significance of Peripatus, Limulus and Archaeopteryx. Animals with adaptive colouration. (Stick insect & Chamaeleon).					

	GENETICS AND BIOSTATISTICS: 1. Observation and record of simple mendelian traits 2. Pedigree analysis – chart preparation 3. Problems based on gene frequency – Hardy Weinberg Law 4. Calculation of mean, mode, median, variance and standard deviation Using leaves 5. Problems related to Student T test, Chi Square test **BIOCHEMISTRY** 1.Qualitative analysis of Carbohydrate, lipid and protein 2. Protein estimation by Lowry methods 3. DNA estimation 4. Separation techniques-Circular paper chromatography A record of lab work should be maintained and submitted at the time of the practical examination. Study tour to the minimum of 1 day duration to be conducted compulsory.
Text Books	1. Lal, S.S, A Text Book of Practical Zoology: Rastogi, Meerut.2014. 2. Verma, PS.A Manual of Practical Zoology-third volume S Chand Publications, New Delhi. 2010, 3. Rajamanickam, C. Experimental protocols in basic molecular biology, Osho Scientific Publications, Madurai. 2001
Reference Books	1. Nigam and A.Ayyagai Lab Manual in Biochemistry, Immunology and Biotechnology. Tata McGraw- Hill Publication, New Delhi, 2007. 2. Zar, J.H. Biostatistical Analysis, Low Price Edition Pearson Education, India, 2008.
E-References	1. http:// www.ecoursesonline.iasri.res.in 2. http:// www.onlinelibrary.wiley.com
Course out come	Upon completion of this course, the students will be able to

	CO	**Course Outcomes**	**Knowledge Level**
	CO1	analyse the various stages of cell divisions	**K5**
	CO2	understand the various stages of embryo development	**K2**
	CO3	learn and interpret the development and evolution process	**K3**
	CO4	develop skill in observing, analyzing and calculating various biological data	**K3**
	CO5	gain knowledge on Mendelian characters, probability tests and Biostatistical calculation	**K3**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	M	S	S	S	S	M
CO2	S	M	S	S	M	S	S	M	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	M	M	S	S	S	S	S	S	M	S	M	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks

Moderately Correlating (M) - 2 marks

Weakly Correlating (W) -1 mark

No Correlation (N) - 0 mark

Course Code	U21ZOE521	CANCER BIOLOGY	L	T	P	C
Elective	III		3	-	-	3
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To distinguish normal cell and cancer cell. ➢ To understand the various methods of diagnosis of cancer ➢ To obtain the knowledge of staging the cancer cells ➢ To know about different types of cancer ➢ To obtain the knowledge about treatments for cancer.					
UNIT – I	**Cancer Cell:**					
Properties of normal cell and cancer cell, benign tumor and malignant tumor. Type of cancer common symptoms, causative factors Definition of primary and secondary cancer.						
UNIT – II	**Diagnosis of cancer:**					
Classification and diagnosis of cancer by tissue type - Solid tumor, Histopathological diagnosis. Immunohistochemistry Hematological malignancies, morphological diagnosis Biopsy its types. Clinical examinations.						
UNIT – III	**Cancer classification:**					
TNM classification Purpose types of staging. TNM System, Stage grouping. Factors affecting the stage and staging system.						
UNIT – IV	**Sporadic cancers:**					
Sporadic cancers, hereditary cancers, examples of cancer susceptibility syndromes, Immune suppression related malignancies, transplantation related malignancies.						
UNIT –V	**Cancer treatments-**					
Surgery and its types, Radiation, Chemotherapy, Biological therapy, Hormone therapy, transplantation. Targeted therapy, Gene therapy and other treatment methods						
Text Books	1. Renganathan, T.S.. A text book of Human Anatomy. VI edn. S. Chand and Company Ltd., New Delhi. 2002 2. Robert A. Weinberg.(Author), Roberts A Weinberg (Author).The Biology of cancer, 2nd Edition 2nd Edition,2005					

Reference Books	1. Vander, A.J. Sherman, J.H. and Luciano, D.S.. Human Physiology: The mechanism of body functions, VI edn. Mc Graw-Hill Publications, New York. 1994 2. Lewis J.Kleinsmith. Principles of cancer Biology, Ie first Edition English, Paperback, 2001 3. Robert G.Mc kinnell Ralph E. Parchment Alan O.Perantoni .The Biological Basis of Cance.r Second edition English, Soft Cover,1998 4. Hesteth Dr Robin HeskethIntroduction to Cancer Biology English, Paperback,2000
E-References	1. http://csbl.bmb.uga.edu/mirrors/JLU/DragonStar2017/download/introduction-to-cancer-biology.pdf 2. https://sphweb.bumc.bu.edu/otlt/MPH-Modules/PH/PH709_Cancer/A10-Cancer.pdf
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	differentiate between normal cell and cancer cell.	**K3**
CO2	understand the classification and diagnosis of cancer by tissue type	**K2**
CO3	gain the knowledge of classification of cancer	**K1**
CO4	understand the sporadic cancers, hereditary cancers and examples of cancer susceptibility syndromes	**K2**
CO5	acquire the knowledge of cancer treatments like radiation, chemotherapy, biological therapy, hormone therapy and transplantation	**K2**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	M	S	S	M	S	S	S	M
CO2	S	S	S	S	S	M	S	S	M	S	S	M	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	M	S	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOE522	PARASITOLOGY	L	T	P	C
Elective	III		3	-	-	3
Cognitive Level	K1:Recall K2:Understand					
Learning objectives	• To understand the concept of parasitology • To know the morphology of parasite • To understand the biological description of all types of parasites					
Unit I	**Introduction to Parasitology**					
Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship						
Unit II	**Parasitic Protists**					
Study of Morphology, Life Cycle, Prevalence, Epidemiology,Pathogenicity, Diagnosis, Prophylaxis and Treatment of Entamoeba histolytica, Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani, Plasmodium vivax						
Unit III	**Parasitic Platyhelminthes**					
Study of Morphology, Life Cycle, Prevalence,Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Fasciolopsis buski, Schistosoma haematobium, Taenia solium and Hymenolepis nana						
Unit IV	**Parasitic Nematodes**					
Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Ascaris lumbricoides, Ancylostoma duodenale, Wuchereria bancrofti and Trichinella spiralis. Study of structure, life cycle and importance of Meloidogyne (root knot nematode), Pratylencus (lesion nematode)						
Unit V	**Parasitic Arthropoda**					
Biology, importance and control of ticks, mites, Pediculus humanus (head and body louse), Xenopsylla cheopis and Cimex lectularius. Parasitic Vertebrates - A brief account of parasitic vertebrates; Cookicutter Shark, Candiru, Hood Mockingbird and Vampire bat						
Text Books	1. Arora, D. R and Arora, B. Medical Parasitology. II Edition. CBS Publications and Distributors.2001. 2. Parija, S. C. Textbook of medical parasitology, protozoology & helminthology (Text and colour Atlas), II Edition, All India Publishers & Distributers, Medical Books Publishers, Chennai, Delhi-1998					

Reference Books	1. Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. Biology of Disease. Taylor and Francis Group.2007. 2. K. D. Chatterjee. Parasitology: Protozoology and Helminthology. XIII Edition, CBS Publishers & Distributors (P) Ltd.2009.
E-Reference	https://www.nature.com/subjects/parasitology#:~:text=Parasitology%20is%20the%20scientific%20discipline,host%20response%20to%20these%20agents.
Course outcome	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand the general introduction about parasitism	**K1**
CO2	know the morphological feature of parasites	**K2**
CO3	comprehend the platyhelminthes parasitic life	**K2**
CO4	acquire knowledge on nematode parasites	**K2**
CO5	gain knowledge about vertebrate parasites	**K2**

Mapping of COs with POs & PSOs

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	S	S	S	S	S	S	M	S	S	M	S	M
CO2	S	S	M	S	S	S	S	M	S	M	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S	S	S
CO5	M	S	S	S	S	M	S	M	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOS531	POULTRY FARMING	L	T	P	C
SBE	III		2	-	-	2
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To study the poultry nutrition and physiology ➢ To learn the nutritive value of egg ➢ To understand the poultry health and management ➢ To learn the techniques in poultry science ➢ To acquire the skill to become entrepreneur					
Unit I	**Poultry Nutrition and Physiology:**					
Essential amino acids, proteins, fatty acids, vitamins and minerals their inter-relationships. Functional regulation of digestion, absorption and metabolism of nutrients.						
Unit II	**Feed formulation for different species and groups:**					
Different systems of feeding wet mash, dry mash, crumble and pellet feeding. Feed Passage rate in G.I. tract in relation to digestion and absorption efficiency; Characteristics features of endocrine glands. Endocrine control and variable factors influencing growth process						
Unit III	**Poultry Products technology:**					
Structure, chemical composition and nutritive value of egg. Various measures of egg quality. Shell, albumen and yolk quality assessment. Factors influencing egg quality traits. Mechanism of deterioration of egg quality. Different methods of preservation of table eggs and their relative merits and demerits. Physical, chemicals, microbial and organoleptic evaluation of meat quality						
Unit IV	**Poultry Health Management:**					
Common diseases of poultry – bacterial, viral, fungal, protozoan, parasitic and other emerging diseases of poultry, their prevention control and treatment. Metabolic and nutrient deficiency diseases and disorders.						
Unit V	**Vaccination programmes and Deworming programmes:**					
Control of coccidiosis, worms, ectoparasites and flies. Medication procedures. Cleaning and disinfection of poultry houses. Drinking water sanitation						
Text Books	1. P.V. Sreenivasaiah Text book of Poultry Science,2002 2. Nilotpal Ghosh - A text book by Poultry Science and practice,2010					

Reference Books	1. Benjamin Macclare- Advances in Poultry science,1999 2. Carlos Hassey- Poultry sciences- Breeding, Rearing and Management of animals,2000		
E-references	1. http://www.fao.org/3/y5169e/y5169e.pdf 2. http://dahd.nic.in/sites/default/filess/Excerpts%20of%20Poultry%20Farmn%20Manual-ilovepdf-compressed.pdf		
Course out come	Upon completion of this course, the students will be		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	learn the nutrition and physiology of poultry	**K2**
	CO2	understand the feed formulation for different species and groups	**K2**
	CO3	develop the skills in analyzing poultry eggs	**K3**
	CO4	identify and manage the microbial infections in poultry	**K3**
	CO5	gather knowledge about metabolic and nutrient deficiency diseases and disorders	**K2**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES(PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	M	S	M	S	S	S	M
CO2	S	M	S	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	M
CO4	S	S	S	S	S	M	S	S	S	S	S	S	M
CO5	S	S	S	S	M	S	M	S	M	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOS532	SERICULTURE	L	T	P	C
SBE	III		2	-	-	2
Cognitive Level	K2:Understand K3:Apply					
Learning Objective	➢ To enlighten the students about sericulture a profitable culture practice. ➢ To enhance the skills, competitiveness and employability of the students ➢ To gain the knowledge of silk production, disease management, quality of silk and marketability. ➢ Non major elective student can become entrepreneur.					
Unit I	**Introduction to sericulture& moriculture**					
Classification of Mulberry, Methods of cultivation. Biology and diseases of Silkworms Life cycle, External morphology and biology of mulberry silkworm. Internal morphology of Silkworm – Digestive, Respiratory, Nervous, Excretory and Reproductive systems.						
Unit II	**Seed /silkworm eggs**					
Structure – Commercial and reproductive, Seeds, Voltinism, Hibernating and Non hibernating eggs. Diseases of *Bombyx mori* -Viral, bacterial protozoan and fungal, Preventive and control measures. Insect and vertebrate Pests of silkworm and their management.						
Unit III	**Rearing**					
Rearing house and appliances, Rearing processes. Chawki worm rearing – optimum feeding, optimum Environmental conditions, care during rearing and cleaning. Selection of ripe worm, spinning, mounting, Harvesting, storage and transport. Reeling – Stifling, reeling appliances – types of reeling machines, Country charka, cottage basin, filature units, Applications of silk.						
Text Books	1. M. S. Nalina sundari, Entomology M. J. P Publications, Chennai, 2006. 2. Sharma P.L & Singh S. Hand book of Bee Keeping, Agrobius Publ, India, 2001. 3. Ravindranathan K. R. A text book of Economic Zoology. Dominent Publishing & distributors, New Delhi, 2005					

Reference Books	1. Ganga & J. Sulochana Chetty, An introduction to sericulture (Oxford & IBH bubl.Co.Pvt. Ltd.) 2001. 2. Hand Book of Practical Sericulture by Ullal and Narsimhanna. CSB. Bangalore.2002
E-References	1. http://www.survivorlibrary.com/library/silk_culture-a_manual_with_complete_instructions_1885.pdf 2. https://n-modell.hu/11kopjts/178679-introduction-to-sericulture-pdf
Course out come	Upon completion of this course, the students will be to

CO	Course Outcomes	Knowledge Level
CO1	acquire knowledge about sericulture and moriculture	**K2**
CO2	learn the commercial and reproductive system of silkworm eggs and pests of silkworm and their management	**K2**
CO3	gain knowledge of rearing house and appliances	**K2**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES(PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	M	M	M	S	S	S	M
CO2	S	S	S	M	S	S	M	M	M	S	M	S	S
CO3	S	S	S	M	S	S	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

SEMESTER VI

Course Code	U21ZOT61	GENETIC ENGINEERING & BIOTECHNOLOGY	L	T	P	C
CORE	XIII		5	-	-	4
Cognitive Level	K2:Understand K3:Apply K6: Create					
Learning objective	• To know the concepts of biotechnology and familiarize with the tools and techniques of Biotechnology • To acquire knowledge on tissue culture and learn the fundamentals of patenting of biological products. • To be familiar with microbial degradation of bioremediation and biomining process. • To understand the production and application of stem cell production • To elucidate the production of transgenic animals and their importance.					
Unit I	**Introduction to Genetic Engineering**					
History and scope of Genetic Engineering and biotechnology, Basic steps in Gene cloning, Restriction enzymes. Cloning Vectors -Bacterial plasmids (p BR 322) Bacteriophage Vector – (Lambda) Animal vector – (SV 40)						
Unit II	**Introduction of DNA into cells**					
Bacteria – Transformation, Plants –Electroporation, Animals – shot gun method, Liposome mediated fusion. Identification of recombinant hosts – Bacteria, Transgenic plants a brief note. Application of Recombinant DNA in medicine and industry, Biohazards of recombinant DNA.						
Unit III	**Animal cell and Tissue culture**					
Animal cell, culture media physical, chemical functions of different constituents of culture medium, Role of carbon dioxide, growth factors, Glutamine in culture medium, serum and protein free media and their applications. Types of cell culture; Primary and established culture, Organ culture Disaggregation of tissue, cell separation cell synchronization, Cryopreservation.						
Unit IV	**Environmental Biotechnology**					
Pollution control –Waste Treatment Anaerobic, Aerobic Waste Treatment, Biodegradation, Microorganism in Pollution Control. Bioremediation, Biosensors and Biofuels						
Unit V	**Transgenic animals**					
Production, application advantages. Transgenic animals in livestock improvement, PCR, DNA finger printing, Ethical issues in animal Biotechnology. Stem cell culture - production and application.						

Text Books	1. P. K. Gupta Rastogi and Co, Elements of Biotechnology. Meerut. 2016. 2. S.K. Agarwal, Environmental Biotechnology APH Publication Co, New Delhi – 2010. 3. V. Kumaresan ,Biotechnology – Saras Publication , (2015)
Reference Books	1. R.C Dubey, A Text book of Biotechnology. III Ed.,S.Chand& company Ltd. 2003. 2. H.K.Das Text book of Biotechnology . III Ed., Wiley India (P) Ltd. ,2004. 3. S.C.Rastogi, Biotechnology – Principles and Applications – I Ed., Narosa Publishing house. 2007.
E-References	1. https://thunderbooks.files.wordpress.com/2009/05/introduction-to-biotechnology-and-genetic-engineering-infinity-2008.pdf 2. http://www.ifsc.usp.br/~ilanacamargo/FFI0740/2.pdf 3. https://ingeniumcanada.org/sites/default/files/2019-01/education-genetics-and-biotechnology-eak.pdf
Course out come	Upon completion of this course, the students can able to

CO	Course Outcomes	Knowledge Level
CO1	understand the genetic engineering tools and gene cloning.	**K2**
CO2	know the transformation mechanism of gene	**K2**
CO3	comprehend the values of animal tissue culture	**K2**
CO4	apply the knowledge of genetic engineering in environmental management	**K3**
CO5	learn the techniques and create new transgenic animals	**K6**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES(PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	S	S	S	S	M	S	S	M	M	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	M	S	S	S	M	S	S	S
CO5	S	S	S	S	S	S	S	S	M	M	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOT62	MICROBIOLOGY AND IMMUNOLOGY	L	T	P	C
CORE	XIV		5	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To provide the knowledge with the latest information in scientific microbiological methods. ➢ To learn the microbial culture and maintenance techniques ➢ To get skills of microbial culture and application of this knowledge to well being of human health and environmental health. ➢ To provide the knowledge of auto immune diseases ➢ Acquire the knowledge to understand the science of immunology for the new invention of vaccine for some deadly diseases.					
Unit I	**Introduction**					
History and scope of Microbiology. Outline classification of microorganisms. General structure of microbes - Bacteria, fungi, Virus algae and protozoa. **Bacterial growth:** Culture media and selective media; continuous and batch culture technique; growth curve.						
Unit II	**Applied Microbiology**					
Food Microbiology: Food poisoning, food spoilage and preservation. Industrial Microbiology: Production of antibiotic with reference & penicillin production. . Soil microbiology: Role of soil microbes in N_2 fixation.						
Unit III	**Medical Microbiology**					
Diseases caused by bacteria in different system of man as given below. Dermal – streptococcal inflammation-upper respiratory tract streptococcal. Respiratory – Tuberculosis. Gastro – intestinal – dysentery. Reproductive – Gonorrhea. Viral disease with reference to causative organisms, symptoms, impact on the host and control measures						
Unit IV	**Immunology**					
History and scope of immunology Immunity – Types of Immunity – Innate and acquired, passive and active. Lymphoid organs – primary and secondary (Thymus, Bone Marrow, Bursa of fabricius, spleen, tonsil, lymph node, payer's patches).						
Unit V	**Immunology:**					
Immunoglobulin structure and function, biological properties of lg classes. Interaction of antigen and antibody, complement activation. Immunopathology: - Major histocompatibility complex and its significance. HLA. Hypersensitivity - Types of hypersensitivity. AIDS and immunity.						

Text Books	1. P.K Gupta, Immunology, Rastogi publication, meerut, 2016. 2. Ananda narayanan, T. and Jayram Paniker, C.K., Textbook of Microbiology, 6th Ed. 3. Orient Longman Ltd., Chennai. 2010. 4. Kannan, I., Immunology, MJP publishers, Chennai. 2011.
Reference Books	1. Microbiolog**y.** Michel J. Pelezar, JR., E.C.S. Chan, Noel R. Krieg, 5th edt. Tata MaGraw- Hill Publishing Company Ltd, New Delhi.2001. 2. Immunology & Immunotechnology, Ashim K. Chakravarth, Published in India by oxford university press, Jai Singh Road, New Delhi.2006. 3. Arora, M.P. Immunology, Ane Books Pvt. Ltd., New Delhi, 2010. 4. Immunology & Immunotechnology, Ashim K. Chakravarth, Published in India by oxford university press, Jai Singh Road, New Delhi. 2006.
E-References	1. https://labscientists.files.wordpress.com/2017/12/microbiology-immunology-1.pdf 2. http://lib.rudn.ru/file/Immunology_Microbiology_Catalogue_eBook.pdf 3. https://www.moscmm.org/pdf/Ananthanarayan%20microbio.pdf 4. https://alraziuni.edu.ye/book1/Laboratories/microbiology%20immunology.pdf
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	gain knowledge with microbial culture and maintenance techniques	**K2**
CO2	learn the food poisoning, food spoilage and preservation and production of antibiotics	**K1**
CO3	Know the diseases caused by bacteria in different system of man	**K2**
CO4	acquire the knowledge of auto immune diseases	**K2**
CO5	attain the knowledge to understand the structure and function of immunoglobulin	**K3**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES(PO)								PROGRAMME SPECIFIC OUTCOMES(PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	M	S	S	S	S	M	M	S	S	M
CO2	S	S	S	M	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	S	M	M	S	S	S
CO5	S	S	S	M	S	S	M	S	S	M	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21ZOT63	EVOLUTION	L	T	P	C
CORE	XV		5	-	-	4
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To know the various stages involved in the embryo development ➢ To study the process of fertilization and its development like organogenesis ➢ To enlighten about the embryo formation and development ➢ To learn the evolutionary process and understand the importance of fossils ➢ To understand the evolutionary theories and speciation process.					
Unit I	**Introduction to Evolution:**					
Introduction- Origins of evolutionary thought, Early ideas of evolution, Concept of Evolution, Origin of Life, Origin of Prokaryotes and Eukaryotes.						
Unit II	**Theories of Evolution:**					
Theories of Evolution – Lamarckism, Darwinism, Neo – Lamarckism, Neo – Darwinism, Mutation theory of Devries modern synthetic theory. Isolating mechanism.						
Unit III	**Evidences of evolution:**					
Morphological, Embryological, Physiological, Geographical and Geological, immunological evidences for evolution. Fossils, Geological time scale						
Unit IV	**Species Concepts:**					
Species Concepts and Species Attributes, The "Modern Synthesis" The nature of evolutionary units; Species concepts- Speciation (Allopatric & sympatric). A general theory of speciation						
Unit V	**The causes of evolution:**					
Hardy-Weinberg equilibrium – Mutation Geneflow, Genetic drift Nonrandom breeding. Natural selection I: Stabilizing, directional, and disruptive selectio- Natural selection II: The general selection model.- Group selection, kin selection, and sociobiology.						
Text Book	1. Developmental Biology - Arumugam N. Saras Publicaion – kottar. 2007. 2. Modern Experimental Zoology by Preeti Guptha and Mridula Chaturvedi. 2000.					

References	1. Modern Experimental Zoology by Preeti Guptha and Mridula Chaturvedi. 2010. 2. An introduction to embryology, – Balinsky B.I- W.B.Saunders Co.., Philadelphia, 2008 3.Strickberger, Evolution, Jones and Barlett Publishers Inc., London, 2010.
E-References	1. https://mobot-biodiversity-jc.weebly.com/uploads/1/8/6/0/18603232/the_evolutionary_biology_of_species_by_t_g_barraclough_2019.pdf 2. http://bgc.org.in/pdf/study-material/developmental-biology-7th-ed-sf-gilbert.pdf 3. https://www.blackwellpublishing.com/ridley/EVOC20.pdf
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand the history of developmental biology and gametogenesis, spermatogenesis and oogenesis process	**K2**
CO2	learn the fertilization, physicochemical, cytological and biochemical aspects of fertilization, cleavage and its pattern in vertebrates	**K2**
CO3	illustrate the process of embryonic adaptation	**K3**
CO4	know the theories of evolution	**K2**
CO5	identify and conserve genetic resources mutation theory of devries modern synthetic theory	**K3**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	M	S	S	S	S	M
CO2	S	S	M	S	S	S	S	M	S	S	S	S	S
CO3	S	S	M	S	S	S	M	M	S	S	S	S	S
CO4	S	M	M	M	S	S	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	M	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOT64	ENVIRONMENTAL BIOLOGY	L	T	P	C
Core	XVI		4	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply K4:Evaluate					
Learning objective	➢ To know the factors involved in the environment ➢ To comprehend the relationship occurs between the organism ➢ To understand the population, community ecology and function of ecosystems ➢ To list biotic and abiotic factors that affect, the distribution, dispersal, and behaviour of organisms. ➢ To describe the structure and function of ecological systems and explain how ecological systems work at different spatial and temporal scales.					
Unit I	**Light:**					
Physico-chemical factors: Light: Spectra (composition of light), Light on land, light in water. Biological effects of light. Temperature: Range, Diurnal variation, thermal Stratification, temperature tolerance, Classification of Organisms. Adaptation of extreme temperature, Biological effects of temperature. Medium and substratum: Atmosphere and Air; Lithosphere and soil; Hydrosphere and water.						
Unit II	**Inter specific relationships and intra specific relationships**					
Types and example, Colonization, Aggregation, Social organization, Psychological Factors Population Ecology: Types, density, and estimation, natality, mortality, age, distribution, growth pattern, fluctuation and equilibrium biotic potential. Dispersal and distribution, Regulation of population.						
Unit III	**Ecosystem**					
Community, characteristics, diversity dominance, structure, Stratification, periodicity, fluctuation, Ecotone and edge effect, Ecological niche, equivalence, ecotypes, ecological succession Ecosystem: Components, food chain and its types- food web, Ecological pyramids. Energy flow and productivity – Examples (Pond and Forests) – Biogeochemical cycles- carbon, Nitrogen and phosphorous.						
Unit IV	**Habitats**					
Fresh water, Marine, Terrestrial and Estuarine Habitats Pollution: Kinds, sources of pollution, Hazards of pollution to human, animals, plants and Buildings. /control and remedial measures. Practical Application of ecology in fishery, management, agriculture And forestry. Wild life conservation in India.						
Unit V	**Biodiversity**					
Types and Levels- Species diversity, values of biodiversity. Causes of erosion of biodiversity. Conservation of biodiversity, Application of remote Sensing in biodiversity.						

Text Books	1. P. D. Sharma, Environmental Biology: Rastogi Publications, Meerut, 2016. 2. Gupta PK. *Cytology, Genetics and Evolution*, Rastogi Publications, Meerut,2016. 3. Arumugam N. *Concepts of Ecology*, Saras Publication, Nagercoil, Tamilnadu,2014.
Reference Books	1. P.S. Verma & V.K.Agarwal, Environmental Biology (Principles of ecology) ISBN- 81-219-0859-0S. Chand &Co. Ram nagar, New Delhi , 2010. 2. Sharma P.D, 7th edt, Elements of Ecology Rastogi Publication, Meerut,2010.
E- Reference	1. http://www.uilis.unsyiah.ac.id/oer/files/original/1c18821adec76287db06550e04d69314.pdf 2. https://www.hzu.edu.in/bed/E%20V%20S.pdf 3. http://assets.cambridge.org/97805217/87277/excerpt/9780521787277_excerpt.pdf
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	learn the physico-chemical factors and biological effects of light	**K1**
CO2	understand the Inter specific relationships and intra specific relationships of ecosystem	**K2**
CO3	elucidate the characteristic features of animal association with various ecosystems and also learn about Energy flow and productivity of ecosystem	**K3**
CO4	learn the different pollution effects	**K2,**
CO5	evaluate the types and application of biodiversity	**K4**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES(PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	S	S	M	M	S	S	M
CO2	S	S	S	S	S	S	S	S	M	S	S	M	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S	S
CO4	S	M	S	S	S	S	S	S	M	S	S	S	S
CO5	S	M	S	M	S	M	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21ZOP65	ENVI RONMENTAL BIOLOGY MICROBIOLOGY & IMMUNOLOGY, GENETIC ENGINEERING & BIOTECHNOLOGY (Practical)	L	T	P	C
Core	XVII		5	-	-	4
Cognitive Level	K2:Understand	K3:Apply	K4:Evaluate			
Learning objective	➢ To comprehend about the physical and chemical parameter in water sample ➢ To gain knowledge about the adaptations of marine animals ➢ To learn about various microbial techniques ➢ To acquire the practical skill on immunological techniques. ➢ To learn the techniques of ames test					
	Environmental Biology 1. Estimation of dissolved oxygen in tap water and distilled water 2. Estimation of dissolved CO2 in water samples. 3. Measurement of hardness of water by using detergent on distilled water and tap water 4. Estimation of salinity in water sample 5. Sampling of animal population by using quadrate method 6. Detection of transparency of water by Secchi disc method 7. Animal association- symbiosis, parasitism, predation & commensalisms 8. Analysis and mounting of freshwater and marine planktons 9. Adaptation of aquatic animals based on a study of museum specimen such as rocky, sandy, muddy and burrowing animals **Microbiology:** 1. Preparation of media – Natural Broth solid media (Agar) 2. Plating techniques – streak plate, pour plate and spread plate 3. Serial dilution techniques 4. Gram‟s staining 5. Hanging drop experiment 6. Screening of antimicrobial agent (Krby Bauer Method) 7. Observation of Instruments: Water bath, laminar air flow, autoclave, Incubator, Hot air oven, Colony counter. 8. Spotters: - Bacteria, Fungi, Algae, Spirogyra, Agaricus, Rhizopus, Bread mould, Protozoa – paramecium, Yeast.					

	Immunology 1. Observation and study of Lymphoid organs i. Bone Marrow, Bursa fabricus ii. Thymus, Lymph node, Spleen 2.Antigen antibody reaction- Any two 3.Observation and study of IgG, IgA and IgM **Biotechnology & Genetic Engineering** 1. Observation of E. Coli, Bacteriophage , Plasmid 2. Demonstration of Complementation test 3. Demonstration of AMES test A record of lab work should be maintained and submitted at the time of the practical examination. Study tour – visit to Labs / Biotechnology units /Animal farm / Microbiology and Immunology lab is compulsory.
Text Books	1. Lal, S.S , A Text Book of Practical Zoology: Rastogi, Meerut.2014. 2. Verma, PS A Manual of Practical Zoology-third volume, S Chand Publications, New Delhi.2010.
Reference Books	1. Janarthanan, S. and Vincent, S. Practical Biotechnology: Methods and protocols, University.Press, 2007. 2. Yogendra, N. and Srivastava, N.. Environmental Pollution, Ashish Publishing House. New Delhi. 2001
Course out come	Upon completion of this course, the students will be able to

	CO	Course Outcomes	Knowledge Level
	CO1	practice water quality analysis	**K4**
	CO2	gain knowledge on animal population methods	**K2**
	CO3	perform the technique of microbial isolation and culturing procedures	**K3**
	CO4	master the immunological techniques to rule out disorders	**K3**
	CO5	interpret the diagnostic tests with health condition.	**K4**

Mapping of COs with POs & PSOs

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	S	S	S	S	S	S	M	S	S	M	S	M
CO2	S	S	M	S	S	S	S	M	S	M	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S	M	S	S
CO4	S	S	S	S	S	M	S	S	S	S	S	S	S
CO5	M	S	S	S	S	M	S	M	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOT641	BIOINFORMATICS	L	T	P	C
Elective	IV		3	-	-	3
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To gain the knowledge about computer and its devices ➢ To learn about the programming languages and its application ➢ To learn the basic concept of bioinformatics and its application in various fields ➢ To learn the use of nucleic acid and protein data banks ➢ To understand the methods of representation for evolutionary analysis tree					
Unit I	**Introduction to Computer**					
History development and types of computers general awareness of computer systems. hard ware and soft ware(CPU and other peripheral devices)						
Unit II	**Programming languages**					
Machine language assembly languages. Higher level language- introduction, email, world wide web – surfing						
Unit III	**Sequence analysis**					
need and importance pairwise alignments- dynamic programming - Global and local – Alignment concepts- Database searching tools Entrez, BLAST, FASTA, Multiple alignment cluster construction of phylogenic trees.						
Unit IV	**Use of nucleic acid and protein**					
data banks NCBI, EMBI, DDBJ, SWISSPORT,3D structural analysis of biomolecules – molecular visualization tools Rasmol, chemsketen and SPDBV- Protein Docking						
Unit V	**Evolutionary analysis :**					
Distance clustering methods- Rooted and Un rooted tree representation Bootstrapping strategies, Neutral networks.						
Text Books	1. Introduction of Bioinfomatics –Attwood tand Parry d. Pearson Education Asia. 2012 2. Computer for biologists- A, Fielding. Benjamin/cuming pubi.co 2015					

Reference Books	1. Attwood, T.K. and Parry, D.J – Smith, D.J. Introduction to Bioinformatics,2005. 2. Baxevanis, A.D. and Quellette, B.F.F.. Bioinformatics. A practical guide to harbour Laboratory Press, New York. 2010
E-references	1. http://www.aun.edu.eg/molecular_biology/Procedure%20Bioinformatics22.232015/Xiong%20%20Essential%20Bioinformatics%20send%20by%20Amira.pdf 2. http://www.ru.ac.bd/wpcontent/uploads/sites/25/2019/03/410_01_Lesk
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	able to know the history development and types of computers	**K1**
CO2	understand the programming languages	**K2**
CO3	apply the knowledge of sequence alignment tools	**K3**
CO4	understand the uses of nucleic acid and protein data banks	**K2**
CO5	know the applications of evolutionary analysis	**K2**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	W	S	S	M	S	M	S	S	S	S	S	M
CO2	S	W	S	M	S	S	S	M	M	S	S	S	S
CO3	S	M	S	S	S	S	M	S	S	M	S	S	S
CO4	S	S	S	S	M	M	S	S	M	S	S	S	S
CO5	S	S	S	S	S	M	M	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOE642	GEOINFORMATICS	L	T	P	C
Elective	IV		3	-	-	3
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learningobjectives	• To understand the concept of GIS • To know the various geographical data • To understand the concept of GPS and Remote sensing					
Unit I	**Introduction to GIS:**					
Definitions, Evolution, Components and Objectives. Overview of GIS Software Packages						
Unit II	**Spatial Data:**					
Types of Geographic Data, Levels of Measurements. Concepts of Space and Time, Layers Coverage. Spatial Data Models, Representation of Geographic Features in Vector, Raster Data Models. Concept of Arc, Node, Vertices and Topology.						
Unit III	**Non-Spatial Data:**					
Advantages of Data Base Management System. Conceptual Implementation Models, Hierarchical, Network, Relational Models. RDBMS: Components, Concept, Database Schema, Tables and Relationships						
Unit IV	**Concepts of GPS:**					
Spherical trigonometry, History, Types, Navigation Systems and Applications, Introduction to IRNSS.						
Unit V	**Introduction to Remote Sensing:**					
Concepts Definition, History Development, Stages in RS-EMR, EMR Spectrum, Types and application of RS.						
Text Books	1. Longley, P. A., Goodchild, M. F., Maguire, D. J.,Rhind, D. W. :Geographical Information Systems and Science, John Wiley & Sons, Chichester .2002. 2. Lo, C. P.,Yeung, A. W: ConceptsTechniques of Geographical Information Systems, PrenticeHall of India, New Delhi.2002.					
Reference Books	1. Chang, K. T. Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York.2008. 2. Ahmed, E. L. Rabbany, Introduction to Global Positioning Systems, ArtechHouse, Boston.2002.					
E-Reference	1. https://geoinformatics.com/ 2. https://www.igi-global.com/dictionary/geoinformatics-in-eco-climatic-studies/42567 3. https://www.igi-global.com/book/advanced-topics-global-information-management/29					

Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	understand the general concept of GIS	**K2**
	CO2	know the spatial data	**K2**
	CO3	acquire knowledge on non-spatial data	**K2**
	CO4	learn the concept of GPS	**K2**
	CO5	know the concept and uses of remote sensing	**K1**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	M	S	S	S	M	M	M	M	S	S	M	M
CO2	S	M	S	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	S	M	S	S
CO4	M	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	M	S	S	M	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOS641	AQUACULTURE	L	T	P	C
SBE	IV		2	-	-	2
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	➢ To understand the importance and scope of aquaculture ➢ To gain knowledge in the cultivable fishes and its economic importance ➢ To understand the Preparation of pond and methods of fish cultures ➢ To gain knowledge on aquatic farm management ➢ To Provide in depth knowledge on fish diseases and its diagnosis					
UNIT – I	**Importance of aquaculture –**					
Prospects and scope – Aquaculture farm- site selection, topography, water availability and supply, soil condition and quality design and layout of farms.						
UNIT – II	**Cultivable species-**					
see weeds. Crustacean (Prawns and Lobsters), Mollusces (Mussels and oysters) and fishes – Economic importance's market values and its by products.						
UNIT – III	**Pond Preparation & Production Culture Systems**					
Traditional, Extensive, Semi- Extensive, and Intensive Systems. Composite fish culture, paddy cum fish culture – Integrated fish culture sewage water fish culture						
UNIT – IV	**Water quality management-**					
temperature, salinity ,pH, O2,CO 2, level, nutrients and trace elements. Control of parasites & predators						
UNIT –V	**Diseases in culture ponds**,					
disease diagnosis, ELISA Western blotting, DNA based diagnosis of disease and Fish vaccines.						
Text Books	1. Arumugam, Aquaculture, Saras Publications,2014. 2. K.Pandey & J.P.Shukla, Fish and Fisheries, Rastogi Publication,2016.					
Reference Books	1. Das. M.K. and R.K. Das .Fish and fisheries in India- Diagnosis and control inland Fisheries Society of India, Barrack pore, west Bengal,2011 2. Govindan, T.K.Fish Processing Technology. Oxford & IBH					

	Publishing Co. Pvt.Ltd.,Kolkata.2010 .
E-References	1. https://www.mooc-list.com/course/oceanography-key-better-understand-our-world-coursera 2. https://igor.crew.c-base.org/aquaculture.pdf 3. http://www.agrifs.ir/sites/default/files/AQUACULTURE.pdf 4. https://www.cabi.org/uploads/CABeBooks/CAB-eBooks-Col-Aquaculture-and-Fisheries.pdf 5. https://www.blackwellpublishing.com/pdf/catalogue_2007_online_aquaculture.pdf
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	learn, rear the cultivable aquatic animals	**K1**
CO2	find out the cost benefit analysis in maintaining aqua farms.	**K3**
CO3	know the pond preparation and production culture system	**K2**
CO4	know the importance of quality of the water to maintain the aquaculture	**K2**
CO5	gain knowledge to prevent disease and parasitic infestations	**K3**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	M	M	S	M	S	S	M
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOE642	ORNITHOLOGY	L	T	P	C
SBE	IV		2	-	-	2
Cognitive Level	K2:Understand K3:Apply					
Learning objective	➢ To give an introduction to bird science ➢ To understand about the method of studying migration ➢ To understand the diversity of foods and foraging ➢ To understand the breeding territories of birds ➢ To know about the bird distribution and its population studies					
Unit I	**Introduction to ornithology**:					
Terminology used in ornithology- types of bills, types of feet- Identification of birds in the field based on tail, bill, crest, leg & color						
Unit II	**Equipments used in the field study:**					
Fields guides- Photography- Identification of calls- feet and beak modification in birds. Bird migration- method of studying migration.						
Unit III	**Diversity of foods and foraging behavior :**					
Social foraging, mating preferences- Pair bonds, courtship and divorce – production and control of the song – functions of bird song.						
Unit IV	**Timing of breeding:**					
Breeding territories nest and nest building egg & clutch size, clutch and egg replacement. Incubation and hatching – caring for young						
Unit V	**Avian population change :**					
Over time and space – methods of estimation- classifying bird species assemblages- recent avian extinctions causes of avian population decline.						
Text Books	1. Salim Ali.S. and Ripley SD. Handbook of the birds of india and Pakistan. Compact edition Oxford University Press and BNHS Mumbai .2011. 2. Chinnasathan and Bal Pandey.The Nesting behavior of Indian Birds, Sugeeth Publication,2001.					

Reference Books	1. Caughley G.Sinclair.AR.Wildlife ecology and management. Back well Science.2000. 2. Dewsbur, D.A Comparative animal behavior. McGraw Hill Book Company. 1998. 3. Drickamer , L.C. S.H. Vessey and E.M. Jakob Animals Behavior. Mc Graw Hill. 2002.
E-references	1. http://www.jnkvv.org/PDF/1304202015324213420140 0.pdf 2. https://txmn.org/elcamino/files/2010/03/Ornithology-Basic-Concepts.pdf
Course out come	Upon completion of this course, t3e students will be able to

CO	Course Outcomes	Knowledge Level
CO1	able to know the introduction and terminology of ornithology	**K2**
CO2	know the importance of equipments used in the field to apply for ornithology studies	**K3**
CO3	learn about diversity of foods and foraging behavior	**K2**
CO4	assess their breeding and migration	**K2**
CO5	create awareness to protect them from extinction	**K2**

Mapping of COs with POs & PSOs

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES(PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	S	M	M	M	S	S	S	M
CO2	S	S	S	S	M	S	M	S	S	S	S	M	S
CO3	S	S	S	S	S	S	M	S	S	S	S	S	S
CO4	S	S	S	S	S	M	M	S	S	S	S	M	S
CO5	S	M	S	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark
No Correlation (N) - 0 mark

Course Code	U21ZOV51	FIRST AID AND SAFETY METHODS	Total Hours	C
Value Added Programme			30	2

Cognitive Level	K2:Understand K3:Apply
Learning objective	➢ To be familiar with the fundamental concept of first aid and safety methods ➢ To learn the skill to manage the medical emergency and action at emergency. ➢ To acquire the knowledge on various accidents and community emergency ➢ To know the causes and symptoms of diabetes mellitus ➢ To study the emergency and to learn community casualty
UnitI	Fundamental Concepts
Managing an incident, Action at an emergency, Traffic accidents, Fires, Electrical incidents, Water incidents, Major incident/Mass casualties.	
Unit II	**First aid**
First aid box, First aid for Drowning, First aid for Fire Injuries, First Aid for Severe Burns, First Aid for Mild Burn, First Aid for Injuries on the Play Field, First aid for snake biting, poisoning and stings, Transporting the Person for Medical Help After Giving First Aid	
Unit III	**Assessing casualties**
Assessing the sick or injured, mechanism of injury, primary survey, secondary survey, Head to toe examination, monitoring vital sign. Breathing and circulation, life saving priorities, unconscious adults, unconscious child, unconscious infant	
Unit IV	**Medical Emergency**
Heart attack, Stroke, Diabetes mellitus, Hyperglycemia, Hypoglycemia, Seizures in adults, Seizures in children, Childbirth, Emergency childbirth.	
Unit V	**Community Emergency**
Fire explosions, Earth quakes, Flood and famine, Burns, Road accidents, Accessing a conscious and unconscious casualty.	
Text Books	First Aid, CPR and AED, 5th ed A. Thygerson, B. Gulli & J.R. Krohmer. Jones & Bartlett. ISBN: 0763742090.2006.
Reference Books	1. The authorized manual of St. John Ambulance, St. Andrew's Ambulance association and the British red cross society. 2002 2. Dorling Kindersley- First Aid manual, 5th edition, , London.2001 3. Clement ,Text book on First Aid & Emergency Nursing, First edition, JP brothers, 2012

E-References	1. https://kuiyem.ku.edu.tr/wp-content/uploads/2016/12/American-College-of-Emergency-Physicians-ACEP-First-Aid-Manual.pdf 2. http://www.panola.edu/collegestore.htm 3. http://www.panola.edu/instruction/dl/testing.htm		
Course outcome			
	CO	**Course Out comes**	**Knowledge Level**
	CO1	develop knowledge about the basics measures to be taken during an emergency.	**K3**
	CO2	understand the situation and act accordingly.	**K2**
	CO3	know and Apply the first aid service for various casualties.	**K3**
	CO4	acquire skill to service for medical emergency	**K3**
	CO5	attain knowledge about uncommon health, environmental conditions and mitigation strategies.	**K2**

Mapping of COs with POs & PSOs:

CO	PO								PSO				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO1	S	S	S	S	S	S	M	S	S	S	S	M	M
CO2	S	S	S	M	S	S	S	S	S	S	M	M	S
CO3	S	M	M	S	M	S	S	M	S	M	S	M	S
CO4	M	S	M	S	S	M	S	S	M	S	S	S	M
CO5	S	S	S	S	S	S	S	S	S	S	M	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

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MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL - 624 101
Tamil Nadu.

Curriculum Framework and Syllabus for

M.Sc. ZOOLOGY

Programme code: PG-MZO

(For the candidates to be admitted from the academic year 2021-2022 onwards)

(UNDER CHOICE BASED CREDIT SYSTEM- CBCS)

Mother Teresa Women's University, Kodaikanal

M.Sc. ZOOLOGY

1. About the Programme

M.Sc Zoology is a 2-year postgraduate programme dedicated to the study of animals. The program comprises the biology, behaviour and structure of animals. The students can acquire adequate knowledge of animal kingdom, Biodiversity, anatomy of animals, embryology, characteristics and evolution of animal life. The programme also addresses the causes in the loss of habitat and conservation of biodiversity. M.Sc Zoology is an advanced course that focuses on modern technology to study various aspects of animal life. This course equally covers theoretical and practical sessions to understand the concepts in a better way along with outdoor tours. After completing M.Sc Zoology course students can opt for various job roles in public and private sectors like academics, official in Zoological park, Ecologist, Conservation officer, field Trials officer etc.

2. Programme Educational Objectives (PEOs):

PEO1	To train the students in basic and advanced areas of Zoology, Animal Biotechnology and other related subjects along with sensitizing them to the scope for research.
PEO2	To empower the students with analytical and research skills, to nurture entrepreneurial endeavours
PEO3	To prepare a competent generation of zoologist, capable of excelling in their careers
PEO4	To develop them with good communicative skills and function effectively as an individual and as a team member in a professional environment.
PEO5	To develop potential biologist with professional ethics in order to address global and societal issues for sustainable development.

3. Eligibility:

- A candidate who has passed Graduate in Zoology and other Relevant Subject
- Candidate should have secured at least 55% in the above subject from any recognized university.
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4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 90**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance less than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

M. Sc. ZOOLOGY CURRICULUM

Sl. No	Course Code	Course Title	Credits	Hours		CIA	ESE	Total
				T	P			
Semester I								
1.	P21ZOT11	Core I -Biology of Invertebrates	4	5	-	25	75	100
2.	P21ZOT12	Core-II- Biology of Chordates	4	5	-	25	75	100
3.	P21ZOT13	Core-III- Cell And Molecular Biology	4	5	-	25	75	100
4.	P21ZOT14	Core-IV-Animal Physiology	4	5	-	25	75	100
5.	P21ZOP11	Core-V-Practical –Biology of Invertebrates, Chordates, Cell & Molecular Biology and Animal Physiology	4	-	6	25	75	100
6.	P21CSS11	Supportive Course I- Computer Skills For Web Designing And Video Editing	2	4	-	25	75	100
		Total	**22**	**30**		**-**	**-**	**600**
Semester II								
7.	P21ZOT21	Core VI- Biochemistry	4	5	-	25	75	100
8.	P21ZOT22	Core-VII- Immunology	4	5	-	25	75	100
9.	P21ZOT23	Core-VIII- Genetics	4	4	-	25	75	100
10.	P21ZOT24	Core-IX - Applied Zoology	4	4	-	25	75	100
11.	P21ZOP22	Core-X-Practical - Biochemistry, Immunology Genetics& Applied Zoology	4	-	6	25	75	100
12.	P21ZON211/ P21ZON212	Non Major Elective	4	4	-	25	75	100
13.	P21ZOS22	Supportive Course II – Medical Laboratory Technology	2	2	-	25	75	100
		Total	**26**	**30**		**-**	**-**	**700**
Semester III								
14.	P21ZOT31	Core XI- Biotechnology & Bioinformatics	4	4	-	25	75	100
15.	P21ZOT32	Core-XII-Developmental Biology	4	5	-	25	75	100
16.	P21ZOT33	Core-XIII-Evolution, Animal Migration & Behaviour	4	4	-	25	75	100
17.	P21ZOT34	Core XIV-Ecology & Toxicology	4	4	-	25	75	100
18.	P21ZOT35	Core XV -Research Methodology and Bioethics	4	5	-	25	75	100
19.	P21ZOP33	Core-XVI- Practical- Biotechnology & Bioinformatics, Developmental Biology, Evolution, Ecology & Toxicology	4	-	6	25	75	100
20.	P21WSS33	Supportive Course III -Women	2	2	-	25	75	100

		Empowerment						
		Total	**26**	**30**				**700**
Semester IV								
21.	P21ZOE411/ P21ZOE412	Elective-I*-Entomology/ Endocrinology/Any MOOC Courses$	4	4	-	25	75	100
22.	P21ZOE421/ P21ZOE422	Elective-II *–Biostatistics & Biophysics/Microbiology/Any MOOC Courses$	4	4	-	25	75	100
23.	P21ZOR41	Project	8	-	22	25	75	100
		Total	**16**	**30**				**300**
Total			**90**	**120**				**2300**

Non Major Elective

The candidates, who have joined the PG programme, can also undergo Non Major Elective offered by other Departments

Non Major Electives (NME) offered by Zoology:

1. NME-I: Conservation Biology-P21ZOE211
2. NME-II: Epidemiology- P21ZOE212

Additional Credit Courses

1. P21ZOV11:Value Added Program I-Two Credits (First Semester)
2. P21ZOI21:Internship/Industrial Training – Two Credits- (Second Semester)
3. P21ZOO31:Online Courses-Two Credits- (Third Semester)
4. P21ZOV41:Value Added Program II-Two Credits (Fourth Semester)

Value Added Courses

1. VAP I - Medical Transcription- P21ZOV11
2. VAP II - Fisheries Technology- P21ZOV41

*Those who have CGPA 9 and want to do the project in industry/institution during 4th semester, those two elective papers in IV semester can be opted in third semester itself.

$ For Elective –I/Elective-II, the students can also take either one 4-credit course or two 2-credit courses in MOOC, with the approval of Departmental Committee.

Outside class hours (Attendance compulsory, Certificate Mandatory)

- Health, Yoga and Physical Fitness
- Library Information access and utilisation
- Employability Training
- Students Social Responsibility

PROGRAMME OUTCOMES (POs)

On completion of M.Sc - Zoology programme students will be able to

PO1	impart knowledge to identify and signify the animal kingdom, diversity of animals, cell molecules.
PO2	understand the principles of development, evolution and ethology of different organisms.
PO3	acquire knowledge on organization and molecular effects of cell, gene, compounds, and immunity and to combat microbial infections.
PO4	enable them to maintain and improve their physiology, health and hygiene.
PO5	gain the ideas about biochemical pathways, genetic engineering, development and their disorders, biotechnology field and handling bioinstrumentation and biotechnology field.
PO6	acquire skill on beneficial insects and useful animals to develop into a successful women entrepreneur
PO7	get familiarize to promote innovative research ideas, field knowledge, scientific writing and statistical approach, involve in environmental activities for sustainable development
PO8	apply the scientific knowledge acquired for the development of scientific society and follow a line of investigation of our country.

PROGRAMME SPECIFIC OUTCOMES – (PSO)

On completion of M.Sc Zoology programme, students will be able to

PSO1	understand and acquire knowledge on the characteristic features, diversity, taxonomy, anatomy and physiology of different animals, evolution of organism
PSO2	gain the knowledge about immunity and to combat microbial infections, biochemical pathways, development and their disorders, beneficial insects, useful animals and their economical benefits.
PSO3	enlighten and receive awareness about environmental benefits and to mitigate its degradation
PSO4	learn the advancements in handling bioinstrumentation, genetic engineering and biotechnology field.
PSO5	familiarize to promote innovative research ideas, field knowledge, scientific writing and statistical approach. Enriched and empowered to clear competitive examinations and grab opportunities

SEMESTER -I

Course Code	P21ZOT11	BIOLOGY OF INVERTEBRATES	L	T	P	C
CORE – I			5	-	-	4

Cognitive Level	K1:Recall K2:Understand K3:Apply	
Learning objectives	• To understand the taxonomy and classification of invertebrates. • To understand the taxonomy and classification of invertebrates. • To know the larval forms of invertebrates • To understand the biological description of invertebrates • To comprehend the structural peculiarities of invertebrates	
Unit I	**Broad classification of the Animal Kingdom**	**12 hours**
Principals involved. Protozoa Feeding, Reproduction and Parasitic Protozoa. Economic importance of Protozoa. Origin and evolution of Metazoa - theories. Mesozoa, Porifera Interrelationship between different classes, Marine sponges and Freshwater sponges.		
Unit II	**Cnidaria Origin and evolution**	**12 hours**
Polymorphism and Reproduction in cnidaria . Corals and Coral reeves, Origin of Bilateria. Importance of Rhabdocoela as a stem group. Origin and evolutionary trends in coelom formation. Platyhelminthes - Functional morphology and adaptive biology for parasitic mode of life.		
Unit III	**Annelida**	**12 hours**
Archiannelida. Inter relationship between different classes of Annelida. Type study - Earth worm, External morphology, setae, nephridia, nervous system and reproductive system – Metamerism in Annelids. Arthropoda: Type study-Marine Prawn – external morphology, appendages, digestive and excretory systems, reproductive system and development—Affinities of Peripatus. Economic importance of Crustaceans, Phylogeny of Arthropoda.		
Unit IV	**Mollusca**	**12 hours**
Type study- Pila – external morphology, digestive system, respiratory system, Osphridium only. Cephalopods as an advanced Mollusc. Echinodermata: Type study – Star fish - external morphology, pedicellaria, Water vascular system only. Larval forms of Echinodermata. Phylogeny of Echinoderms.		
Unit V	**Minor Phyla**	**12 hours**
Structural peculiarities and affinities of Ctenophora, Nemertinea, Rotifera, Pogonophora, Phoronida and Lophophorates. Invertebrate fossils: Trilobites, Brachiopoda, Cephalopoda and Echinodermata.		
Text Books	1. Nair NC, Leelavathy S, Soundara Pandian N Murugan T and Arumugam N. A Text Book of Invertebrates, Saras Publication Nagercoil, Tamilnadu.2010. 2. Nair NC. Invertebrata and Chordata, Saras Publication Nagercoil,Tamilnadu.2017.	
Reference Books	1. Barnes RD, Invertebrate Zoology.7th edition, Thomson Press (India) Ltd 2010. 2. E.L.Jordan and P.S. Verma Invertebrate Zoology, S.Chand & Company Ltd,New Delhi, 2009. 3. P.S. Dhami and J.K. Dhami, Invertebrate Zoology R.Chand & Co. New Delhi, 2003 .	

	4. R.L.Kotpal, Invertebrate Zoology, Rastogi Publications, Meerut, 2005. 5. M.Ekambaranatha Iyer and T.N.Ananthakrishnan, A Manual of Zoology Viswanathan Publications, Chennai, 2003.
E-Reference	1. https://nptel.ac.in/courses/102/106/102106035/ 2. https://biologydictionary.net/invertebrate 3. http://rcastilho.pt/DA/ewExternalFiles/Invertebrates_Cap_33_Cambell.pdf 4. file:///C:/Users/ACER/Downloads/invertebrates_3-4_unit_guide%20(1).pdf

Course outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	understand the general taxonomic rules on animal classification.	**K1**
CO2	know the origin and evolution of Cnidaria and adaptation of parasite	**K2**
CO3	acquire knowledge on Annelids and Arthropods with economic importance.	**K2**
CO4	classify phylum Molluscs and Echinodermata with taxonomic keys.	**K3**
CO5	gain knowledge about structural peculiarities of minor phyla and fossils	**K2**

Mapping of COs with POs &PSOs:

Course Outcomes	**POs**								**PSOs**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	S	M	M	S	M	M	S	S	M	M	S
CO2	S	S	S	M	M	S	S	M	S	S	M	M	S
CO3	S	M	S	S	S	S	S	S	S	M	M	S	S
CO4	S	S	S	M	M	S	S	S	S	S	M	M	S
CO5	S	M	S	M	M	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOT12	BIOLOGY OF CHORDATES-	L	T	P	C
CORE-II			5	-	-	4

Cognitive Level	K1:Recall K2:Understand K3:Apply	
Learning Objectives	• To comprehend the general classification of chordates taxonomy • To learn the salient features of vertebrates • To understand the economic importance of vertebrates and fossil bird	
Unit I	**Overview Taxonomy**	**12 hours**
Principles of Taxonomy. Nomenclature: Binomial, taxonomic keys. Outline classification of Chordates upto order level with example. Prochordata, Pisces and Amphibia, Concept of Prochordata – Hemichordata- Balanoglossus.		
Unit II	**Urochordata**	**12 hours**
Ascidians, Cephalochordata – Amphioxus - Salient features and Functions. Affinity of Cephalochordata - Origin and Adaptive radiation of bony fishes. Amphibia - Adaptive radiation from water to land.		
Unit III	**Reptilia, Aves and Mammals**	**12 hours**
Classification of class Reptilia, Aves and Mammals upto orders. Salient features with examples - Adaptive radiation of reptiles. Reptilia -Type study – Calotes, external morphology, Urinogenital system and nervous system. Poisonous and non-poisonous Snakes, identification and biting mechanism.		
Unit IV	**Adaptive Radiation**	**12 hours**
Aves- Birds as glorified reptiles, adaptive radiation in birds. Aves- Type study – Pigeon- external morphology, respiratory system, pectoral and pelvic girdles only. Flight adaptations. Migration of birds, - Flightless birds, -Fossil bird Archaeopteryx and its evolutionary importance.		
Unit V	**Mammalia**	**12 hours**
Classification of Mammals with examples, external morphology, nervous system and reproductive system. Dentition in mammals, Stomach in ruminants, Aquatic mammals and economic importance of vertebrates.		
Text Books	1. Thangamani A, Prasannakumar S, Narayanan LM, Arumugam N. A Text Book of Chordates, Saras Publication, Nagercoil, Tamilnadu. 2014. 2. KotpalRL. Mordern Text Book of Zoology Vertebrates, 4th edition, Rastogi Publications, Meerut.2019.	
Reference Books	1. E.L.Jordan and P.S. Verma, Chordate Zoology, S.Chand & Company Ltd, New Delhi, 2011. 2. Pough Harvey F, Christine M .Janis and John B. Heiser. (2002). Vertebrate Life, Pearson Education Inc. New Delhi. 3. Route and Solanki.2002.Learning Prochordata- Mammalia –Theory and Practice Dominant Pub. & Distributors, New Delhi 4. Verma.P.S.(2013).Chordate Zoology, S Chand Publishers, New Delhi.	

E-references	1.https://nptel.ac.in/courses/102/106/102106035/ 2.http://assets.vmou.ac.in/MZO06.pdf

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	acquire depth knowledge on the principles and taxonomic keys concepts of chordates to apply the knowledge for animal classification	**K3**
CO2	learn the salient features and functions of proto chordates with fishes and amphibians.	**K2**
CO3	understand the classification and functional attributes of reptiles	**K2**
CO4	gain deep knowledge on morphology, physiology and adaptive radiation of Aves	**K2**
CO5	comprehend the classification and unique adaptations in mammals.	**K2**

Mapping of COs with POs &PSOs:

Course Outcomes	**PO**								**PSO**				
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	S	S	M	S	M	S	M	S	M	M	M	M	S
CO2	S	S	M	M	S	S	M	M	M	M	M	S	S
CO3	S	S	S	S	M	S	M	S	S	S	S	S	S
CO4	S	S	S	M	S	M	S	S	M	S	S	M	S
CO5	S	S	M	M	S	S	M	M	S	S	M	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOT13	CELL AND MOLECULAR BIOLOGY	L	T	P	C
CORE-III			5	-	-	4

Cognitive Level	K1:Recall K2:Understand
Learning Objective	• To understand the various concepts of molecular biology and the central dogma of life. • To develop a comprehensive understanding in the mechanisms of replication, transcription and translation • To gain extensive knowledge on gene expression

Unit I	**Cell Theory & Cell Cycle**	**12 hours**

Cell theory, protoplasm theory, prokaryotic and eukaryotic cell differentiation, Cell cycle and regulations. Cell division: mitosis, meiosis and their significance. Cytoplasm: Physical and biological properties of cytoplasmic matrix. Plasma membrane: Chemical composition, structure and functions.

Unit II	**Structure and function of Cell Organelle**	**12 hours**

Ribosome and Golgi bodies: Ultrastructure, types and function. Lysosome: Chemical composition, Polymorphism and Functions. Endoplasmic reticulum and plastids. Ultrastructure, types and functions, Mitochondria: Ultra structure and functions. Micro bodies peroxisomes and glyoxisomes.

Unit III	**Structure and Function of Cell Organelle**	**12 hours**

Ultra-structure of nuclear membrane. Nucleolus, Nucleoplasm and Chromatic fibres. Microtubules, Microfilaments – Cilia and Flagella. Signal Transduction Pathways: Organisation signals, Receptors. Ion channel coupled receptors – Secondary messengers. Amplifiers, Integrators and Signal hypothesis.

Unit IV	**Nucleic acid**	**12 hours**

Nucleic Acid as the genetic material - direct and indirect evidences – Structure and types of DNA and RNA. Eukaryotic Chromosome: Chromosome structure and organization. C-Value paradox DNA – Repetitive DNA. Mutations and DNA damage: physical, chemical and biological agents – Mutation types – Molecular basis of spontaneous and induced mutations. Environmental mutagenesis and toxicity testing: AMES test.

Unit V	**DNA replication**	**12 hours**

Semi conservative and rolling circle. Enzymes involved in replications: types and their functions. Transcription and Translation: RNA polymerase – types, properties and functions – Transcription process in prokaryotes and eukaryotes – RNA processing, capping, polyadenylation, splicing, introns and exons. Regulation of gene expression- *lac* operon *and trp* operon, Regulation of gene expression in eukaryotes.

Text Book	1. Frifelder, D. Molecular Biology 2nd edition. Narosa Publishing House, New Delhi. 2000. 2. Gupta, M.L. and Jangir, M.L., Cell Biology Fundamentals and Application,

	Student Edition, Jothpur. 2003. 3. Krebs, J.E., Goldstein, E.S., Kilpatrick, S.T. Lewin"s Genes X, Jones and Bartlett publishers Inc, London UK.2011.
Reference Books	1. Karp G .Cell and Molecular Biology: Concepts and Experiments. 6th edition, John Wiley & Sons Ltd. New York. 2010. 2. De Roberties E.D.P and E.M.F.De Roberties. Cell and Molecular Biology. 8th edition. B.I. Publicatons Pvt. Ltd., India. 2011. 3. Haddin J. Becker"s World of the Cell (8th Editon). Benjamin Cummings Publishing Company , New York.2011 . 4. Lewin, B., Genes-X, Oxford University Press Inc., New York.2012 5. Cooper, GM and Hawman RE. Cell a Molecular Approach (6th Edition). Sinauer Associates, Inc. 2013. 6. . Karp G. Cell and Molecular Biology Concepts and Experiments. John Wiley & Sons, Inc.2013.
E-References	1. https://nptel.ac.in/courses/102/106/102106025/ 2. https://nptel.ac.in/courses/102/103/102103012/ 3. https://swayam.gov.in/nd2 4. https://nptel.ac.in/courses/102/104/102104059

Course outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	understand the cell theory, cell cycle and regulation	**K1**
CO2	attain a deep knowledge on the structure and functions of cell organelles	**K2**
CO3	comprehend the ultra structure and functions of genetic material with microtubules, microfilaments and transduction pathways.	**K2**
CO4	acquire wide knowledge on the organization of genome.	**K2**
CO5	learn DNA replication, transcription, translation with regulation of gene expression.	**K2**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	M	M	S	S	S	S	M	S	M
CO2	S	S	S	M	M	M	M	S	S	S	S	S	M
CO3	S	S	S	S	M	M	M	S	S	S	M	S	M
CO4	M	S	M	S	M	S	M	S	M	S	M	M	M
CO5	S	S	M	S	M	S	M	S	S	S	M	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks

Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOT14	ANIMAL PHYSIOLOGY	L	T	P	C
CORE IV			5	-	-	4

Cognitive Level	K1:Recall K2:Understand K3:Apply
Learning objective	• To learn the biochemical changes and basic thermo dynamic principles. • To know the carbohydrate, Lipid and aminoacid metabolism • To learn the integration of metabolic pathways and Hormonal regulation. • To get thorough knowledge on metabolic pathways of human physiology and to apply the knowledge for biotechnological and biochemical research

Unit I	**Digestive System (Man)**	**12 hours**

Digestion, absorption, energy balance, BMR with reference to man, Obesity. Respiratory system (Man): Transport of gases, exchange of gases, respiratory pigments. Haemoglobin as oxygen carrier, respiratory quotient, neural and chemical regulation of respiration in man. Hamperson phenomenon. SARS.

Unit II	**Blood and Circulation**	**12 hours**

Blood and its components, haemopoiesis and formed elements, plasma function, blood volume, blood volume regulation, blood groups, haemoglobin, haemostasis, Hemophilia. Cardiovascular System: Comparative anatomy of heart structure, myogenic heart, ECG – its principle and significance, cardiac cycle, heart as a pump, blood pressure, Myocardial Infarction and CPR.

Unit III	**Excretory System (Man)**	**12 hours**

Kidney- Structure and functions, micturition, Osmoregulation in aquatic and terrestrial environments, acid-base balance, Renal failure and Dialysis **Nervous system (Man):** Neurons, action potential, gross neuroanatomy of the brain and spinal cord, central and peripheral nervous system, Alzheimer's disease/ Stroke.

Unit IV	**Muscles**	**12 hours**

Structure and mechanism of Muscle Contraction - Regulation and Energetics of Contraction, Muscular Dystropy.

Sense organs (Man): Vision, hearing and tactile response, Glaucoma.

Physiology of Reproduction: Human Reproductive Physiology- Reproductive Cycles, Hormonal Control, PCOS and Endometriosis.

Unit V	**Ethology**	**12 hours**

Patterns and mechanism of behavior, Pheromones in colonial interactions.

Reflexes: reflex action, types of reflexes, reflex arch, characteristics of reflexes, Reflex dysfunction.

Text Books	1. Bijlani, R.L.Fundamentals of Physiology. I edn. JayPee brothers, New Delhi.2001. 2. Mariakuttikan, A., Animal Physiology. SARAS Publication, Nagerkoil.2011. 3. Text Book of Medical Physiology, Elsevier Inc. Hall, J.E., 2013.

	4. Arumugam N and Mariakuttikan A..*Animal Physiology*, Saras Publications, Nagercoil, Tamilnadu.2014.
Reference Books	1. Hall, J.E., Text Book of Medical Physiology, Elsevier Inc. 2013, 2. H.R and Neeraj Kumar Animal Physiology and Biochemistry.Vishal Publishing Co, New Delhi Singh, 2009. 3. Verma, P.S., Agarwal, N.K.,Thyagi, B.S., Animal Physiology. S.Chand & Co.,New Delhi. 1980. 4. Hoar, W.S., General and Comparative Physiology, Prentice Hall. 1987, 5. Renganathan, T.S. A text book of Human Anatomy. VI edn. S. Chand and Company Ltd., New Delhi, 2002. 6. Hoar W.S General and Comparative Physiology. Prentice-Hall of India (P) Ltd. New Delhi, 2004.
E-References	1. https://www.classcentral.com/course/swayam-animal-physiology-12894 2. https://swayam.gov.in/nd1_noc20_bt42/preview 3. https://www.classcentral.com/course/edx-respiration-in-the-human-body-3050. 4. https;//swayam.gov.in/nd1_noc20_hs33/preview

Course outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	understand the nutrition, digestive and respiratory system of man	**K1**
CO2	compare the circulatory and cardio vascular system.	**K3**
CO3	relate the structure and function of excretory and nervous system of man.	**K3**
CO4	understand the function of muscles, sense organs and reproductive physiology .	**K2**
CO5	gain knowledge on the ethology and reflexes action of human.	**K2**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	M	S	S	S	M	M	M	S	M	S
CO2	S	S	S	M	S	S	S	M	M	M	M	M	S
CO3	S	S	S	M	S	S	S	M	M	M	S	S	S
CO4	S	S	S	M	M	S	M	S	M	S	M	S	S
CO5	S	S	S	S	S	S	M	S	M	S	M	M	S

Strongly Correlating	(S)	- 3 marks	Moderately Correlating	(M)	- 2 marks
Weakly Correlating	(W)	- 1 mark	No Correlation	(N)	- 0 mark

Course Code	P21ZOP11	PRACTICAL-BIOLOGY OF INVERTEBRATES & CHORDATES, CELL & MOLECULAR BIOLOGY AND ANIMAL PHYSIOLOGY –	L	T	P	C
CORE V			-	-	6	4

Cognitive Level	K2:Understand K3:Apply K4: Evaluate
Learningobjective	• To know the methods for biochemical test and enzyme activity assay • To know the chromatography techniques and develop the laboratory skills. • To train the students to analyze the enzyme properties
Experiments in Biomolecules	**TAXONOMY** Identification and Classification of at least 20 representative animals belonging to major classes of Invertebrate phyla and phylum Chordata by studying their salient features. **Mounting:** Prawn -appendages, Teleost Fish – Placoid, Cycloid / Ctenoid scales, Honey bee - Sting apparatus and Mouth parts. Mosquito – mouth parts **Spotters:** Invertebrate any three Larval forms ; Minor Phyla - *Chaetognatha*, *Phoronida*, and *Sipunculida*. **Diagrammatic representation** 1. Nervous system of Cockroach, Prawn, *Pila globosa* 2. Nervous System of Rat , Cat Fish 3. Major Organs ; Rat-heart, pancreas, liver, kidney and gonads **CELL AND MOLECULAR BIOLOGY** 1. Micrometry - Measuring the diameter of microscopic cells using ocular stage micrometer 2. Preparation of squamous epithelium to observe Barr body 3. Study of Mitosis in the Cells of Onion Root Tip 4. Observing the giant/ polytene chromosomes in the salivary glands of larva of *Chironomus* sp. 5. Isolation of mutant colonies by Gradient plate method. 6. Isolation of mutant colonies by Replica plate method. 7. Description of -__Bacterial transformation, Conjugation experiment, Complementation test, Phage isolation. **Spotters:** Epithelial Tissues (Ciliated, Columnar, Glandular and Squamous epithelium), Smear of Frog's Blood, Muscles (Cardiac,

	Striated and Non - Striated) and Nerve cell. **ANIMAL PHYSIOLOGY** **1.** Quantitative Estimation of Amylase Activity 2. Oxygen Consumption in Fish related to temperature and salinity 3. Preparation of Haemin crystals. 4. Estimation of Haemoglobin by Sahli's method 5. Total RBC count 6. Total WBC count and Differential count 7. Detection of nitrogenous wastes-Ammonia, Urea and Uric acid **Spotters:** Haemocytometer, Haemoglobinometer, Glucometer, Sphygmomanometer and Kymograph
References	1. Sinha, J., Chatterjeee A.K., Chattopadhyay P Advanced Practical Zoology , Arunabha Sen Publishers 2011 2. H.S. Bhamrah Practical Zoology Invertebrate, Dominant Publishers. 2003. 3. Preeti Guptha and Mridula Chaturvedi, Modern Experimental Zoology,. 2000 4. Verma, Manual of Practical Zoology: Chordates, S. Chand Publishing 2000. 5. Chaitanya K.V. Cell and Molecular Biology: A Lab Manual Prentice Hall India Learning Private Limited, 2013.

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Out comes**	**Knowledge Level**
CO1	acquire the knowledge of identification and classification of major classes of animals of both invertebrates and chordates and evaluate the salient features	**K4**
CO2	know the methods of mounting of appendages, mouth parts, stings and scales.	**K2**
CO3	perform the technique of micrometry, differentiate cells and invitro culture of bacteria.	**K3**
CO4	know the different methods to enumerate the cells	**K2**
CO5	handle the apparatus and devices used for molecular biology and Animal physiology.	**K3**

Mapping of COs with POs &PSOs:

Course Outcomes	**POs**								**PSOs**				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**

CO1	S	M	M	S	S	S	M	M	S	M	M	S	S
CO2	S	S	S	M	S	S	S	M	S	M	M	M	S
CO3	S	M	S	S	S	S	S	M	M	S	S	S	S
CO4	S	M	S	S	S	M	S	S	M	M	S	S	M
CO5	S	S	S	S	S	S	S	S	M	S	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21CSS11	COMPUTER SKILLS FOR WEB DESIGNING AND VIDEO EDITING	L	T	P	C
SUPPORTIVE COURSE- I			4	-	-	2

Cognitive Level	K2: Understand K3: Apply	
Learning objective	• To gain knowledge on effective web page creation using HTML tags • To create a table within a web • To gain knowledge on inserting heading levels within a web page • To learn how to insert ordered and unordered lists within a web page • To publish a web page • To learn how to combine basic design principles in video editing • To generate a video by applying her knowledge • To present the edited video • To record short clips by using camera	
Unit I	**Basics of Hardware and Software**	**12 hours**
Basics of Windows Operating System – Windows Utilities. **Internet:** Concept of Internet, Applications of Internet, Connecting to the Internet, Troubleshooting – World Wide Web – Web Browsers – Search Engines: Accessing Web Browser, Downloading Web Pages, Printing Web Pages – Understanding URL – Surfing the Web: Using e-Governance Websites.		
Unit II	**Hyper Text Markup Language (HTML)**	**12 hours**
Structure of HTML Script – Components: Text, Table, Image, Hyperlinks, Types of Lists – Headers and Footers. F**orms in HTML**: Label – Text Field – Radio Group – Text Area – Buttons.		
Unit III	**Open Element**	**12 hours**
Introduction – Creating and Saving a Project - Basic User Interface Elements – Media Elements – Images – Carousels - Image Gallery – Videos – Project Preview in Browser. **Containers and Groups:** Accordion Group – Collapsible Panel – Group of Elements – Back-End and Full Stack Development.		
Unit IV	**Video Recording**	**12 hours**
Grabbing all computer activities like playing video games, browsing the net, making VoIP calls, and more - Record the desktop screen in custom or full-screen mode - Capture the computer screen with voice narrations, system audio, and PIP effects - Include annotations such as colorful texts, shapes, lines, arrows, and drawings - Edit the video by cropping, trimming, adding subtitles, applying watermarks - Conversion of Recorded Video to MP4, VOB, MTS, DV.		
Unit V	**Video Editor**	**12 hours**

New Video Project – Sort Video Projects – Store Board – Project Library – Video Editing Tools: Filters, Trim, Split, Text, Motion, 3D Effects, Speed - Screen Direction - Sound Design – Continuity – Titling - Picture Management - Color Correction - Special Effects	
References	1. Jennifer Sargunar **,** Introduction to Information Technology**,** , Dorling Kindersley (India) Pvt. Ltd, 2011 2. A. Ravichandran , Fundamentals of Information Technology, , Khanna Book Publishing Co. Pvt. Ltd. First Edition, 2010. 3. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, Information Technology - The Breaking Wave, Dennis P. Tata McGraw -Hill Publishing Company Limited, New Delhi, 1998. 4. Anne Boehm & Zac Ruvalcaba, HTML5 and CSS3, 4th Edition, 2018. 5. Aaron Goold, Video Editing Handbook, ISBN : 1521721041.2017

Course outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	learn the basics of hardware and software, windows Operating System, web pages	**K2**
CO2	develop an effective web page using HTML tags	**K3**
CO3	execute the media elements, images, carousels, image gallery	**K3**
CO4	apply knowledge to generate video	**K3**
CO5	learn how to combine basic design principles in video editing	**K2**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	M	M	S	M	S	S	M	S	M
CO2	S	M	S	M	S	M	M	S	S	M	S	M	S
CO3	S	M	S	S	M	S	S	M	S	M	M	S	S
CO4	S	S	M	S	S	S	M	M	S	S	M	S	M
CO5	S	S	M	S	S	M	S	S	S	M	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER II

Course Code	P21ZOT21	BIOCHEMISTRY	L	T	P	C
CORE-VI			5	-	-	4

Cognitive Level	K1:Recall K2:Understand K3:Apply
Learning Objectives	• To study the hormone classification and biosynthesis • To learn the synthesis and biological functions of pituitary hormones growth hormones and thyroid hormones. • To study about function of pancreas, adrenal hormones, mechanism and role of pathophysiology. • To acquire the knowledge about hormone secretion, function and metabolic regulations

Unit I	**Atoms & Carbohydrates**	**12 hours**

Atom, Molecules and chemical bonds, Properties of H_2O, Henderson and Hasselbach equation – Buffer solutions. Carbohydrates – Classification, Structure and properties, Biological importance .Metabolism and its regulation – Glycolysis-TCA cycle, Oxidative phosphorylation. Glycogenesis, Glycogenolysis, Gluconeogenesis, HMP shunt pathway.

Unit II	**Lipids & Vitamins**	**12 hours**

Classification and Biological importance, Biosynthesis of fatty acids, triglycerides, phospholipids and cholesterol – Oxidation of fatty acids, Hypercholesterol disorders.

Vitamins – Classifications, sources, biological importance, Hormones – Types, functions & disorders.

Unit III	**Amino acids**	**12 hours**

Structure, Classification, properties & Biosynthesis of amino acids.
Proteins- Classification and Biological significance, Level of organization - Primary, secondary, tertiary and quaternary structure; Ramachandran plot, protein metabolism and degradation- Transamination, deamination and transmethylation & Urea cycle. Peptide sequencing.

Unit IV	**Nuclic acids**	**12 hours**

DNA & RNA – structure of purine and pyrimidine bases, nucleosides and nucleotide biosynthesis, regulation & degradation of purine and pyrimidine nucleotides – Biosynthesis of deoxyribonucleotides. Types of RNA, Structure of tRNA.

Unit V	**Enzymes**	**12 hours**

Nomenclature and Classification – protein enzymes, coenzymes, prosthetic groups, cofactors, isoenzymes, ribozymes, abyzymes; chemical properties of enzymes, Factors influencing enzyme activity – temperature, pH, concentration of enzyme, substrate and effect of ions: Enzyme kinetics; types of enzyme inhibition – reversible, competitive, non-competitive, uncompetitive, irreversible inhibition; Allosteric enzymes.

Text Books	**1.** Bhagavan NV.*Medical biochemistry*, fourth edition Academic Press.2010 2. Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students.2003. **3.** K.Ramadevi Ambika Shanmugam's Fundamentals of Biochemistry for Medical students, Published by wolters Kluwer Health(India)2016 .
Reference Books	1. Satyanarayana, U. and Chakrapani, U. Biochemistry, Books and Allied Pvt. Ltd., Kolkat, 2009. 2. Deb, A.C, Fundamentals of Biochemistry, 10th Edition, New Central Book Agency Pvt Ltd., Kolkata, 2011. 3. Jain, J.L., Sunjay Jain and Nitin Jain. Fundamentals of Biochemistry, Fifth Edition,Chand and Company Ltd, NewDelhi, 2010. 4. David L. Nelson & Michael M. Cox, Lehninger Principles of Biochemistry, 6th edition, Worth Publishers, New York. 2011. 5. Nelson, D.L., Leninger, A.L. and Cox, M.M.. Lehninger Principles of Biochemistry, W.H. Freeman Co.,2008.
E-Reference	1. https://swayam.gov.in/nd2_cec20_bt19/preview 2. https://swayam.gov.in/nd1_noc20_cy10/preview 3. https://www.mooc-list.com/course/biochemistry-biomolecules-methods-and-mechanisms-edx

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	understand the principles of biophysical chemistry and glucose metabolism.	**K1**
CO2	gain knowledge of lipids, vitamins and hormones in the biological system.	**K2**
CO3	understand the classification, biosynthesis and role of amino acids and use it for proteomic research	**K3**
CO4	distinguish the structure of DNA and RNA and their importance in the cells	**K3**
CO5	have a spell bound idea about enzyme activities and enzyme kinetics.	**K2**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	S	S	M	S	S	M	M	S	S	S
CO2	S	S	S	M	S	S	S	S	S	S	M	M	M
CO3	S	M	S	M	S	M	S	S	M	M	M	M	M

CO4	S	S	S	S	S	M	S	S	M	M	M	S	S
CO5	S	S	M	M	M	M	S	S	S	S	M	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOT22	IMMUNOLOGY	L	T	P	C
CORE –VII			5	-	-	4

Cognitive Level	K1:Recall K2:Understand K3:Apply
Learning objective	• To gain in depth knowledge of human immune system • To know the antigen and antibody reactions • To learn the mechanism of Immuno pathology • To acquire the knowledge on hypersensitivity and immunodeficiency diseases • To learn various techniques of immunology

Unit I	**Lymphoid organs**	**12 hours**
History and Recent advancements in immunology. Innate and Adaptive Immune System: Lymohoid organs**,** Basics of Immunity- Innate immunity and Adaptive immunity-B and T cells-. Cells of the immune system. Immunological factors.		
Unit II	**Antigens**	**12 hours**
Structure and function ,Antibodies: structure. Antigen and antibody reaction Types of immunoglobulin classes. Humoral and cell mediated immune responses- Interferon. - Monoclonal antibodies		
Unit III	**Immunopathology**	**12 hours**
Major histocompatibility complex and its significance. HLA. Transplantation Immunology - Types of graft - Mechanism of allograft rejection.		
Unit IV	**Hypersensitivity**	**12 hours**
Types of hypersensitivity. AIDS and immunity . Complement system. Immunological disorders: Use of artificial intelligence in Immunodeficiency diseases - Congenital and acquired immunodeficiency.		
Unit V	**Immunotechnology**	**12 hours**
Active immunization - Passive immunization - Immunological techniques - RIA and ELISA, COVID virus and immunity. Hybridoma techniques , Vaccines -types of vaccine, immunisation schedule autoimmune Disorders.		

Text Books	1. Goldsby, R.A., Kindt, T.J., Osborne, B.A., Kuby, J. Immunology, Vth edition, W.H. Freeman and Company, New York.2002 **2.** Coico, R., Sunshine, G., Benjamini, E., Immunology: A Short Course, VIth edition. Wiley-Blackwell, New York.2003 **3.** Kannan, I., Immunology, MJP publishers, Chennai.2011.
Reference Books	1. Arora, M.P. Immunology, Ane Books Pvt. Ltd., New Delhi.2010. 2. Delves, P.J., Martin, S.J., Burton D.R., Roitt, I.M. Roitt‟s Essential Immunology. XIIth edition. Wiley-Blackwell, Oxford, UK.2011. 3. W. Paul., Fundamentals of Immunology, Lippincott Williams & Wilkins.2012. 4. David male, Immunology VII Ed., Elsevier Health sciences, 2008. 5. Kannan, Immunology I Ed., MJP Publisher, 2007. **6.** Coico, R., Sunshine, G., Benjamini, E. Immunology: A Short Course, VIth

	edition. Wiley-Blackwell, New York.2003.
E-Reference	1. https://www.classcentral.com/course/immunologyfundamentalsimmunitybcells-12724 2. https://swayam.gov.in/nd2_cec20_bt05/preview 3. https://www.classcentral.com/course/swayam-immunology

Course Outcome

Upon completion of this course, the students willbe		
CO	**Course Outcomes**	**Knowledge Level**
CO1	learn the importance of immune system and lymphoid organs	**K1**
CO2	know about various types of antigens and Immuno globulins, monoclonal antibodies , Hybridoma and vaccine.	**K2**
CO3	comprehend the view of hypersensitivity and graft rejection	**K2**
CO4	distinguish immunological disorders, artificial intelligence in immune deficiency disease.	**K3**
CO5	attain a deep knowledge on immunological techniques like hybridoma.	**K2**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	S	S	M	M	M	S	S
CO2	S	S	S	M	S	M	S	S	M	S	S	S	S
CO3	S	M	M	S	M	S	S	S	M	S	S	M	S
CO4	S	S	S	S	M	M	S	S	S	S	S	S	S
CO5	S	S	S	W	M	M	S	S	M	S	S	M	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOT23	GENETICS	L	T	P	C
CORE VIII			4	-	-	4

Cognitive Level	K1:Recall K2:Understand 3:Apply	
Learning objective	• To get the knowledge about Mendel law • To learn about the Coupling and repulsion hypothesis and Mechanism of crossing over • To gain the knowledge regarding the Chromosome theory of inheritance. Karyotype and Idiogram • To understand the detection of chromosomal aberration and syndromes	
Unit I	**Historical Background of Genetics**	**12 hours**
Mendel‟s Study of Heredity: Monohybrid Crosses (pea plant), Mendel‟s laws of Dominance and Segregation, Dihybrid Crosses (pea plant), Mendel‟s laws of Independent Assortment. Incomplete Dominance (flower color in snapdragons and Punnet‟sgametic check board method). Multiple Allelic Inheritance**:** Blood group inheritance in Humans.		
Unit II	**Linkage and Sex Linkage**	**12 hours**
Coupling and repulsion hypothesis. Linkage in Drosophila, Linkage groups, Complete linkage, incomplete linkage, factors affecting linkage. Crossing over – Mechanism of crossing over. Cytological theories of crossing over. Germinal and Somatic crossing over. Interference and Coincidence. Construction of genetic maps (*Drosophila*).		
Unit III	**Physical basis of inheritance**	**12 hours**
Chromosome theory of inheritance. Karyotype and Idiogram. Sex Linked inheritance: X-Linked Inheritance (eye colour in Drosophila, haemophilia in humans), Y-linked inheritance (hairy pinna in males). Extra Chromosomal Inheritance / Cytoplasmic Inheritance – Mitochondrial DNA, Kappa particles in Paramecium.		
Unit IV	**Chromosomal aberration**	**12 hours**
Numerical – Euploidy (Monoploidy, Haploidy and Polyploidy) Polyploidy – Autopolyploidy and allopolyploidy. Aneuploidy – Monosomes, Nullisomes & Trisomes. Structural aberrations: Deletions, Duplications, Translocations and Inversions.		
Unit V	**Syndromes**	**12 hours**
Down, Edward,Turner and Klinefelter Syndromes. Detection of chromosomal anomalies: Pedigree analysis, Prenatal diagnostics (Amniocentesis, Chorionic Villus sampling).		
Text Books	1. Verma PS and Agarwal VK.. *Genetics*, S. Chand Publishers, New Delhi. 2010. 2. Meyyan RP. . Fundamendals of *Genetics*, Saras Publication Nagercoil, Tamilnadu.2014.	

Reference Books	1. D. Peter Snustad, Michael J. Simmons, . Principles of Genetics, 7th Edition, John Wiley & Sons, Inc. 2015. 2. D. Peter Snustad, Michael J. Simmons Principles of Genetics 7th Edition. John Wiley & Sons Ltd. New York. 2015. 3. Benjamin Lewin, , Genes IX, Oxford University Press, New York. 2008.
E-references	1. https://swayam.gov.in/nd2_cec20_bt17/preview 2. https://nptel.ac.in/courses/102/104/102104052/

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	gain more knowledge on Mendelian principles and inheritance of blood grouping in man.	**K1**
CO2	have an elaborative idea about mechanism of linkage, crossing over and gene mapping.	**K2**
CO3	understand the inheritance of traits linked with X and Y chromosomes.	**K2**
CO4	comprehend the various kinds of chromosomes aberrations	**K2,**
CO5	distinguish genetic disorders related syndromes and trace the pedigree of Mendelian traits.	**K3**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	S	S	M	M	M	M	S
CO2	S	S	S	S	S	M	S	S	S	S	M	S	S
CO3	S	S	S	M	S	M	S	M	S	S	M	S	S
CO4	S	M	S	S	S	S	S	S	S	M	M	S	S
CO5	S	S	S	M	S	S	S	S	M	S	M	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOT24	APPLIED ZOOLOGY	L	T	P	C
CORE-IX			4	-	-	4

Cognitive Level	K2:Understand K3: Apply
Learning Objective	• To learn the vermi compost technology, • To provide knowledge on apiculture and sericulture. • To understand the economic importance of silkworms. • To know about dairy farming and livestock diseases. • To acquire knowledge about poultry management

Unit I	**Vermiculture**	**12 hours**

Introduction to vermiculture. Types of earthworm, Biology of *Eisenia foetida*. *Eudrilus eugeniae*, Rearing of earthworms, Equipments, devices used in vermiculture, Vermicompost Technology –Methods and Products, Small Scale Earthworm farming for home gardens, Larger scale commercial composting, Vermiwash collection, composition &use, Predators and parasites and diseases of Earthworms and their control

Unit II	**Apiculture**	**12 hours**

Systematics, Morphology and Biology of honey bees – Honey bee species – Seasonal activities and social behaviour of honey bees – Food of the honeybees, bee flora and honey flow period – Bee keeping and ancillary industries – Newton's Beehive- Extraction of honey-Medicinal value of honey- bee products- Importance of bee colonies in crop pollination- diseases and Predators and parasites of honeybees and their control.

Unit III	**Sericulture**	**12 hours**

Origin and history of Sericulture, Moriculture-Mulberry cultivation methods, Silkworm – Taxonomy, Types, Biology and Lifecycle of *Bombyx mori*, Rearing of silkworm – Equipments, Methods, Characteristics and quality of Cocoon- Economic importance of Silk and Silk worm, Diseases and Predators and parasites of Silkworm and their control.

Unit IV	**Dairy farm Management**	**12 hours**

Introduction and scope of dairy farming, livestock in India, Dairy animals management and a model dairy farm. Livestock diseases, nutritive value of milk, milk products and dairy industry.

Unit V	**Poultry**	**12 hours**

Breeds of fowl, Housing and equipment, deep litter system, laying cages, Methods of brooding and rearing, debeaking. Management of growers, layers, broilers – Feed formulations for chicks, growers, phase I to phase III layers and broilers. Diseases and enemies affecting fowl. Nutritive value of egg and meat, factors affecting egg size, storage and preservation of egg, marketing, incubation and hatching of eggs. Economics of poultry production units.

Text Books	1. Gnanamani, M.R., Modern Aspects of Commercial Poultry Keeping, Deepam Publications, Madurai. 2010. 2. Seethalakshmi.M, and Shanthi.R., Vermitechnology, Saras Publications, Nagercoil,2014.
Reference Books	1. Ashan, J. and S.P. Sinha – A hand book of Economic zoology – S. Chand & Co-2010. 2. Zade, S.B., Khune, C.J., Sitre, S.R., and Tijare, R.V., Principles of Aquaculture, Himalaya Publishing House, Mumbai. 2011. 3. Ismail. S , Vermiculture, Orient Longman Ltd., Chennai, 2001.
E-Reference	1. https://swayam.gov.in/nd2_cec20_ge23/preview 2. https://www.classcentral.com/course/swayam-indian-agricultural-development-14119

Course Outcome

Upon completion of this course,the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	practice vermicompost technology	**K3**
CO2	acquire knowledge on Aviary and Honey extraction.	**K2**
CO3	understand the process of Silk production and its economy.	**K2**
CO4	acquire the management skills in animal behaviour.	**K2**
CO5	apply and manage a poultry farm to become potential entrepreneur	**K3**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	M	S	S	W	S	S	M	M	M	S	S	S
CO2	S	M	M	M	M	M	W	S	M	S	M	M	M
CO3	M	M	M	M	S	M	S	M	S	M	S	S	S
CO4	S	S	S	M	S	M	M	S	M	M	M	S	S
CO5	S	S	M	S	S	S	S	S	M	S	S	M	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOP22	PRACTICAL – II - BIOCHEMISTRY, IMMUNOLOGY, GENETICS and APPLIED ZOOLOGY	L	T	P	C
CORE- X			-	-	6	4
Cognitive Level	K2:Understand K3:Apply					
Learning objective	• To learn the biochemical techniques • To observe the microbial populations. • To gain hands on training on blood group and Rh typing • To know the simple Mendelian traits • To find out adulteration and silkworm disease					

BIOCHEMISTRY-

1. Qualitative / Quantitative analysis of Carbohydrates, Proteins (Lowry's & Bradford's method) and Lipids and Preparation of standard graph.
2. Isolation and identification of aminoacids using paper chromatography.
3. Determination of pH using pH paper and pH meter.
   Determination of glucose level in blood & urine.

Spotters – Thin Layer Chromatography, Chromatogram, pH-Meter, Colorimeter, Spectrophotometer, Centrifuge, Models - Heamoglobin and ATP.

(Study Tour / Field Trip to animal farm, sanctuary, research lab or industrial area should be arranged to equip practical knowledge.)

IMMUNOLOGY

1. Preparation of Serum and Plasma
2. Determination of human blood group and Rh typing by haemagglutination test.
3. Virtual dissection and Display of Lymphoid organs of mice and chicken.
4. Protein estimation from serum by Biuret method

Spotters: Autoclave, Petridish, Inoculation loop, Colony counter, Laminar Air Flow Chamber. Immunoelectrophoresis, ELISA reader, Model - Antibody structure.

GENETICS

1. Recording Mendelian Traits among students.
2. Study of polygenetic inheritance among students using finger print.
3. Identification of Colour blindness among the students using Isihara"s colour chart.
4. Mendelian traits and pedigree analysis in man.

Spotters: Normal Human Karyotype, Down syndrome, Klinefelter's syndrome, Turner's syndrome, Edward Syndromes.

APPLIED ZOOLOGY

1. pH and microbial study of vermicompost
2. Milk test for adulteration.

	3. Cocoons, egg cords, Different silkworms. 4. Diseases of silkworm
References	1. Sinha, J., Chatterjeee A.K., Chattopadhyay P., Advanced Practical Zoology Arunabha Sen Publishers, 2011. 2. H.S. Bhamrah, Practical Zoology Invertebrate Dominant Publishers. 2003. 3. Preeti Guptha and Mridula Chaturvedi, Modern Experimental Zoology . 2000. 4. Jain J.L, Sunjay Jain, Nitin Jain, Fundamentals of Biochemistry, 2007. 5. Richard L. Myers Immunology: A Laboratory Manual. McGraw-Hill Inc., US; 2nd Revised edition. 1994.

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	perform the quantitative and qualitative estimation of biomolecules; and understand various biochemical instrumentation methods	**K3**
CO2	Learn the bacterial culture techniques	**K2**
CO3	practice immunological techniques	**K3**
CO4	carry out pedigree analysis and predict mendelian traits	**K3**
CO5	perform microbial study on compost and milk test	**K3**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	S	M	M	S	S	S	M
CO2	S	S	M	S	S	S	S	M	S	M	S	S	M
CO3	M	M	S	M	S	S	S	M	M	M	S	S	M
CO4	S	M	S	M	S	M	S	S	M	M	S	S	M
CO5	M	M	S	S	S	M	M	S	M	M	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOS22	MEDICAL LABORATORY TECHNOLOGY	L	T	P	C
SUPPORTIVE COURSE- II			2	-	-	2
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	• To learn the proper procedure for the collection, safe handling and analysis of biological specimens. • To understand the medical diagnostics methods used for analysis of Blood. • To know the urine test, blood test and important human diseases. • To enlighten the skills of basic medical techniques. • To mould in clinical testing procedures to fetch job opportunities					
Unit I	**Introduction to Medical Diagnostics and its Importance**					**6 hours**
Diagnostics Methods Used for Analysis of Blood- Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)						
Unit II	**Urine analysis**					**6 hours**
Physical characteristics; Abnormal constituents, Detection of sugar, albumin, deposits and pregnancy test, (b) Blood analysis – Blood grouping, Haemoglobin estimation, Cell counts DC/TC.						
Unit III	**Diseases**					**6 hours**
Causes and diagnosis of– typhoid, malarial fever, dengue, SARS, Helminthes diseases. Glucose Tolerance Test, LFT -Liver Function Tests and Serum Amylase Estimation Increase of bilirubin and levels of SGOT, SGPT, Bilirubin tests, Alkaline phosphatase tests, Prothrombin Time, Coomb's , Liver biopsy						
Unit IV						**6 hours**
Post-Exercise or Sleeping GH levels, Clonidine Stimulation Test, Insulin **Stress Test:** Thyroid Function Test , Thyroid Stimulating Hormone (TSH) Serum Total and Free Thyroxine (T4) Metyrapone Test. Pregnancy test						
Unit V	**Tumours**					**6 hours**
Types Benign/Malignant, Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT Scan.						
Text Books	1.Ochei, Medical Laboratory Science. Theory and practice, Tata McGraw Hill publ. Co, Noida, India, 2000. 2. Dubey R. C. and Maheshwari D. K. S A text book of Microbiology,. Chand & Co. Publ. New Delhi, India, 2007.					
Reference Books	1. Ashok, R. 2000.Antimicrobials in Laboratory Medicine, B.I. Churchill Livingstone. New Delhi 2. Root & I. Samuel. M. K. G.Notes on Clinical Lab Techniques, Iyyer & Sons Publ. Co, Chennai, 1992. 3. 3.Mukherjee. Medical Laboratory Technology Vol. 1,2& 3, Tata McGraw Hill publ. Co, Noida, India, 2006.					

E- Reference	1. https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/med_lab_tech_students/medicallabtechnology.pdf 2. https://scert.kerala.gov.in/wp-content/uploads/2020/06/16-mlt.pdf 3. https://www.coloradomesa.edu/iris/documents/MedLabTech.pdf

Course Out come

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	learn the medical diagnostics and its importance	**K1**
CO2	get familiarized with urine analysis and blood analysis and able to perform	**K3**
CO3	know causes and diagnosis of– typhoid, malarial fever, dengue, SARS, Helminthes diseases	**K2**
CO4	acquire a sound knowledge in sleeping GH level and thyroid function test	**K2**
CO5	develop the knowledge about tumors types and its diagnosis	**K2**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	S	M	S	S	S	M	M	S	S	S
CO2	S	S	S	M	S	S	M	S	S	S	S	S	M
CO3	S	S	S	M	S	S	S	M	S	S	S	M	S
CO4	S	M	S	S	S	S	M	S	M	S	S	S	S
CO5	S	S	M	S	M	S	S	S	M	S	S	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER III

Course Code	P21ZOT31	BIOTECHNOLOGY & BIOINFORMATICS	L	T	P	C
CORE-XI			4	-	-	4

Cognitive Level	K2:Understand K3:Apply K4:Evaluate K5: Analyze
Learning objective	• To learn various tools and techniques in biotechnology • To gain knowledge in different areas like animal, industries, medical, agriculture biotechnology • To learn about the applications of cell culture • To acquire knowledge about internet, e-mail, e-book and youtube applications in biology • To understand genomics, proteomics and bioinformatics tools and data bases

Unit I	**Tools and Techniques of Genetic Engineering**	**12 hours**

Basic Principles of Genetic Engineering; Restriction enzymes, Linkers/Adaptors; Cloning Vectors - Salient Features and Types; Techniques – Strategies of rDNA Technology, Gene Library, Insertion of a Foreign DNA into a Vector; Transfer of rDNA into a Bacterial Cell, Selection & Screening of Recombinants, Recovery of Cells containing rDNA, Expression of Cloned DNA.

Unit II	**Industrial, Medical & Environmental Biotechnology**	**12 hours**

Fermentation - Types, Upstream and Down Stream Processing; Production of Alcohol, Antibiotics, hormones, vaccines and interferons, Biofuels, Bioremediation, Biodegradation, Biomining & Biosorption. Bioplastics.

Unit III	**Animal and Plant biotechnology**	**12 hours**

Equipments for animal cell culture, Types of tissue culture medium, Primary culture, Stable cell line, Cultivation of Animal Cells; Somatic Cell Fusion, Applications of Cell Culture– , Blood Factor VIII and Erythropoietin; Organ Culture; Transgenic Animals and their application; Micropropagation of plants, Transgenic plants. Biosafety and bioethics.

Unit IV	**Bioinformatics**	**12 hours**

Scope and applications of Bioinformatics. Biological/specilalized databases- Nucleic acid databases (Genbank,DDBJ and EMBL), NCBI, EBI, Protein databases - primary, composite, secondary; Specialized databases-SGD,TIGR, Structural databases -PDB, CATH ModBASE. Genomics - Proteomics.

Unit-V	**Applications**	**12 hours**

Similarity search (FASTA, BLAST), Multiple sequence alignment-Clustal W (Conserved domains search), Mult Align, Homology modelling, Phylogenetic analysis – MEGA, phylogenetic tree construction (Neighbor Joining method and Maximum parsimony). Data mining tools for Biomedical applications-SNP analysis, drug designing and docking.

Text Books

1. Dubey, R.C., A Text book of Biotechnology, S.Chand & Co., New Delhi, 2015.
2. Gupta, P.K, Elements of Biotechnology, Rastogi Publications, Meerut, 2006 .
3. Sathyanarayana, Biotechnology, Uppala Author-Publisher Interlinks,Vijayawada,A.P.2015

References Books	1. Lewin, B., Gene XI , Oxford University Press, New York, 2002. 2. Brown, T.A. Gene Cloning & DNA Analysis: An introduction. V edn. Blackwell publishing USA, 2006.. 3. Balasubramanian, D, C.F.A. Bryce, K.Dharmalingam, Y.Green, Kunthala Jeyaraman, Concepts in Biotechnology. Universities (P) ltd. Hyderabad, 2004. 4. Baxevanis, A.D. and Quellette, B.F.F.. Bioinformatics. A practical guide to the analysis of genes and proteins. II edn. Wiley-Intern Science Publication, New York, 2009. 5. Lesk, M.A. Introduction to Bioinformatics. Oxford Univ. Publishers, 2008. 6. Attwood, T.K. and Parry, D.J – Smith, D.J. Introduction to Bioinformatics. Pearson Education (Singapore) Pvt. Ltd, 2005. 7. Twyman, R.H, Instant notes on Bioinformatics. Viva Books Pvt. Ltd., NewDelhi, 2003 8. Mount, W. Bioinformatics sequence and genome analysis. Cold Spring harbour Laboratory Press, New York, 2005.
E-References	1. https://swayam.gov.in/nd1_noc20_bt31/preview 2. https://swayam.gov.in/nd1_noc19_bt33/preview 3. https://swayam.gov.in/nd1_noc19_bt15/preview

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	know the various techniques used in genetic engineering	**K2**
CO2	learn the methods used in manufacturing of industrial, medical products, waste removal and pollution control field	**K2**
CO3	understand the animal and plant tissue culture techniques along with the bio safety methods	**K2**
CO4	analyse the nucleotide and amino acid sequences of DNA and proteins by using bioinformatics tool	**K5**
CO5	Compare and evaluate the similarity of species and their phylogenetic relations	**K4**

Mapping of COs with POs &PSOs:

CO	Pos								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	S	S	M	M	S	S	S
CO2	S	S	M	S	S	S	S	M	S	S	S	S	S
CO3	S	M	M	S	S	M	S	M	S	S	S	S	M
CO4	S	S	M	M	S	S	S	S	S	M	S	S	M
CO5	S	S	M	S	S	S	S	S	M	M	S	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mar

Course Code	P21ZOT32	DEVELOPMENTAL BIOLOGY	L	T	P	C
COREXII			5	-	-	4

Cognitive Level	K1:Recall K2:Understand K3:Apply
Learning objective	• To acquire knowledge about basic concepts of development • To understand the events of gametogenesis, fertilization and early development • To learn the mechanism of differentiation and organogenesis • To study regeneration and screening of genetic disorders • To learn about assisted reproductive technology (ART)

Unit I	**Theories**	**12 hours**

Introduction historical perspective, Theories – preformation, epigenesis, recapitulation and germplasm, Gametogenesis- Spermatogenesis, Oogenesis. Fertilization - Physiological and biochemical pathway, Parthenogenesis - types, (natural and artificial) and significance.

Unit II	**Cleavage**	**12 hours**

Salient features, Planes of cleavage, Patterns of cleavage and factors affecting cleavage. Gastrulation- Salient features, Metabolic and Molecular changes during gastrulation, gastrulation in amphioxus. Fate-map: construction of fate-map in amphibians- artificial and natural markings.

Unit III	**Organogenesis**	**12 hours**

Organogenesis in Vertebrates – brain, eye, heart, kidney, skin and its derivatives, Regulation and development. Placentation: Classification and physiology of placenta. Teratogenesis - Teratogenic agents.

Unit IV	**Metamorphosis and regeneration**	**12 hours**

Morphological and biochemical changes during amphibian metamorphosis and its hormonal control. Neuro endocrine control of insect metamorphosis - Biochemistry and mechanism of action of hormones during metamorphosis. Process and factors influencing regeneration.

Unit V	**Programmed cell death, aeging and senescense**	**12 hours**

- Asexual reproduction – assisted reproductive technology(ART) – Male infertility – sperm abnormalities – super ovulation – IVF – ICSI – GIFT – Screening genetic disorders. Contraceptive devices.

Text books	1. Arumugam, N., A Text book of Embryology, Saras Publications, Nagercoil. 2012. 2. Arumugam NA. *Text Book of Embryology*, Saras Publication Nagercoil.2014. **3.** Balinsky, B.K.,.An introduction to embryology, saunders Philadelphia.1981.
References Books	1. Gilbert, S.F., Developmental Biology, 7th Ed., Sinamer Associates Inc., Publishers, Saunderland, Massachusettes, USA. 2003. 2. Arora M.P. Embryology , Himalaya Publishing House, New Delhi . 2009. 3. Gilbert SF . *Developmental Biology*, IX Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.2010.
E-references	1. https://nptel.ac.in/courses/102/106/102106084/]

Course outcome

Upon completion of this course, the students will be able to		
CO	**Course Out comes**	**Knowledge Level**
CO1	know the history of embryology.	**K1**
CO2	understand the functions of gonads and gametogenesis.	**K2**
CO3	gain in depth knowledge about the organogenesis.	**K2**
CO4	differentiate the progressive and retrogressive metamorphosis.	**K3**
CO5	attain knowledge on the IVF and other important aspects of animal reproduction.	**K2**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	M	S	S	S	M	M	M	M	S	M
CO2	M	S	S	M	S	S	S	S	S	W	S	S	M
CO3	M	S	M	M	M	S	S	S	M	M	S	S	S
CO4	S	S	S	S	S	S	S	M	M	M	S	S	M
CO5	M	S	S	S	S	S	S	S	M	M	S	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOT33	EVOLUTION,ANIMAL MIGRATION AND BEHAVIOUR	L	T	P	C
CORE XIII			4	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objective	• To study the different evolutionary theories • To understand the role of gene in evolution • To be acquainted with the species concept and phylogeny • To gain the knowledge on animal behaviour. • To know the importance of migration					
Unit I	**Concepts**					**12 hours**
Early ideas of evolution- The nature of evolutionary units Darwinism. Lamarckism. Natural selection. The causes of evolution; Hardy-Weinberg equilibrium: - Genetic drift and Non-random breeding-Reproductive isolating mechanisms.						
Unit II	**Models of population growth**					**12 hours**
Phenetics and cladisticts, molecular clock. Ontogeny and phylogeny: Evolutionary innovations and the origin of higher taxa-Evolution of *Homo sapiens* and molecular biological and immunological evidences for evolution. Impact of DNA bar coding in modern Evolutionary studies.						
Unit III	**Species concepts**					**12 hours**
The Biological Species concept and Theories of Evolution. A general theory of speciation and its impacts. Historical perspective; allometry and Species selection. Population genetics and ecology. Metapopulations - Monitoring natural populations – Extinction of small populations - Loss of genetic variations - Conservation of genetic resources in diverse taxa – Artificial evolution (in vitro).						
Unit IV	**Animal behavior & Evolution**					**12 hours**
Importance of animal behaviour studies – patterns of behaviour – daily and seasonal cycles of behaviour – physiological basis of behaviour. Environmental modification of behaviour – developmental changes in behavior – Genetic differences in behavior – behavioral disorders						
Unit V	**Migratory animals**					**12 hours**
Importance of bird migration – behaviour – special reference to bird pollinations – migratory fishes and crustaceans – importance of migration. Group formation- Social relationship, process of socialization, locality and behaviour – practical application – behavioral characters for management practices**.**						

Text Books	1. Hoshang S. Gunderia and Hare Govind Singh. The text book of Animal behaviour ., S. Chand & Co.) .2005. 2. Himanshu Arora and Mohan P. Arora . A Text Book of Organic Evolution, third edition. Himalaya Publications, New Delhi. 2013. 3. Arumugam NA and Natarajan P. Animal Behaviour – Ethology, Saras Publication Nagercoil,Tamilnadu.2012. 4. The text book of Animal behaviour by Hoshang S. Gunderia and Hare Govind Singh, S. Chand & Co.) 2005
Reference Books	1. Himanshu Arora and Mohan P. Arora. A Text Book of Organic Evolution, third edition. Himalaya Publications, New Delhi, 2013. 2. Veer Bala Rastogi, Organic Evolution. Kannan publications, Meerut, 2012. 3. Peter E. Rosenbaum. Volpe‟s Understanding Evolution, McGraw-Hill, New York.2010. 4. Peter E. Rosenbaum. 2010. Volpe‟s Understanding Evolution, McGraw-Hill, New York.2010. 5. Veer Bala Rastogi, *Organic Evolution*. Knrn publications, Meerut.2012. 6. Animal Behaviour (Ethology), V.K. Agarwal, S. Chand & Company Ltd, New Delhi.2009.
E-references	1. https://www.classcentral.com/course/early-vertebrate-evolution-5417 2. https://www.classcentral.com/course/molecularevolution-3555

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Out comes**	**Knowledge Level**
CO1	understand the ideas of Darwinism, Lamarckism and Natural Selection	**K1**
CO2	comprehend the Phylogeny, Ontogeny and knowledge on evidences of Evolution.	**K2**
CO3	gain knowledge on species concept and Theories of Evolution	**K2**
CO4	describe the students to understand animal behaviour and developmental changes in behaviour.	**K2**
CO5	acquire the knowledge of importance of animal behavior and migration.	**K2**

Mapping of COs with POs &PSOs:

CO	Pos								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	S	S	S	M	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	M	S	S	S	M	S	S	S	S	M	S	S	M
CO5	S	S	S	S	S	S	S	S	S	M	S	S	S

Strongly Correlating S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOT34	ECOLOGY AND TOXICOLOGY	L	T	P	C
CORE-XIV			4	-	-	4

Cognitive Level	K1:Recall K2:Understand K3:Apply	
Learning objective	• To understand different habitat and niche • To acquire the knowledge on interactions between organisms and their environments, dynamics of populations and communities • To know the different types of pollution and their management to protect the environmental health • To gain knowledge about biomes in biogeography	
Unit I	**Concepts of Environmental studies**	**12 hours**

Renewable and non-renewable resources. Conservation of natural resources, Use of alternate energy sources. Ecosystems: concept, types, structure, components and functions. Energy flow, Review of Bio-geo Chemical cycles. Energy cycles in the ecosystems and ecological succession. Food chains, webs and ecological pyramids.

Unit II	**Concept of Limiting factors**	**12 hours**

Liebig's law of the minimum – Shelford's law of tolerance. Population and Community Ecology: Basic concepts, characteristics, dynamics and regulation of population density. Characteristics, composition, structure, development and classification of communities.Succession, Homeostasis.

Unit III	**Environmental Pollution**	**12 hours**

Air, water, soil and land pollution. Radioactive pollution Impact of pollutants on general fauna, flora and ecosystems. Factors influencing physiology due to concentration of toxicants. Toxicity: Pesticides and Types: insecticides, herbicides, fungicides, rodenticides, nematicides, fumigants. Properties and effects of pesticides: Mechanism of action Ecotoxicology and its environmental significance, Environmental monitoring of pollutants Environmental policy in control of pollution.

Unit IV	**Toxicology**	**12 hours**

Definition – Types – Scope of toxicology –Routes of Entry and Testing Procedures: Absorption – distribution – Excretion – Bio-transformation-Bioassay – Acute toxicity – Chronic toxicity. Assessment of safety /risk. K3Pesticide. Margin of safety, Toxicity curves, cumulative toxicity and toxicity of chemical mixtures. Food Additives: Types and functions of food additives, hazards of food additives.. Toxicology of metals – Arsenic, cadmium, chromium, lead, mercury. Metabolism, Storage and Excretion of Xenobiotic

Unit V	**12 hours**	**12 hours**

Acute, Sub acute, Chronic and Special tests (Metabolic, neurotoxicity and reproductive toxicity, Carcinogenicity and Mutagenicity). Synergism and antagonism, Dose-Response relationships, determination of LD50 and ED50, Statistical concept of toxicity-concentration,- SPSS software to determine LC50 –Computers in Toxicology and Risk Assessment	
Text Books	1. Verma PS and VK. *Cell Biology, Genetics, Evolution and Ecology*, S Chand Publishers, New Delhi.2004. 2. Arumugam N. *Concepts of Ecology*, Saras Publication, Nagercoil, Tamilnadu.2014. 3. Agarwal.K.C. Textbook for Environmental Studies, Erach Bharucha, UGC, New Delhi.2018. 4. P. D. Sharma. Environmental Biology and Toxicology Rastogi Publications, Meerut.2018
References Books	1. M.Kato. The Biology of Diversity- Springer 2012 2. S. N. Prasad & Vasantika Kashyap, Introduction to Toxicology: S. Chand & Co., New Delhi.1991 3. M. Manivasakam Environmental Pollution :, National Book Trust, New Delhi 2017 4. Gupta, P. K. and Salunkhe. D. K Modern Toxicology: Vol. I, II, III:. Metropolitan Book Co. Pvt. Ltd. New Delhi.1985. 5. S. N. Prasad & Vasantika Kashyap, Introduction to Toxicology: S. Chand & Co., New Delhi. 2008. 6. M. Manivasakam, Environmental Pollution : National Book Trust, New Delhi .2001 7. Modern Toxicology: Vol. I, II, III: Gupta, P. K. and Salunkhe. D. K. Metropolitan Book Co. Pvt. Ltd. New Delhi.2002.
E-References	1. https://swayam.gov.in/nd1_noc19_ge23/preview 2. http://ugcmoocs.inflibnet.ac.in/ugcmoocs/view_module_pg.php/697

Course Outcome

Upon completion of this course, the students will be		
CO	**Course Outcomes**	**Knowledge Level**
CO1	understand the ecosystem and bio-geo chemical cycles.	**K1**
CO2	obtain sound knowledge on population and community ecology .	**K2**
CO3	get an in depth knowledge on environmental populations and its impacts.	**K2**
CO4	learn about the toxicological testing methods and to perform the test	**K3**
CO5	know the effects of toxicants, metabolism and control measures	**K2**

Mapping of COs with POs &PSOs:

CO	Pos								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	S	S	S	S	S	M	M	S
CO2	S	S	S	M	M	S	S	S	M	S	S	S	M
CO3	M	S	S	S	M	M	S	S	S	S	M	M	M
CO4	S	S	S	S	M	M	M	M	M	S	S	S	S
CO5	M	M	S	M	S	M	M	S	M	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOT35	RESEARCH METHODOLOGY AND BIOETHICS	L	T	P	C
CORE-XV			5	-	-	4

Cognitive Level	K1:Recal K2:Understand K3:Apply	
Learning objective	• To acquire knowledge on dissertation writing and publishing of research papers. • To learn laboratory hazards and safety measures • To study the variables in biology • To understand the hypothesis testing, significance of correlation. Regression and application of SPSS in biology	
Unit I	**Importance of scientific research**	**12 hours**
Identification of research problems and research gaps–Sources, Extensive Literature Review, Developing the objectives, Preparing the Research Design, Types, Approaches, Methods of Research (Survey, Observation, case study, experimental, historical and comparative methods) collection and review of literatures– Planning and implementation of Research work – Journals database: Web of science- Scopus- UGC Care list Pubmed-Google scholar		
Unit II	**Presentation, publishing research report**	**12 hours**
Dissertation writing – Preparation of research papers- Scientific Journals- Ethics in thesis writing- Plagiarism Impact factor of journals- Articles citations, h-index- i10 index. PowerPoint preparation for presentation Research funding promoting agencies- State- TANSCHE, TNSCST, National (ICMR, ICAR, DAE,CSIR, UGC, DST, DBT)		
Unit III	**Principles of microscopy**	**12 hours**
fluorescent microscope, UV-visible spectrophotometer- SEM-TEM-GCMS- HPLC- AAS-PCR- DNA sequence- NGS Dosimetry: Ionization chamber, GM counter, Solid and liquid scintillation counters, Autoradiography, Radio Immuno Assay, Enzyme Linked Immuno Sorbent Assay (ELISA); SDS-PAGE, Agarose Gel Electrophoresis, 2D Gel Electrophoresis, Gel Documentation.		
Unit IV	**Bioethics, GLP and CPCSEA Guidelines**	**12 hours**
Introduction to Bioethics-Positive effects – Negative effects - Biotechnology examples – Rice , Vitamin A - Slow Ripening Fruits- Saving the Banana- Toxic Soils-Fast Growing fish- The Monarch Butterfly Story- Consumer traits – food safety- Environmental concerns- Economic and Social Concerns. Bioethics regulation frame work in India. GLP introduction – National Good Laboratory Practice (GLP) Programme. CPCSEA Guidelines for Laboratory Animal Facilities.		
Unit V	**Intellectual Property Rights**	**12 hours**
Origin of the Patent Regime- Early patents Act. History of Indian Patent System– Basis of Patentability –Patent Application Procedure in India- Patent Granted Under copy right, trade mark, Convention Agreement- Opposition to Grant of Patent-Grant and Sealing- Exclusive Rights - Special Provision for selling or distribution - Suits relating to infringements – Compulsory License- Relief under TRIPS agreement.		

Text Books	1. Gurumani, Research Methodology, MJP Publishers, Chennai. 2006. **2.** Kothari C.R.,. Research Methodology. 2nd edition, New Age International Publishers, 2004.
Reference Books	1. Sood (O.P), Rattan (Ashok),Ethics in animal experimentation .Ranbaxy science foundation and Design.2004. 2. Leedy, P.D. and Ormrod, J.E., Practical Research: Planning, Prentice Hall.2004. 3. Fink, A., Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications.2009. 4. Veerakumari, L. Bioinstrumentation. MJP Publishers, Chennai.2009. 5. Ghatak K.L.Techniques and Methods in Biology. PHI Learning Pvt. Ltd. New delhi.2011. **6.** Shaleesha A.Bioethics. Stanley Wisdom Publication .2018.
E-references	https://www.mooc-list.com/course/understanding-research-methods-coursera https://swayam.gov.in/nd2_ugc19_ge04/preview

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	understand the research problems	**K1**
CO2	understand the method of thesis and research paper writing	**K2**
CO3	learn the principles and mechanism of various research instruments and able to handle them for research	**K3**
CO4	understand the laboratory practices and animal usage with reference to bioethics	**K2**
CO5	know about the patent rights and its regulations.	**K2**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	M	M	S	S	M	M	M	M	S	M	S	S
CO2	M	M	S	M	S	S	M	M	M	M	M	M	S
CO3	M	S	S	S	S	S	M	S	M	S	S	S	S
CO4	S	S	M	S	S	S	S	S	M	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOP33	PRACTICAL-III	L	T	P	C
CORE -XVI		BIOTECHNOLOGY & BIOINFORMATICS, DEVELOPMENTAL BIOLOGY, EVOLUTION, ECOLOGY & TOXICOLOGY	-	-	6	4

Cognitive Level	K2:Understand K3:Apply
Learning objective	• To learn the techniques of DNA isolation and safe handling of microorganisms • To acquire the skill to use Bioinformatics tool for analysis of sequence • To know the various stages involved in embryo • To estimate the physico-chemical parameters of the water and lethal dose of toxic chemicals
Experiments in Biomolecules	**BIOTECHNOLOGY** • Laboratory demonstration on safe handling of microorganisms. • Isolation of DNA from saliva. • Isolation of yeast DNA and Transformation of E-Coli. • Trypan blue exclusion method for cell viability estimation. • Production of penicillin and testing of antimicrobial activity. **BIOINFORMATICS** • Multiple Sequence Alignment. • Construction of Phylogenetic Trees for DNA and Proteins. • Sequence Retrieval from Databases. • Building of Molecules. • BLAST, FASTA programs for sequence database search. **DEVELOPMENTAL BIOLOGY** • Temporary mounting of chick blastoderm (24, 48,72 and 96 hrs). • Observation of frog spermatozoa. • Study of life cycle /early embryogenesis of frog. • Effect of hormones in amphibian metamorphosis **Spotters** Frog's / Human's sperm Frog's Egg, 8-Celled Stage, 16 Celled Stage, Yolk Plug Stage, Blastula, Gastrula • T.S of testis and ovary of frog and mammal • Chick Embryo: Primitive Streak, 24 hrs, 48 hrs and 72 hrs Chick Embryo. **EVOLUTION:** • Observation of forelimbs and hindlimbs -Frog, Calotes, Bird and Mammal) • Observation of fossils. Peripatus, Archaeyopteryx ,*Physa princepii* • Observation of leaf insects and stick insects , Monarch and Viceroy butterflies • Study of polygenetic inheritance among students using finger print.

- Hardy - Weinberg Law & Calculation of Gene Frequency of Dominant and Recessive using two different colour beads.

ECOLOGY & TOXICOLOGY

- Estimation of Chlorides, Total Hardness
- Determination of pH, DO and Co2
- Collection and Mounting of any three Zoo planktons-
- Estimation of primary productivity
- Estimation of LC50 or LD50 of an organo phosphorous pesticide.
- Physico-chemical analysis of soil pH, moisture, temperature, organic matter.

Spotters: Secchi Disc, BOD incubator, Wet and Dry bulb Thermometer, , Hygrometer, Rain Gauge, Sandy, Muddy and Rocky Shore Fauna (each five).
Report on Ecological Collection of Fauna representing Different Habitat

(Study Tour/Field Trip to animal farm, sanctuary, research lab or industrial area should be arranged to equip practical knowledge.

COURSE OUTCOME

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	perform the techniques, isolation of DNA and antimicrobial test	**K3**
CO2	use bioinformatics tool for research analysis	**K3**
CO3	differentiate various stages of development of chick blastoderm	**K3**
CO4	compare the fore limbs and hind limbs of different vertebrates on evolutionary pattern	**K2,**
CO5	gain practical knowledge on toxicolological techniques –LC_{50} / LD_{50} and water quality test	**K3**

Mapping of COs with POs &PSOs:

CO	POs								PSOs				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO1	S	S	S	S	S	S	S	M	S	S	S	S	M
CO2	S	S	S	S	S	S	S	M	S	S	S	S	M
CO3	S	S	M	S	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	M
CO5	S	S	M	S	S	S	S	S	S	S	M	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21WSS33	WOMEN EMPOWERMENT	L	T	P	C
SUPPORTIVE- COURSE- III			2	-	-	2
Cognitive Level	K2: Understand K3: Apply K5:Analyse					
Learning objective	• To know the objectives, types, determinants of women Empowerment. • To learn the various national and international agencies for women empowerment. • To uplift women in socially, economically and politically as empowered. • To make aware of women rights and enhance their life • To know the women entrepreneurship development in India					
Unit I	**Fundamentals of Women's Studies**					**6 hours**
Meaning and Definition of the concept of Women's studies - Need and Scope - Women's studies as an academic discipline - Women's Studies – theories and Achievements- International Women's Year 1975 - International Women's Decade 1975 -1985; Towards Equal Status 1976 – Current trends-Importance of women's education – Efforts of various Committees –Life Skill Education to build capacity - Education as a tool of Women Empowerment - Obstacles to Women Education – Social, Economic, Cultural and other factors, limitations of Formal system of education-Role of educational institutions, Parents and Community						
Unit II	**Issues of Women**					**6 hours**
Girl Children and Women in Society: Social Networking- Influencing factors of Social Networking-Types of Social Networking- impact and consequences of networking- Remedial measures and strategies for solution- NCW: Initiatives to overcome Women's issues - Ministry of Home Affairs and Networking with State Women Commissions: Cyber Crime Prevention against Women and Children (CCPWC)-challenges - efforts & effective measures to prevent crime against women and children - create awareness for social issues. Motherhood - Single Parent - Widows – Multiple Roles of Women - Role conflict, Role change - Social Responsibility and Gender Empowerment.						
Unit III	**Achievement and Rights of Women**					**6 hours**
Gender Equality: Achievement of Women - Educational, Political, Economic, Social - Panchayat Raj - Political role and participation - National and International Levels; Women's Rights - Property Rights - Redressal mechanism at different levels - Rights of Women with Disability: Case Studies on Women Achievers in the field of politics, education, arts science, law etc.						
Unit IV	**Empowerment of Women**					**6 hours**
Empowerment of Women: Alternative approaches - Women in Development (WID) - Women and Development (WAD) - Women's Development- Definition, Meaning and Scope, Gender and Development (GAD), Human Development Index (HDI) vs Gender Development Index (GDI). Types of Empowerment: Social, Educational, Political, Economical, Legal to Holistic levels-Role of Govt. and NGOs - Help line numbers in promoting women's empowerment - National and International Funding Agencies in promoting research on women.						
Unit V	**Women Entrepreneurship**					**6 hours**

Women Entrepreneurship:– Types of Entrepreneurs Opportunities and Risk – Push and Pull Factors –financial Assistance and credit facilities-Micro finance- Entrepreneurship Skill and Competencies - Women Entrepreneurship Development in India: TRYSEM – NABARD – NMEW - Support to STEP – TREAD – Rural Entrepreneurship Development Programme – Gramia Bank –Mahila bank and supportive measures- Industrial Development Bank of India (IDBI) – Small Industries Development Bank of India-SHG and Entrepreneurship opportunities	
Text Books	1. Rani Sandhya, "Development of Women – Issues and Challenges", Discover Publishing House Pvt Ltd, New Delhi, 2012. 2. Anil Kumar Jha, "Gender Inequality and Women Empowerment", Axis Books, New Delhi, 2012. 3. Nandal Santosh , "Women and Development", A Mittal Publications, New Delhi, 2012
Reference Books	1. Rao Pulla, "Political Empowerment of Women in India – Challenges and Strategies", ABD Publishers, New Delhi, 2012. 2. Jenny Edwards, Andrea Cornwall, et al., "Feminisms, Empowerment and Development: Changing Women's Lives", Kindle Edition, 2014. 3. Elson Diane, et al. "Gender Equality and Inclusive Growth: Economic Policies to Achieve Sustainable Development", UN Women, 2019 4. Priyanka Sharma Gurnani, "Women Entrepreneurship – Emerging Dimension of Entrepreneurship in India" Educreation Publishing House, New Delhi, 2016.
E-Reference links	1. https://asiapacific.unwomen.org/en/focus-areas/governance/political-participation-of-women

Course outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	gain knowledge about the concept, need and scope of women's studies	**K2**
CO2	acquaint and analyze issues of women in various contexts	**K5**
CO3	understand changing role of women in society and issues related to it	**K2**
CO4	understand the importance of women's education.	**K2**
CO5	comprehend empowerment of women and their achievement	**K3**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	M	S	S	S	M	S	S	M	S	M

CO2	S	M	M	S	M	S	S	M	S	M	S	S	M
CO3	M	M	M	S	S	S	S	M	S	S	S	M	S
CO4	S	M	S	M	S	S	M	S	S	M	S	S	M
CO5	M	S	M	S	S	S	S	S	S	M	M	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER-IV

Course Code	P21ZOE411	CHOICE -I	L	T	P	C
ELECTIVE – I		ENTOMOLOGY	4	-	-	4

Cognitive Level	K2:Understand K3:Apply	
Learning objective	• To learn the classification of insects • To comprehend the external morphological features of insects • To understand the various internal organs systems of insects • To gain deep knowledge in insects relationship between abiotic and biotic factors • To understand the pest of various crops	
Unit I	**Taxonomy**	**12 hours**
Basics of Insect Classification, Classification up to Order Level, Key Characteristics with South Indian Examples.		
Unit II	**External anatomy and Growth**	**12 hours**
External Anatomy of a Typical Insect - Exoskeleton, Head, Thorax, and Abdomen. Mouth Parts of Insects, Different Types of Larvae and Pupae - Growth and Metamorphosis of Insects.		
Unit III	**Physiology of Insects**	**12 hours**
Digestive System, Excretory System, Respiratory System, Circulatory System, Nervous System and Sense organs, Reproductive System of a typical insect. Endocrine System and Pheromones in ants.		
Unit IV	**Ecology of Insects**	**12 hours**
Abiotic Factors Affecting Insects - Temperature, Moisture, Air-currents, Diapause, Light, Food. Habit & Habitat - Terrestrial and aquatic. P rotection, Competition, Parental Care, Trophyllaxis, Commensalism, Captives, Food Storage, Natural Enemies, Insects and Plant associations. Brief note on social insects.		
Unit V	**Agricultural Entomology**	**12 hours**
Insect Pest of Crops and their control measures: Paddy, Groundnut, Coconut, Cotton. Sugarcane, Brinjal, Lady's finger and Pests of Stored grains. Pest Control: Prophylatic, Mechanical, Chemical and Biological Control measures. Integrated Pest Management.		
Text Books	1. Ambrose Dunston P.The Insects: Structure, Function and Biodiversity, Kalyani Publishers, Ludhiana. 2004. 2. Vasantharaj David, B. and Kumaraswami, T., Elements of Economic Entomology, Popular Book Depo, Chennai. 1995	
Reference Books	1. Tembhare, D.B.,Modern Entomology, Himalaya Publishing House, Mumbai. 2012 2. Ambrose Dunston P., The Insects: Structure, Function and Biodiversity, Kalyani Publishers, Ludhiana. 2004, 3. Chapman, R.F., The Insects: Structure and Function, Cambridge University Press. 2012. 4. T.N. Ananthakrishnan, and B.V.David, General and Applied Entomology, Tata McGraw Hill Publishing House, New Delhi.1986 5. Wigglesworth, V.B., , Principles of Insect Physiology, 9th Ed. Chapman & Hall, London. 2001.	

E-references	1.https://onlinecourses.swayam2.ac.in/cec20_bt02/preview 2.https://www.classcentral.com/course/swayam-endocrinology-19855

Course outcome

Upon completion of this course, the students will be able to		
CO	**Course Out Comes**	**Knowledge Level**
CO1	classify and group the insects according to their taxonomy.	**K3**
CO2	understand the characteristic features of insects	**K2**
CO3	learn the importance of beneficial insects	**K2**
CO4	know the physiology and significance of pheromones	**K2**
CO5	know the vector and pest management practices.	**K2**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	M	S	S	S
CO5	S	S	S	S	S	S	S	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOE412	CHOICE -II	L	T	P	C
ELECTIVE-I		ENDOCRINOLOGY	4	-	-	4

Cognitive Level	K1:Recall K2:Understand
Learning Objectives	• To have a knowledge on the functions of neuroendocrine systems • To get a thorough knowledge on various glands and related hormones • To know the role of hormones in metabolism • To understand the hormonal regulation in reproduction
Unit I	**Hormone:** Nature, function and classification of hormones – Feedback control of hormone secretion – Organisation and functions of neuroendocrine systems- Hypothalamo– hypophyseal interactions- Bioactive peptides.
Unit II	**Pituitary gland:** Structure and functions, role of hormone secretions - Thyroid gland – Structure, function and biosynthesis of thyroid hormone – Parathyroid – Structure and PTH – Calcitonin – Role of hormones in calcium and phosphate metabolism.
Unit III	**Gastrointestinal hormones**: secretion, control and function – Insulin and glucagons – Adrenal hormones and Stress management – Catecholamines as emergency hormones- their role in the regulation of carbohydrate, protein and lipid metabolisms.
Unit IV	**Adrenal Hormone:** Adrenal gland – Structure and role played its hormones in glucose metabolism – Aldosterone and the rennin- angiotensin system – Pineal gland- structure and its influence on reproduction and pigmentation – Thymus gland – Structure and thymic hormones – their functions in brief
Unit V	**Steroid hormone**: Biosynthesis in the ovary and testis – Hormonal regulation of ovarian cycles in mammals – Folliculogenesis, ovulation, corpus luteum formation and regression – Hormones in pregnancy and lactation. Gonadal steroid action on spermatogenesis and spermiogenesis – Role of hormones in sex accessory gland growth and functions.
Text Books	1.Yadav, Text book of Endocrinology, 2009, Sonali Publications, New Delhi - 2009.
Reference Books	1.Yadav, Text book of Endocrinology, 2009, Sonali Publications, New Delhi 2. M.P. Goswami, Endocrinology and Molecular Cell Biology, Gaurav book centre Pvt Ltd, Delhi .2013 3. George Griffing, Endocrinology,Stat Pearls Publishing, USA .2015 4. Mac E. Hadley, Endocrinology, Prentice Hall .2001

E-Reference	https://www.classcentral.com/course/swayam-endocrinology-19855

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	understand the hormone classification and function of hormones	**K1**
CO2	know the structure of Pituitary glands and its hormone function	**K2**
CO3	comprehend the gastrointestinal hormones functions on the regulation of macromolecules metabolism	**K2**
CO4	learn the importance of adrenalin and thymic hormones	**K2**
CO5	get deep knowledge on ovarian cycles and sex hormones	**K2**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	M	S	S	M	S	M	S
CO2	S	S	S	S	M	S	S	S	S	S	M	S	S
CO3	S	S	M	S	S	S	S	S	S	M	M	S	S
CO4	M	S	S	S	M	S	S	S	S	M	S	S	M
CO5	S	S	S	M	S	S	S	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOE421	CHOICE -I	L	T	P	C
ELECTIVE- II		BIOSTATISTICS AND BIOPHYSICS	4	-	-	4
Cognitive Level	K1:Recall K2:Understand K3:Apply					
Learning objectives	• To learn the variables in biology • To explore the use of statistical methodology in designing, analyzing,interpreting and presenting biological experiments and observations. • To understand the basic concepts of Biophysics					
Unit I	**Data collection & presentation:** Variables in Biology, Collection, classification and tabulation of data. Frequency distribution, Diagrammatic and Graphical presentation of statistical data, Sampling techniques. Measures of Central Tendencies: Mean, Median and Mode; Measures of Deviation: Standard Deviation, Quartile deviation, Mean deviation and Standard Error					
Unit II	**Normal Distribution:** Data distribution – Normal, Binomial and Poisson Distribution. Skewness and Kurtosis. Correlation Analysis - types, methods - Scatter plot, Karl Pearson's Correlation Coefficient, Spearman's Rank correlation. Simple regression Analysis - predicting X on Y and Y on X.					
Unit III	**Hypothesis Testing and estimation:** H_0 and H_1, Hypothesis testing, significance level, degrees of freedom. Definitions and applications of Chi-square test, 't' and 'f' test. Analysis of variance (ANOVA)-One way and two way classified data; Application of SPSS in biology.					
Unit IV	**Biophysics:** Introduction – Scope of biophysics.-I, II, III laws of Thermodynamics, Concepts of free energy, Entropy, Enthalpy, biological oxidation reduction reaction – redox potentials in biological system. Molecular structure of water–Non-covalent bonding: Hydrogen bond, electrostatic interaction-Vander Waals forces thermal, solvent properties, ionization of water – colligative properties of aqueous solution					
Unit V	Biological significance of Osmosis, Electrical conductivity, Diffusion, Surface tension, Adsorption, Hydrotropic, Precipitation, Viscosity and Colloids, - Donnan Equilibrium in Living systems. Diffusion – Fick"s laws, constant laws–exergonic and endergonic reaction – rate of reactions – energy activation – Arrhenius expression- LASER and its applications in Biology.					

Text Books	1.Pillai, R.S.N. and Bagavathi,V. S. Statistics theory and practice. Chand & Co.Ltd, New Delhi. 2010. 2.Gupta, S.P. Statistical Methods. S. Chand & Co. Ltd, New Delhi.2014. 3.Kothari,C.R. and Garg,G. Research methodology –Method and techniques. NewAge International (P) Ltd. New Delhi. 2010.
Reference Books	1. Arora, P.N and P.K.Malhan. Biostatistics. Himalaya Publications, Mumbai.2008. 2. Daniel, W.W. Biostatistics-A foundation for analysis in health sciences, John Wiley (Asia) & sons, Singapore.2006 3. Gupta S.P.. Statistical Methods. 40th edition, S.S. Chand Publishers, New Delhi.2011. 4. Subramanaiam, M.A., Biophysics. MJP Publishers, Chennai. 2002 5. Daniel, M., Basic Biophysics for Biologists, Agro-Botanical Publisher, Bikaner, India.2001
E-References	1. https://swayam.gov.in/nd2_ugc19_ma03/preview 2. http://rijuebookbiostatistics.blogspot.com/2008/06/biostatistics-ebooks-free-download.html

Course outcomes

Upon completion of this course, the students will be able to		
CO	**Course Out comes**	**Knowledge Level**
CO1	understand to collect the data , arrange and interpret it.	**K1**
CO2	differentiate the normal and skewed data., correlation between different variables.	**K3**
CO3	comprehend the significanceof testing, for their present statistical results and understand the importance of statistical software in research.	**K3**
CO4	understand the thermodynamic laws and type of bonding lying between different biological atoms.	**K2**
CO5	get thorough knowledge on osmosis and diffusion	**K2**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	S	S	S	M	S	S	S
CO2	S	S	S	S	M	S	S	S	S	S	M	S	S
CO3	S	M	S	S	S	M	S	S	S	S	S	M	S
CO4	M	S	S	S	M	S	S	S	S	M	S	S	M

CO5	S	S	S	M	S	S	S	S	S	M	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOE422	CHOICE -II	L	T	P	C
ELECTIVE-II		MICROBIOLOGY	4	-	-	4

Cognitive Level	K1:Recall K2:UnderstandK3:Apply	
Learning objectives	• To understand the basics of microbiology and its classification • To comprehend the various pathways of microbial metabolism • To get knowledge about food spoilage and food poisoning by micro organisms • To know the techniques of production of various microbial commercial products • To learn the microbial role for the treatment of sewage and agricultural	
Unit I	**History and Microbial Growth**	**6 hours**
History and scope of Microbiology, Microbial Culture: Sterilization Isolation of Pure Culture, Microbial growth -Synchronous. Bacterial growth - Growth curve, Measurement of Bacterial Growth. – Cell, count method and Turbido metric method. Staining Techniques - Simple, differential and Gram Staining.		
Unit II	**Microbial Metabolism**	**6 hours**
Glycolysis, Pentose Phosphate Pathway (HMP), Entner-Doudoroff pathway,TCA cycle, Glyoxylate cycle and Fermentation. Bacterial Photosynthesis-Classification of photosynthetic Bacteria, Mechanism of photosynthesis.		
Unit III	**Food and Medical Microbiology**	**6 hours**
Microbiology of Milk,Dairy Industry ; Dairy Products-Yoghurt, Butter Milk, Butter, Cheese. Microbial Spoilage of food: Microbial Contamination and Spoilage of Poultry, Fish and Sea.Preservation of Food - Physical and Chemical Methods.Bacterial diseases: Diphtheria, Meningitis, Pertusis, Streptococcal Pneumonia.Sexually Transmitted Diseases - Gonorrhea and Syphilis,Contact Disease – Leprosy. Viral diseases - Influenza, Hepatitis - B, Rabies.		
Unit IV	**Industrial Microbiology**	**6 hours**
Alcohol production – Ethanol:Production of Acids - Lactic acid and Vinegar,Production of Antibiotics – Penicillin and Streptomycin ;Production of Amino acid - L-lysine, L- glutamic acid. Production and Application of Microbial Enzymes.		
Unit V	**Agricultural and Environmental Microbiology**	**6 hours**
Role of Ti Plasmid and Nif gene in Agriculture. Biofertilizers and Biopesticides, Bacterial Insecticides - Bacillus thuringenesis and Viral Insecticides. Potable water and Sewage treatment. Water Pollution Management – Bioaugmentation and Bioremediation		
Text Books	1. Ananda narayanan, T. and Jayram Paniker, C.K., 2000, Textbook of Microbiology, 6th Ed. Orient Longman Ltd., Chennai. 2. 2. Tortora, G.J., Funke, B.R. and Case, C.L. Microbiology: An Introduction. 9th Edition, Pearson Education, Singapore .2009. 3. Dr.R.C.Dubey .Dr.D.K.Maheswari, A Text book of Microbiology, S.Chand & CO Ramnager, New Delhi. 2010.	

	4. Kanika Sharma. Textbook of Microbiology – Tools and Techniques. 1st Edition, Ane Books Pvt. Ltd., New Delhi. 2011. 5. .Dr.R.C.Dubey .Dr.D.K.Maheswari, A Text book of Microbiology, S.Chand& CO Ramnager, New Delhi, 2010.
Reference Books	1. Pelczar, M.J., E.C.S. Chan and N.R. Kreig. 2009. Microbiology, fifth edition. McGraw-Hill. Book Co. Singapore . 2009. 2. Samuel Baron , Medical Microbiology, II Ed., Wesley publishing company-2008. 3. Black, J.G. Microbiology-principles and explorations, 6th edition. John Wiley & Sons, Inc. New York .2005. 4. Prescott, L.M., Harley, J.P. and Klein, D.A. Microbiology (7th edition) McGraw Hill, Newyork.2008. 5. Madigan, M.T., Martinkl, J.M. and Parker, J. Brock Biology of Microorganisms, 12th Edition, MacMillan Press, England,2009.
E-references	1. https://onlinecourses.swayam2.ac.in/cec20_ag09/preview 2. https;//onlinecourses.swayam2.ac.in/cec20_bt14/preview

Course Outcomes

Upon completion of this course, the students will be able to		
CO	**Course Out comes**	**Knowledge Level**
CO1	learn the development and advancements of microbiology	**K1**
CO2	understand the microbial feature and immune system.	**K2**
CO3	gain knowledge on food preservation, infectious diseases and to overcome infection.	**K3**
CO4	learn the production of microbial products from industries	**K2**
CO5	attain knowledge about microbial role in environment and agricultural sector.	**K2**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	S	S	S	S	M	S	S	S
CO2	S	S	S	M	S	M	M	M	S	S	M	S	S
CO3	M	S	M	S	S	S	S	M	S	S	S	S	S
CO4	S	M	S	S	S	S	M	S	S	S	S	M	S
CO5	S	S	M	M	M	S	M	M	M	S	S	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOR41	MAJOR PROJECT	L	T	P	C
			-	-	22	8

All the candidates of M.Sc (Zoology) are required to undergo a Major project and submit the following:

1. Dissertation/Thesis based on the work done by the student.
2. Soft copy of the project on CD/DVD

Project Evaluation Guidelines.

The project is evaluated on the basis of following heads:

Presentation - 25% of total marks

Viva - 20% of total marks.

Thesis/ Dissertation - 30% of total marks.

Learning outcome: Empowering students to carryout individual research projects.

NON-MAJOR ELECTIVES

Course Code	P21ZON211	CONSERVATION BIOLOGY	L	T	P	C
NME -I			4	-	-	4

Cognitive Level	K1:Recall	K2:Understand	K3:Apply
Learning objective	• To update the knowledge of current status of biodiversity and its extinction • To understand the significance of biodiversity • To identify the ways to conserve the biodiversity • To obtain knowledge about the conservation of Biodiversity		

Unit I	**Components of Biodiversity**	**12hours**

(Ecosystem, Genetic and Species diversity) – Assigning values to biodiversity – Species concepts – Animal diversity: (Distribution inventory, species richness) – Biodiversity Hotspots (Western Ghats, Indo-Burma region). Biogeography of India – patterns and distribution of ecosystems, ecological succession, biotic and abiotic factors of an ecosystem. Conservation ethics and values of wildlife.

Unit II	**Extinctions**	**12hours**

Past rates of Extinctions – Concepts of Island biogeography and extinction rates on Islands – Human induced, Modern and local extinctions – Population reduction-threats to wildlife (examples) – Habitat loss, degradation and fragmentation. Threats to animal diversity in India – Status of species: Rare, endemic and threatened species – Measuring status of species in the wild – IUCN Red list (Assessments and methodologies) – Status of Indian animals.

Unit III	**In situ conservation of Indian animals**	**12hours**

(Case studies). Ex situ: Captive breeding programme – people participation in conservation – Successes and failures of conservation actions in India (Case study) – Tools in Conservation: GIS – remote sensing – Landscape model – PVA – VORTEX. Red listing process: categories and criteria, SIS. Wildlife conservation in India importance of conservation – methods of wildlife conservation

Unit IV	**Economics of biodiversity conservation**	**12hours**

Wildlife (Protection) Act of India (1972) – Protected Area network – forest policy – Prevention of cruelty to Animal Act – Convention on Biological diversity, International Trade in endangered species – Zoo policy- Laws and their applications in Zoological parks, wildlife sanctuaries and biosphere reserves – Economics of biodiversity conservation. The world Conservation Union (IUCN) – World wildlife fund (WWF) – Indian Board for Wildlife (IBWL).

Unit V	**Wildlife / Animal magazines**	**12hours**

Journals- How to write popular and Scientific articles – Magazine and Journal information – Wildlife, nature, environment games (examples) – Role of NGO's and Government organizations in wildlife conservation – Wildlife celebration days in India. Technical writing and reporting of field studies. Public presentation. Field Project/ Report – visit to Zoological parks, wildlife sanctuaries and biosphere reserves.

Text Books	Peter H. Raven, Navjot S. Sodhi, Luke Gibson, Conservation Biology: Voices from the Tropics, Willey Online library.2013.
Reference Books	1. Meffe, G. K. and C. R. Carroll.Principles of Conservation Biology, Sinauer Associates, USA .1994 2. Michael, P. Ecological Methods for Field and Laboratory Investigations. Tata Mc Graw Hill Publishing Company Limited, New Delhi. 2001. 3. Peter H. Raven, Navjot S. Sodhi, Luke Gibson. Conservation Biology: Voices from the Tropics, Willey Online library.2013
E-references	1. https://nptel.ac.in/courses/102/104/102104068/ 2. https://swayam.gov.in/nd1_noc20_bt39/preview 3. https://swayam.gov.in/nd1_noc20_bt38/preview

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	understand the types of biodiversity and conservation ethics	**K1**
CO2	know the causes of biodiversity extinction and IUCN-Red list	**K2**
CO3	learn the insitu and exsitu biodiversity conservation methods	**K2**
CO4	know the wild life protection act and organization	**K2**
CO5	obtain the knowledge on wild life animal magazines and role of NGOs for the conservation of biodiversity	**K3**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	S	S	S	M	S	S	S
CO2	S	S	S	M	S	S	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	M	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	M	S	S	M
CO5	S	S	S	M	S	S	S	M	S	M	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZON212	EPIDEMIOLOGY	L	T	P	C
NME-I			4	-	-	4
Cognitive Level	K1:Recall K2:Understand					
Learning Objectives	• To understand the basic principle of Epidemiology • To know the concepts of infectious diseases, non-infectious diseases and sexually transmitted diseases					
Unit I	**History**					**12 hours**
Historical aspects of Epidemiology and evolution - Definition and understanding - Natural history of disease - Survey methodology including census procedures and Sampling.						
Unit II	**Tools of Epidemiology**					**12 hours**
measuring disease Frequency (Prevalence, incidence, morbidity rates, attack rates etc.						
Unit III	**Epidemiological aspects of diseases of national importance**					**12 hours**
Diarrhoea - Vaccine preventable disease - Tuberculosis - Visual impairment/blindness - Malaria - Filariasis - Coronary Heart disease.STD						
Unit IV	**Non-infectious Diseases**					**12 hours**
Localized or widespread rise in a various type of cancer, birth defects. Infectious disease-Food borne illness, Influenza, Pneumonia and COVID.						
Unit V	**National Programmes**					**12 hours**
National Programmes related to Communicable and Non Communicable diseases, Dengue, Swine Flu, Chikungunya,COVID etc.						
Text Books	1. Gordis, L. *Epidemiology.* Third edition. Philadelphia: Elsevier Saunders. (The second edition is also acceptable.)2004 2. Pagano, M. and Gauvreau, K. *Principles of Biostatistics.* Belmont, CA: Wadsworth. 2000. 3. Aschengrau A & Seage GR. Essentials of Epidemiology in Public Health. 3 rd Edition.2014					
Reference Books	1. Robert H. Friis and Thomas A. Sellers. Epidemiology for Public Health Practice, Fourth Edition. Jones and Bartlett Publishers, 2009 2. Aschengrau A & Seage GR. Essentials of Epidemiology in Public Health. Sudbury, Massachusetts: Jones and Bartlett Publishers, 2013. 3. Gordis L. Epidemology, 3rd Ed. Philadelphia, PA. Elsevier Saunders: 2004 4. Last JM, editor. Dictionary of epidemiology. 4th ed. New York: Oxford University Press; 2001. 5. Cates W. Epidemiology: Applying principles to clinical practice. Contemp Ob/Gyn. 1982.					
E-Reference	1. http://www.phppo.cdc.gov/PHTN/catalog/pdffile/Epi_Course.pdf 2. http://www.pitt.edu/~super1/ 3. https://www.bmj.com/about-bmj/resources-readers/publications/epidemiology-uninitiated/1-what-epidemiology					

Course outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	know the concept of epidemiology	**K2**
CO2	acquire knowledge on tools of epidemiology	**K2**
CO3	construct clinical life table in epidemiologic studies	**K2**
CO4	gain knowledge on vaccine preventable diseases	**K2**
CO5	clearly understand the national programme for various diseases	**K1**

Mapping of COs with POs &PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	S	S	S	M	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	S	M	M
CO3	M	S	M	S	S	M	S	S	S	S	M	S	S
CO4	S	S	S	S	M	S	S	S	M	M	S	S	M
CO5	S	M	S	M	S	S	S	M	S	M	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

VALUE ADDED COURSE

Course Code	P21ZOV11	MEDICAL TRANSCRIPTION	L	T	P	C
VALUE ADDED COURSE-1			4	-	-	2

Cognitive Level	K1:Recall K2:Understand K3:Apply	
Learning objective	• To understand the fundamental concepts of medical transcription • To learn medical theories and legal responsibilities • To gain basics of computer for preparing medical reports	
Unit I	**Medical terminology**	**6 hours**
Pharmacology and Anatomy of humans , General medical terms, surgical terms, diseases , Human body parts, systems and functions , Medication terminology, treatments, drug reactions, pharmacology legalities, medication handling and doctor's orders.		
Unit II	**Theory**	**6 hours**
Medical Theories and Techniques Ethical and Legal Responsibilities Medical Transcription Equipment and Technology, Diagnostic and therapeutic procedure terms and practices, Surgical procedure terms and practices, Lab procedures: patient preparation and blood drawing techniques.		
Unit III	**Basic Transcription**	**6 hours**
Medical Grammar and Style, Medical Reports Formatting, Transcribing audio files into typed format. Healthcare Documentation formats, American Medical Association stylistic standards.		
Unit IV	**Computer Information Systems**	**6 hours**
Speech Recognition Editing, Basics of Microsoft Office software, including Word, PowerPoint, Excel, Basic formatting practices and e-mail and Internet usage and file organization.		
Unit V	**Software**	**6 hours**
Speech recognition software to transcribe dictation and taking dictation with background noise.		
Reference Books	1. Medical Transcription: Fundamentals and Practice, Prentice Hall,2007. 2. Linda Campbell, The Medical Transcription.,Paper back, 2011	
E-References	1. https://hlcuomtdn.firebaseapp.com/aGxjdW9tdGRuMDEzMTg4MTQzNA.pdf 2. https://www.yumpu.com/en/document/view/64011468/pdf-download-medical-transcription-fundamentals-where-success-takes-root-full-online	

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Outcomes**	**Knowledge Level**
CO1	learn and familiar with medical terminology and medication handling	**K1**
CO2	comprehend the medical theories, therapeutic, surgical and lab procedures	**K2**
CO3	know the basic transcription and medical reports	**K1**
CO4	handling computer for preparation of necessary reports and documents	**K3**
CO5	acquire knowledge in software for transcription.	**K2**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	S	S	M	S	M	S	M	S	M	S
CO2	M	S	S	M	S	S	S	S	S	S	S	M	S
CO3	S	M	M	S	S	M	S	M	S	S	S	S	S
CO4	M	M	S	S	M	S	S	S	S	M	M	S	M
CO5	M	S	S	M	S	S	S	M	S	M	M	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	P21ZOV41	FISHERIES TECHNOLOGY	Total Hours	C
Value Added Course-2			30	2

Cognitive Level	K1:Recall K2:Understand K3:Apply	
Learning Objective	• To understand the basics of fisheries • To know the aquarium fish culture • To learn construction of fish farm and management	
Unit I	**Basics of Fisheries**	**6 hours**
Scope and importance of Fisheries - Development of fish culture. Indian Fisheries – Research and career opportunities.		
Unit II	**Aquarium Setting**	**6 hours**
Freshwater and Marine Ornamental Fisheries Ornamental Fish Trade- Disease Management for Aquarium Fishes.		
Unit III	**Culture of Edible Fishes**	**6 hours**
Biology of Carps – Culture of Indian Major Carps Integrated Fish Farming – Fish Culture in Rice Fields– Induced Breeding – Procedure of Induced Breeding Hypophysation.		
Unit IV	**Aqua Feed Formulation Methods**	**6 hours**
Nutritional Requirement of Finfish - Types of Fish Feeds – Formulated Feeds – Preparation of Supplementary Feed – Immunostimulants-Diet Processing – Management of Feeding – Preparation of Natural Food In Fish Pond		
Unit V	**Construction of a Fish Farm**	**6 hours**
Site Selection – Size and Depth of the Ponds – Water Quality (Physical Chemical and Biological Factors) Pond Renovation – Harvesting – Post Harvesting – Fish Preservation – Hatchery seed production- Fish Products and by Products.		
Text Books	Omprakash Sharma, Handbook of Fisheries and Aquaculture,Agrotech publishing Academy,Udaipur,2009.	
Reference Books	1. Faridi.A.Z.Textbook of Fish Processing, Technology,2014.ISBN: 9789353147167 2. Dr. D. K. Belsare,Text Book of Fish, Fisheries and Aquaculture, Kindle Edition,2019. 3. Claude E. BoydAaron A. McNevin, Aquaculture, Resource Use, and the Environment, John Wiley & Sons, 2014.	
E-References	1. https://content.kopykitab.com/ebooks/2016/05/7035/sample/sample_7035.pdf 2. https://www.cmfri.org.in/ebooks	

Course Outcome

Upon completion of this course, the students will be able to		
CO	**Course Out comes**	**Knowledge Level**
CO1	understand the importance of fish culture	**K1**
CO2	develop skills for setting aquarium	**K3**
CO3	know the principles and methods involved in the induced breeding of fishes	**K2**
CO4	acquire knowledge on the aqua feed Formulation	**K2**
CO5	apply knowledge of Construction of a Fish Farm and become potential entrepreneur	**K2**

Mapping of COs with POs &PSOs:

CO	**Pos**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	S	S	M	S	M	S	M	S	M	S
CO2	S	M	S	M	S	S	S	S	S	S	S	M	S
CO3	S	M	M	S	S	M	S	M	S	S	S	S	S
CO4	S	M	S	S	M	S	S	S	S	M	M	S	M
CO5	S	M	S	M	S	S	S	M	S	M	M	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

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Department of Botany

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL – 624 101

B.Sc. BOTANY

Curriculum Framework and Syllabus for

B.Sc. BOTANY

(For the candidates to be admitted from the academic year 2021-2022 onwards)

(UNDER CHOICE BASED CREDIT SYSTEM- CBCS)

Mother Teresa Women's University, Kodaikanal
Choice Based Credit System (CBCS)
(2021-2022 onwards)
B.Sc. Botany

1. About the Programme

This is a 3 year long undergraduate programme which is generally divided into six semesters. It deals with the basic principles of plant biology and related fields. It covers topics like plant kingdom, Taxonomy, microbiology, genetics and ecology etc. The course incorporates core courses, electives and practical. The delivery methods for B.Sc. Botany courses involve theoretical classes, lab work and hands-on practical training, outdoor tours etc. The students completing this programme generally go for higher education to build a career in academics, public and private sectors.

2. Programme Educational Objective

1. Develop the curriculum for fostering discovery-learning and know the importance of discipline
2. Inculcate interest in nature with its myriad living forms
3. Impart knowledge of Science as the basic objective of Education
4. Create a scientific approach to make students open-minded, critical, curious and make aware of natural sciences
5. Develop the ability to work hard and produce students to become entrepreneur who are fit for society

3. Eligibility

i. Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Examination, Govt. of Tamilnadu or any other Examination accepted by the syndicate as equivalent there to with at least one of the following subject Biology/Botany
ii. Candidate should have secured atleast 55% in the above subject and above in the aggregate.
iii. A relaxation of 10% in the total percentage will be given to SC, ST candidates

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.
ii. **Medium of Instruction:** English
iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	10	25	10	25
External	30	75	30	75

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance less than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

9. PROGRAMME OUTCOMES (POs)

On completion of B.Sc., Botany Programme, the students will be able to

1. enrich the fundamental concepts of botany and plant science.
2. apply the knowledge of biology to make scientific queries and enhance the comprehension potential.
3. demonstrate comprehensive knowledge about plants, current research, scholarly and professional literature of advanced learning areas of Botany
4. gain proficiency and skills in different topics of module of Botany use, principles of basic science and fundamental process to study and analyze the plant forms.
5. apply the acquired scientific knowledge to the development of Indian economy
6. pertain skills in science and apply in life for sustainable environment
7. enhance their capacity to obtain employment and higher studies in science

PROGRAMME SPECIFIC OUTCOMES (PSOs):

On completion of B.Sc., Botany Programme, the students will be able to

1. enrich knowledge on diversity, life patterns of plants and their importance to other life forms.
2. utilize the theoretic and practical knowledge of Botany in achieving a successful career.
3. impart knowledge obtained from the programme to develop their entrepreneurship skills in self supported or funded business /giving consultancy
4. communicate appropriately and effectively in botanical science and also interact productively with people from diverse background
5. impart the basic laboratory experiments and hands on training perceived will pave way to advanced research and higher studies

MOTHER TERESA WOMEN'S UNIVERSITY, KODAIKANAL
Common Course structure for UG programmes under CBCS
B.Sc., BOTANY (candidates admitted from 2021-2022 onwards)

Sl. No.	Course Code	Title of the Course	Credits	Hours		Maximum Marks		
				T	P	CIA	ESE	Total
		FIRST SEMESTER						
1.	U21LTA11	Part I-Tamil I	3	6		25	75	100
2.	U21LEN11	Part II-English I	3	6		25	75	100
3.	U21BOT11	**Core- I -** Algae, Fungi and Lichens	4	5		25	75	100
4.	U21BOP11	**Core-II-** Practical - Plant Diversity I	4		6	25	75	100
5.	U21 ZOA11	**Allied- I**-Zoology	4	5		25	75	100
6.	U21EVS11	Environmental Studies	2	2		25	75	100
7.	U21PEPS11	Professional English-I	4	6		25	75	100
		Total	**24**	**30**	**6**			**700**
		SECOND SEMESTER						
8.	U21LTA22	Part I-Tamil II	3	6		25	75	100
9.	U21LEN22	Part II-English II	3	6		25	75	100
10.	U21BOT21	**Core- III -** Bryophytes, Pteridophytes, Gymnosperm and Paleobotany	4	5		25	75	100
11.	U21BOP22	**Core- IV**-Practical - Plant Diversity-II	4		5	25	75	100
12.	U21ZOA22	**Allied-II**-Practical-Zoology	4		5	25	75	100
13.	U21VAE21	Value Education	3	3		25	75	100
14.	U21PEPS22	Professional English-II	4	6		25	75	100
		Total	**25**	**26**	**10**			**700**
		THIRD SEMESTER						
15.	U21LTA33	Part I-Tamil III	3	6		25	75	100
16.	U21LEN33	Part II-English III	3	6		25	75	100
17.	U21BOT31	**Core- V**-Cell and molecular biology	4	5		25	75	100
18.	U21CHA33	**Allied- III** –Chemistry	4	5		25	75	100
19.	U21BOE311/ U21BOE312	**Elective-I**-Bioprospecting of plants / Biodiversity conservation	3	4		25	75	100
20.	U21MSS31	**Skill Based Elective-I-**Managerial skill	2	2		25	75	100
21.		**Non Major Elective – I**	2	2		25	75	100
22.	U21PEPS33	Professional English-III	4	6		25	75	100
		Total	**25**	**36**		**-**	**-**	**800**

	FOURTH SEMESTER							
23.	U21LTA44	Part I-Tamil- IV	3	6		25	75	100
24.	U21LEN44	Part II-English- IV	3	6		25	75	100
25.	U21BOT41	**Core-VI** – Morphology and Taxonomy of Angiosperms	4	4		25	75	100
26.	U21BOP43	**Core- VIII-** Practical - Taxonomy of Angiosperms	4		4	25	75	100
27.	U21 CHA44	**Allied-IV**- Practical Chemistry	4		4	25	75	100
28.	U21BOE421/ U21BOE422	**Elective – II** - Wood Technology / Silviculture	3	3		25	75	100
29.	U21CSS42	**Skill Based Elective -II-** Computer Skills for Office Management	2	2		25	75	100
30.		**Non Major Elective –II**	2	2		25	75	100
31.	U21PEPS44	Professional English-IV	4	6		25	75	100
		Total	**29**	**29**	**8**	**-**	**-**	**900**

	FIFTH SEMESTER							
32.	U21BOT51	**Core VIII- Genetics and Evolution**	4	5		25	75	100
33.	U21BOT52	**Core IX – Plant physiology**	4	5		25	75	100
34.	U21BOT53	**Core X – Plant Biochemistry**	4	5		25	75	100
35.	U21BOT54	**Core XI –Plant Anatomy and Embryology**	4	5		25	75	100
36.	U21BOP54	**Core XII-** Practical - Genetics and Evolution ,Plant physiology, Plant Biochemistry, Plant Anatomy and Embryology	4		5	25	75	100
37.	U21BOE531/ U21BOE532	**Elective –III –** Ethano Botany and Ethanopharmacognosy / Biofertiliser and Waste management	3	3		25	75	100
38.	U21BOS531/ U21BOS532	**Skill Based Elective-III-**Organic farming /Food processing & preservation	2	2		25	75	100
		Total	**25**	**25**	**5**	**-**	**-**	**700**

	SIXTH SEMESTER							
39.	U21BOT61	**Core - XIII** – Basics of Plant Biotechnology	4	5		25	75	100
40.	U21BOT62	**Core - XIV** – Environmental Biology and Phytogeography	4	5		25	75	100
41.	U21BOT63	**Core- XV**– Fundamentals of Microbiology and Plant Pathology	4	5		25	75	100

42.	U21BOT64	**Core-XVI-** Biostatistics, Bioinstrumentation and Biophysics	4	5		25	75	100
43.	U21BOP65	**Core-XVII** – Practical -Plant Biotechnology, Environmental Biology, Microbiology and Plant Pathology	4		5	25	75	100
44.	U21BOE641/ U21BOE642	**Elective –IV** –Forestry / Seed technology	3	3		25	75	100
45.	U21BOS641/ U21BOS642	**Skill Based Elective-IV-** Horticulture Techniques & Plant Breeding / Microtechnique and Histochemistry	2	2		25	75	100
46.	U21EAS61	**Extension Activities** (NSS/NCC/RRC/YRC/Physical Education)	3			100		100
		Total	**28**	**25**	**5**	**-**	**-**	**800**
		Grand Total	**156**	**205**				**4600**

Non Major Elective

The candidates, who have joined the UG programme, can also undergo Non Major Elective offered by other Departments

S.No	Code	NME Title
1	U21BON311	Forest Botany
2	U21BON312	Mushroom Cultivation
3	U21BON421	Horticulture
4	U21BON422	Pomology

Additional Credit Courses (Two credit courses)

1. **U21BOO31**: Online Course – III Semester
2. **U21BOI41** : Internship – IV Semester
3. **U21BOV51** : Value added course – V Semester (**Spirulina Cultivation)**

SEMESTER-I

COURSE CODE	U21BOT11	ALGAE, FUNGI AND LICHENS	L	T	P	C
CORE I			5	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To comprehend the major classes of algae, fungi and their important features. • To understand the distribution and life cycle pattern of algae, fungi and lichens • To learn in detail about the ecological and economic importance of algae, fungi and lichens • To enumerate the key points for identifying important algae and fungi
Unit I	**Algae**
Distribution and general characteristics of algae. Classification of Algae by F.E. Fritsch (1945). Thallus organization, Structure and reproduction of the Class Chlorophyceae (*Volvox)*	
Unit II	**Structure and reproduction of the Classes**
Phaeophyceae (*Sargassum*), Rhodophyceae(*Gracilaria*)andCyanophyceae (*Nostoc*). Economic Importance of algae.	
Unit III	**Fungi**
General Characteristics of the Fungi. Classification of Fungi by C.J. Alexopoulos (1962).Structure and reproduction of Myxomcetes (*Stemonites*) and Phycomycetes (*Albugo*).	
Unit IV	**Fungi**
Structure and reproduction of Ascomycetes (*Peziza*), Basidiomycetes (*Saccharomyces*) and Deuteromycetes (*Puccinia*). Economic importance of Fungi.	
Unit V	**Lichens**
General characteristics and classification of lichens. Structure and reproduction of *Usnea*. Role of Lichens in succession and monitoring pollutants. Economic importance of Lichens.	
Text books	1. Pandey, P.B. College Botany - 1: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. Chand Publishing, New Delhi. 2014. 2. Bilgrami, K.S. A Textbook of Algae. CBS Publisher & Distributors, New Delhi, ISBN: 978-8123900490. 2010. 3. Johri, R.M., Smeh Lata, Kavitha Tyagi. A Text Book of Fungi, Dominant Publishers and Distributors Pvt. Ltd., New Delhi. 2011. 4. A.V.S. Sambamuty, A text book of Algae,I.K.International publishing house, Pvt. Ltd 2005.
Reference books	1. Kevin K. Fungi biology and Application, 3rd Edition, Wiley Blackwell. 2018 2. Vashista B.R.Algae, S.Chand & Co.Ltd, New Delhi. 2012. 3. Power and Dagainwala. General Microbiology, Himalayan publishing House,New Delhi.2012 4. Sharma, P. D. Microbiology, Rastogi & Co., Meerut. 2011. 5. Alexopoulos, C.J., C.M. Mims and M. BlackMell. Introductory Mycology. IV Edition. Miley India (P) Ltd., Daryaganj, New Delhi. 2007

E-References	1. http://deskuenvis.nic.in/pdf/PhycologyLee.pdf 2. http://deskuenvis.nic.in/pdf/WEBSTER30521807395.pdf 3. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvMmpzQ2loYjQvamQxTUhmT2lQTE1JT3BVeUVjTUtIdGEySlVIRzlrMjdpUkRNR3hUeQ		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	understand the general features and classification of algae	**K2**
	CO2	enumerate the life cycle of major classes of algae and their economic importance	**K2**
	CO3	acquire a deep knowledge on principles of fungi classification to apply in the field	**K3**
	CO4	know the life cycle of major classes of fungi and their economic importance	**K2**
	CO5	have clear idea about lichens including their economic importance	**K1**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	S	M	S	S	M	S	S
CO2	S	S	S	M	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	M	S	S	S	S	M	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

COURSE CODE	U21BOP11	ALGAE, FUNGI AND LICHENS	L	T	P	C
CORE II			-	-	6	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Evaluate
Learning objective	• To observe the vegetative structures of algae, fungi and lichens through microscope and study it's structure • To learn thallus structure of lower plants • To develop skills on identification of lower plants through morphological characters
	<u>Observation on</u> 1. Microscopic observation of thallus structure and reproductive organs in selected group of microalgae 2. Analysis of thallus structure, anatomical features and reproductive structure of selected macro algae 3. Mycelial morphology, organization, fruiting bodies and structure of spores in selected group of fungi 4. Morphology, anatomy and reproductive parts of crustose, foliose and fruticose lichen. Biochemical test to determine the genus or species of various lichens. 5. Two to three days field trip to collect of algae/fungi/lichen specimen 6. Submission of 10 algae/fungi/lichen herbarium specimens and maintenance of record book
Text books	1. Sivakumar, K. Algae- A Practical Approach. MJP Publishers, Chennai, India. 2016. 2. Gupta, V.K., Tuohy, M.G., Ayyachamy, M., Turner, K.M. and O'Donovan, A. Laboratory Protocols in Fungal Biology: Current Methods in Fungal Biology. Springer, London, UK. 2013. 3. Chmielewski, J. G. and Krayesky, D. General Botany laboratory Manual. AuthorHouse, Bloomington, USA. 2013.
Reference books	1. Bendre, A. M. A Text Book Of Practical Botany – 1. Rastogi Publications, Meerut, India. 2010. 2. McMahon, K., Levetin, E. and Reinsvold, R. Laboratory Manual for Applied Botany. McGraw-Hill Education, New York, USA. 2001.
<u>E-References</u>	1. http://assets.vmou.ac.in/MBO10.pdf 2. http://ndl.iitkgp.ac.in/document/NXpzbzZQcHVvTFUrTGdYcTF0VlQxczVoUDhzOE9FOXg2MnN1bHhjSUNmOD0 3. https://WWW.researchgate.net/profile/Barry-Rosen/publication/235654691_Aquaculture_Manual/links/02bfe512518c53a0de000000/Aquaculture-Manual.pdf

	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
Course outcome	CO1	perform microscopic examination of algae and fungi	**K3**
	CO2	understand the thallus structure and anatomical structure of macro algae	**K1**
	CO3	examine the fruiting bodies and structure of spores of selected fungi	**K4**
	CO4	identify the genus or species of various lichens through biochemical test	**K3**
	CO5	have a clear idea on morphological characters of lower plants	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	M	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	M	S	S	S	M	S
CO3	S	S	M	S	S	M	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

COURSE CODE	U21ZOA11	ZOOLOGY	L	T	P	C
ALLIED-I			5	-	-	4

Cognitive Level	K2: Understand K3: Apply
Learning objective	• To know the diagnostic characters of phyla • To understand the classification of chordates with their diagnostic characters • To acquire knowledge on cell division and cell cycle • To understand the origin of life and cell
Unit I	**Invertebrata**
Study of the following types with their diagnostic characters of the phyla and classes to which they belong. a) Paramecium b) Ascaris c) Starfish Life history, transmission and control measures of plasmodium, Morphology and appendages f prawn	
Unit II	**Chordata**
Classification of chordates up to classes with their diagnostic characters with few examples from each class. Mammalian representative – Rabbit. Digestive, Respiratory, structure of Heart, Brain and Reproductive system. Identification and significance of any 5 edible fishes. Snakes- Identification of poisonous and non-poisonous Snakes-Mechanism of bite-venom and action, first aid for snake bite.	
Unit III	**Cyto genetics**
Mitosis, Meiosis cell division, cell cycle and control Laws of Mendel and common Mendelian traits in man.	
Unit IV	**Physiology & Embryology**
Endocrine glands – Pituitary and thyroid. Excretion-Structure of nephron-Physiology of excretion. Development of frog upto gastrulation. Test tube babies-Birth control-Aritificial insemination-IVF.	
Unit V	**Evolution**
Introduction to evolution, A Short History of Evolutionary Thought , Origin of Life and Cells, Theories of Lamarck, Darwinism and Neo-Darwinism.	
Text books	1. Ayyar, E.K. and T.N. Ananthakrishnan, Manual of Zoology Vol. I (Invertebrata). Parts I & II.S. Viswanathan (Printers and Publishers) Pvt Ltd. Madras. 1992. 2. Power, C.B. Cell Biology Himalayan Publishing House, New Delhi.2009 3. A Text Book of Genetics Rastogi V.B, Kedar Nath Ram Nath. Meerut.1997. 4. Animal Physiology. S.Chand & Co.,New Delhi. Verma, P.S., Agarwal, 1980, 5. Chordate Embryology -P.S .Verma & V.K.Agarwal---S. Chand & Co.1995. 6. Organic Evolution, Rastogi. V.B. - Kadar Nath & RaNath, 7th edtion, 1988 – 89, Meerut

Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	identify the classes of different phyla by analysing its diagnostic characters	**K3**
	CO2	differentiate poisonous and non-poisonous snakes	**K3**
	CO3	enumerate the identification characters of fishes	**K2**
	CO4	understand the Mendelian traits in man	**K2**
	CO5	Learn the techniques of artificial insemination	**K2**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	S	S	S	S	M	M	M	S
CO2	S	S	S	S	M	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	M	S
CO4	S	S	S	S	S	S	M	S	M	S	S	M	S
CO5	S	S	M	S	S	S	S	S	S	S	S	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark No Correlation (N) - 0 mark

SEMESTER-II

Course Code	U21BOT21	BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERM AND PALEOBOTANY	L	T	P	C
CORE III			5	-	-	4

Cognitive Level	K1: Recall K2: Understand
Learning objective	• To understand the general characters of major groups of plants such as Bryophytes, Pteridophytes and Gymnosperms • To have knowledge on classification, structure, reproduction and economic importance of Bryophytes, Pteridophytes and Gymnosperms • To find the significance of these plant groups to human welfare • To acquire knowledge and interest in the study of fossil plants
Unit I	**Bryophytes**
General Characteristics, classification by Reimers (1954). Morphology, occurrence, structure and reproduction of *Riccia*, *Marchantia* and *Polytrichum* (Need not study developmental aspects). Economic importance of Bryophytes.	
Unit II	**Pteridophytes**
General characteristics and classification by Smith (1955). Morphology, structure, reproduction and life-cycle of *Lycopodium* and *Selaginella.*	
Unit III	**Pteridophytes**
Structure, reproduction and life-cycle of *Equisetum* and *Marselia.* Stelar evolution in Pteridophytes. Economic importance of Pteridophytes.	
Unit IV	**Gymnosperms**
General characteristics and classification of Gymnosperms by Sporne (1965). Morphology, structure, reproduction and life-cycle of the following: *Cycas* and *Pinus*. Economic importance of Gymnosperms.	
Unit V	**Paleobotany**
Brief study of geological time scale. Methods of fossilization. A brief study on *Rhynia*, *Lepidodendron*, *Lyginopteris* and *Williamsoniella*	
Text books	1. Parihar, N.S. An Introduction to Embryophyta Pteridophytes. 5th Edition, Surjeet Publication, Delhi.2019. 2. Sharma, O.P. Pteridophyta. Tata McGraw-Hill Education, Delhi. 2017. 3. Johri , RM, Lata S , Tyagi K, A text book of Gymnosperms , Dominate pub and Distributer, New Delhi. 2005.
Reference books	1. Sharma, O.P. Bryophyta. MacGraM Hill Education (Pvt) Limited, New Delhi. 2017. 2. Vasishta, P.C., Sinha, A.K. and Anil Kumar. Botany for Degree Students, Pteridophyta. S.Chand &Company ltd., New Delhi. 2016. 3. Vashishta, Sinha A.K, Adarsh Kumar. Bryophytes, S.Chand &Company ltd., New Delhi. 2011. 4. Pandey B.P.A textbook of Botany (Bryophyta, Pteridophyta and Gymnosperms) S.Chand & Co., P.Ltd., Ram Nagar, New Delhi. 2010.

E-References	1. http://ndl.iitkgp.ac.in/document/OEYMeXpIRmlkYURkM3JkbUdtKy9UU3NFQ1BtNlk5dURFdUo2TM9Ec2V0aGJxRXJlNTdmTnBScMJlSmkrYk5ZQmxsUmJyMGYxUDY4MXFoOXlTV0hxaFE9PQ 2. https://WWW.ias.ac.in/article/fulltext/reso/009/06/0056-0065 3. http://ndl.iitkgp.ac.in/document/Z3dSNXd5OEtFblFDcMRPUk9LNVZIRElXaHQycVRlbkM4TnJvU2hDRDgxMD0 4. http://ndl.iitkgp.ac.in/document/RDB5OXNIdXBlRTBmUTNpODk4OS9zT3lId0tTQlI3YnBudE96OG9MMzRMUT0 5. http://ndl.iitkgp.ac.in/document/eVZ0Ky92RFRRc29LVDBqM1ZGZ1NLV2Q1blFNN2pUbUFMY2JDNUc4OTI5TT0

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	have a clear idea about the characters and life cycle of Bryophytes and their economic importance	**K1**
CO2	describe the features and life cycle of Pteridophytes	**K2**
CO3	understand the stellar evolution and economic potential of Pteridophytes	**K2**
CO4	gain knowledge on features, classification, life cycle and economic importance of Gymnosperms	**K2**
CO5	have better understanding on fossilization process and fossil plants	**K2**

Mapping of COs with POs & PSOs:

CO	POs								PSOs				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO1	S	S	S	M	S	S	M	S	S	S	M	S	S
CO2	S	S	S	M	S	M	S	M	S	S	M	S	S
CO3	S	S	S	M	S	S	S	S	S	S	M	S	S
CO4	S	S	S	M	S	M	M	S	S	S	M	S	S
CO5	S	S	S	S	S	S	M	S	S	S	M	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOP22	BRYOPHYTES, PTERIDOPHYTES, GYMNOSPERM	L	T	P	C
CORE IV			-	-	5	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K6: Create
Learning objective	• To observe the thallus structure of microscopic lower plants • To understand the vegetative structure of Bryophytes • To learn morphology and anatomical features of Pteridophytes • To analyze the anatomical characters of Gymnosperms
	<u>Observation on</u> 1. Morphology and anatomy of thallus and reproductive parts of various groups of Bryophytes; *Riccia, Marchantia, Funaria, Polytrichum, Anthoceros* 2. Morphology and anatomy of sporophytes and spore producing organs of selected Pteridophytes; *Psilotum, Lycopodium, Selaginella, Equisetum, Adiantum, Pteris, Marselia* 3.Morphology and anatomy of vegetative parts and reproductive structure of selected Gymnosperms; *Cycas, Pinus, Gnetum* 4. Microscopic observation on various plant fossils 5.Two to three days field trip to collect of Bryophytes/Pteridophytes/Gymnosperms specimen 6. Submission of 10 Bryophytes/Pteridophytes/Gymnosperms herbarium specimens and maintenance of record book
Text books	1. Sivakumar, K. Algae- A Practical Approach. MJP Publishers, Chennai, India. 2016. 2. Gupta, V.K., Tuohy, M.G., Ayyachamy, M., Turner, K.M. and O'Donovan, A. Laboratory Protocols in Fungal Biology: Current Methods in Fungal Biology. Springer, London, UK. 2013. 3. Chmielewski, J. G. and Krayesky, D. General Botany laboratory Manual. AuthorHouse, Bloomington, USA. 2013.
Reference books	1. Bendre, A. M. A Text Book of Practical Botany – 1. Rastogi Publications, Meerut, India. 2010. 2. McMahon, K., Levetin, E. and Reinsvold, R. Laboratory Manual for Applied Botany. McGraw-Hill Education, New York, USA. 2001.
E-References	1. http://assets.vmou.ac.in/MBO10.pdf 2. http://ndl.iitkgp.ac.in/document/NXpzbzZQcHVvTFUrTGdYcTF0VlQxczVoUDhzOE9FOXg2MnN1bHhjSUNmOD0 3. https://WWW.researchgate.net/profile/Barry-Rosen/publication/235654691_Aquaculture_Manual/links/02bfe512518c53a0de000000/Aquaculture-Manual.pdf

	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
Course outcome	CO1	perform microscopic examination of thallus structure	**K3**
	CO2	understand the sporophytic character of Pteridophytes	**K2**
	CO3	examine the internal features of typical Gymnosperms	**K2**
	CO4	identify species of bryophytes based on morphological characters	**K1**
	CO5	prepare wet specimen as herbarium	**K6**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	M	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	M	S	S	S	M	S
CO3	S	S	M	S	S	M	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21ZOA22	PRACTICAL ZOOLOGY	L	T	P	C
ALLIED-II			-	-	5	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To understand the mounting method • To acquire knowledge on virtual dissection • To know the preparation of blood smear • To identify specimen based on their characteristics
	<u>Mounting</u> Paramecium - Whole Mount Earthworm - Body and Penial setae Prawn - Appendages Fish - Cycloid scale or Placoid scale **Virtual dissection**. Cockroach - Nervous system Starfish - Water vascular system . Rabbit - Heart and Brain. **Spotters and specimen** Amoeba Plasmodium Ascaris Entire (male & female) Prawn Starfish oral and aboral view Amphioxus. Narcine. Clarius. Rhacophorus. Chamaeleon. Poisonous snakes.- Naja naja, Krait Non poisonous snakes-Water snake, Wolf snake Pigeon and parrot -beak and feet Rabbit **Physiology** Mitosis in Onion root tip cells Observation of simple mendelian traits Human blood smear Demonstration of blood pressure using Sphygmomanometer. Examination of excretory products of fish, bird and mammal Endocrine glands – Pituitary and thyroid **Embryology** - Frog cleavage, blastula and gastrula. **Evolution** - **Vestigial Organs- Pinna.** **Fossils:** Peripatus, Limulus **Analysis of variation** - Finger prints.

Reference Books	1. Sinha, J., Chatterjeee A.K., Chattopadhyay P Advanced Practical Zoology , Arunabha Sen Publishers 2011 2. H.S. Bhamrah Practical Zoology Invertebrate, Dominant Publishers. 2003. 3. Preeti Guptha and Mridula Chaturvedi, Modern Experimental Zoology,. 2000 4. Verma, Manual of Practical Zoology: Chordates, S. Chand Publishing 2000.		
Course outcome	Upon completion of this course, the students will be able to		
	CO1	prepare specimens of different organism	**K1**
	CO2	check blood pressure by Sphygmomanometer	**K1**
	CO3	understand variations occur in finger prints	**K2**
	CO4	explain the dissection and identification of organs in specimens	**K3**
	CO5	describe the stages in mitosis	**K2**

Mapping of COs with POs & PSOs:

CO	**PROGRAMME OUTCOMES (PO)**								**PROGRAMME SPECIFIC OUTCOMES (PSO)**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	M	S	M	M	M	S
CO2	S	S	S	S	S	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S	S	M	S
CO4	S	S	S	S	S	S	M	S	M	S	S	M	S
CO5	S	S	S	S	S	S	S	M	S	S	S	S	M
CO5	S	S	S	S	S	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark No Correlation (N) - 0 mark

SEMESTER III

Course Code	U21BOT31	CELL AND MOLECULAR BIOLOGY	L	T	P	C
CORE –V			5	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To learn the basic structure and function of cell and cell organelles • To understand different stages of cell division • To figure out the structure and organization of DNA • To improve the knowledge of Genetics and Molecular basis of life
Unit I	**Basic structure of Plant cell:**
Structure and function of cell wall and cell membrane. Membrane models (Unit membrane model, Fluid Mosaic Model and Davson–Danielli Model)	
Unit II	**Structure and function of cell organelles**
Chloroplast, mitochondria, ribosomes, peroxisomes, golgi apparatus, nucleus and endoplasmic reticulum.	
Unit III	**Non –living cell inclusions**
Raphides, cystolith and granules. Cell divisions; Mitosis and meiosis, Cell cycle and cytokinesis.	
Unit IV	**Chromosomes**
Morphology, chromatin organization. Watson and crick model of DNA. DNA synthesis and replication. Transposons and plasmids. C- Value paradox. Central dogma of Molecular Biology - Protein synthesis.	
Unit V	**General principles of gene regulation**
Gene regulation in prokaryotes, Operon concepts; *lac* Operon, *trp* Operon. Eukaryotic gene regulation. PCR- Sanger's DNA Sequencing Method.	
Text books	1. Pawar, Cell Biology, Himalaya Publishing House, Mumbai. 2019. 2. Rastogi, S.C. Cell and Molecular Biology. New Age International Publishers, New Delhi. 2016.
Reference books	1. Derobertis E.D. and De Robertis E.M.F. Cell and Molecular Biology 8th Edition. Lee and Fab International edition, Philadelphia.2017. 2. Verma P.S.and Agarwal V.K.Cell Biology(Cytology,Biomolecules,Molecular biology),Paper back,S.chand and Company .Ltd. 2016. 3. Buchanan B.B. Gruissem M., Jones R.L. Biochemistry and Molecular Biology. American Society of Plant Physiologist, Maryland, USA. 2015. 4. Cooper G. The cell – A molecular approach. ASM Press, Washington.2015. 5. Sheeler P and Binachi D. Cell and Moecular Biology, Third edition, Miley New York, USA. 2009.
E-References	1. http://ndl.iitkgp.ac.in/document/eXF1YzdhQ2RxM3hPUm8ra0k0NHZGUT09 2. http://ndl.iitkgp.ac.in/document/SFBhRUg0cDg3MTJyRXE0OVB5RkpLZz09 3. https://epgp.inflibnet.ac.in/Home/VieMSubject?catid=4 4. http://ndl.iitkgp.ac.in/document/OEYMeXpIRmlkYURkM3JkbUdtKy9UZXgvY1pnaUtMUG4vNUhiMnZ5R2NkaWWWZ3FVNTFkeVhtRkUzd1JGSmNJMEgxOTNJSXlyQ2ZnT3pHZMtmVE5LRGc9PQ

	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
Course outcome	CO1	understand the organization of Plant cell, cell wall and its Membrane	K2
	CO2	describe the structure and role of cell organelles	K3
	CO3	know the stages and types of cell divisions K2	K1
	CO4	know the organization and structure of plant genetic material	K2
	CO5	differentiate the prokaryotic and eukaryotic gene regulation	K3

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO1	S	S	M	S	S	S	S	M	S	S	S	M	S
CO2	S	S	M	S	S	M	M	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	M	S	S	S	M	S
CO4	S	S	M	S	S	M	S	S	S	S	S	M	S
CO5	S	S	M	S	S	S	S	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark
No Correlation (N) - 0 mark

Course Code	U21CHA33	CHEMISTRY	L	T	P	C
ALLIED-III			5	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To understand the handling of chemicals and errors in chemical analysis • To get knowledge in chemical bonding and hybridization • To acquire knowledge in volumetric analysis • To understand the basic concept of chemistry of thermodynamics and kinetics
Unit I	**Handling of chemicals and Data analysis**

a) Storage and handling of chemicals: Handling of acids, ethers, toxic and poisonous chemicals. Antidotes, threshold vapour concentration and first aid procedure.
b)Errors in chemical analysis: Accuracy, precision. Types of error-absolute and relative errors.Methods of eliminating and minimizing errors.
c) Separation techniques–Solvent extraction. Principle of adsorption and partition chromatography, column chromatography, thin layer chromatography (TLC), paper chromatography and their applications.

Unit II	**Chemical bonding**

a) Ionic Bond: Nature of Ionic bond. Structure of NaCl, KCl and CsCl. Factors influencing the formation of ionic bond.
b) Covalent Bond: Nature of covalent bond. Structure of CH_4, NH_3, H_2O based on hybridization.
c) Coordinate Bond: Nature of coordinate bond. Coordination complexes. Werner's theory. Geometrical and optical isomerism in square planar and octahedral complexes. Mention of structure and functions of chlorophyll and hemoglobin.
d) Hydrogen Bond: Theory and importance of hydrogen bonding. Types of hydrogen bonding. Hydrogen bonding in carboxylic acids, alcohol, amides, polyamides, DNA and RNA.
e) van der Waal's forces: Dipole – dipole and dipole - induced dipole interactions.

Unit III	**Volumetric analysis**

a) Methods of expressing concentration: normality, molarity, molality, ppm.
b)Primary and secondary standards: preparation of standard solutions
c)Principle of volumetric analysis: end point and equivalence points.
d)Strong and weak acids and bases - Ionic product of water , pH, pKa, pKb. Buffer solutions - pH of buffer solutions. Mention of Henderson equation & its significance.

Unit IV	**Kinetics & Thermodynamics**

Chemical Kinetics: Rate, rate law, order and molecularity. Derivation of rate expressions for I and II order reactions.
Catalysis-Homogeneous and heterogeneous catalysis. Enzyme catalysis, enzymes in biological system and in industry.
Thermodynamics: Introduction, scope and importance of thermodynamics- system and surrounding-isolated, closed and open systems- state of the system- intensive and extensive variables. Thermodynamic process- reversible and irreversible, isothermal and adiabatic process- First law of thermodynamics- statement- definition of internal energy (E),enthalpy (H), applications of first law of thermodynamics.

Unit V	**Chemistry of biomolecules**

a) Fats – Occurrence and composition. Hydrolysis of fats. b) Vitamins – Source, provitamin, properties and classification. Structure and functionof vitamin A, C, D, K and E c) Hormones – Thyroxin, adrenaline and sex hormones (structure and functions only)			
Text books	1. R. Gopalan, S. Sundaram, *Allied Chemistry*, Sultan Chand and Sons, 1995.		
Reference books	1. U. Sathyanarayana, *Biochemistry*, Books and Allied (p) Ltd, 1999. 2. B.R.Puri and L.R.Sharma, *Principles of physical chemistry*, Shoban Lal Nagin Chand and Co. 33rd ed., 1992.		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	gain the knowledge on the handling of chemicals and errors in chemical analysis	**K1**
	CO2	learn chemical bonding and hybridization	**K2**
	CO3	learn the calculations of preparing standard solutions	**K2**
	CO4	understand and appreciate the advanced concepts and rate equations in chemical kinetics.	**K2**
	CO5	calculate the change in thermodynamic properties, equilibrium constants, partial molar quantities, chemical potential.	**K3**

Mapping of Cos with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	S	M	S	S	M	S	S
CO2	S	S	S	M	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	M	S	S	S
CO4	S	M	S	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	M	S	S	S	S	M	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOE311	BIOPROSPECTING OF PLANTS	L	T	P	C
ELECTIVE –I			4	-	-	3

Cognitive Level	K1: Recall K2: Understand
Learning objective	• To understand the current practices in bioprospecting for conservation of biodiversity and genetic resources. • To know the basics and concepts of medicinal plants bioprospecting/ pharmaceutical bioprospecting. • To be familiar with the isolation and cultivation and bioactive compounds and their applications of marine bioresources • To learn the isolation of microbial metabolites products and its applications
Unit I	**Bioprospecting**
Definition, introduction, current practices in bioprospecting for conservation of Biodiversity and Genetic resources. Bioprospecting Act: Introduction, phases of bioprospecting, exemption to Act. Fields of bioprospecting	
Unit II	**Medicinal plants bioprospecting / pharmaceutical bioprospecting**
for new drugs, assays in bioprospecting. Antioxidant assay – NO free radical scavenging assay, antigenotoxicity assay – MTT assay, antiviral activities of plants – SRB assay	
Unit III	**Marine bioprospecting**
Sources of marine planktons and their bioprospecting, Isolation and cultivation of marine bioresources, isolation of marine yeast and its industrial applications, Bioactive chemicals from seaweeds and their applications	
Unit IV	**Microbial bioprospecting**
Isolation of microbial metabolites and their bio-activity. Endophytic microbial products as antibiotics	
Unit V	**Economic crops**
Origin, evolution, botany, cultivation and uses of food, fodder, fibers, oil yielding crops, wood and timber, non-wood forest products(NWFPS): Bamboos, gums, dyes, resins, fruits etc	
Text books	1. Arora, R.K. and Nayar, E.R. Wild relatives of crop plants in India, NBPGR Science MonographNo.7. 1984. 2. Baker, H.G. Plants and civilization. Ill Ed. (A. Wadsworth, Belmount). 1978. 3. Thakur, R.S., Puri, H.S. and Husain, A. Major medicinal plants of India, Central Institute of medicinal and aromatic plants, Lucknow. 1969. 4. Swaminathan, M.S. and Kocchar, S.L. (Es.) Plants and Society, MacMillan Publication Ltd., 1989.
Reference books	1. Bole, P.V. and Vaghani, Y. Field guide to common Indian trees, Oxford University Press, Mumbai. 1986. 2. Kocchar, S.L. Economic Botany of the tropics, II Edn. MacMillan India Ltd.1998. 3. CSIR. The useful plants of India Publication and Information directorate, CSIR, New Delhi. 1986.

E-References	1. https://www.researchgate.net/publication/264238213_Bioprospecting 2. https://www.researchgate.net/publication/266948374_Bioprospecting_medicinal_plants_for_antioxidant_components 3. https://www.researchgate.net/publication/335714642_Biodiversity_Bioprospection_with_Respect_to_Medicinal_Plants

Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	comprehend the basic concepts of bioprospecting	**K2**
	CO2	understand the basics of medicinal plant bioprospecting	**K2**
	CO3	know the basics of marine bioprospecting and their applications	**K2**
	CO4	learn about the basics of microbial bioprospecting	**K2**
	CO5	Gain knowledge on the basics of forest products	**K1**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	S	M	S	S	M	S	S
CO2	S	S	S	M	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S	S	S	S
CO4	S	S	S	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	S	M	S	S	S	S	M	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark
No Correlation (N) - 0 mark

Course Code	U21BOE312	BIODIVERSITY CONSERVATION	L	T	P	C
ELECTIVE –I			4	-	-	3

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To learn the biodiversity and geographical regions of India. • To know the conservation strategies of Biodiversity. • To learn the origin of crop plants. • To understand international agreements like MTO and GATT.
Unit I	**Biodiversity and conservation**
Categories of biodiversity – species concepts: keystone, flagship, dominant and co-dominant species. Biogeography: major terrestrial biomes, theory of island biogeography, biogeographical zones of India. Principles and approaches of conservation – *In situ*conservation: National parks, wildlife sanctuaries and biosphere reserves – *Ex situ* conservation: Botanical and herbal gardens, zoological parks and gene banks etc.	
Unit II	**Values of biodiversity**
Ecosystem services, screening plants for medicines, New agricultural and industrial products from the tropics. Origin of agricultural crops. Centres for origin of domesticated crops. Speciation- species area relationship and productivity- diversity relationship. Biodiversity hotspots	
Unit III	**Extinction and conservation**
Effect of global climatic change on natural communities. Causes for species extinction. IUCN Red list categories. Red data book. Impact of exotic species on native vegetation. GMOs and biosafety – Intellectual property rights- GATT,MTO, farmers and breeders rights. Biodiversity act -2002	
Unit IV	**Remote sensing**
Introduction-Analysis techniques-Digital image processing, role of remote sensing in biodiversity management, GIS and biodiversity, water security. Environment assessment and monitoring	
Unit V	**Information management for the conservation of biodiversity**
cryobiology, agro-ecology and *in situ* conservation of native crop diversity- International and indian initiatives of biodiversity conservation. Role of biotechnology in biodiversity conservation	
Text books	1. Gillson, L. Biodiversity Conservation and Environmental Change, Oxford University Press, Oxford.2015. 2. Poul V.I. Biodiversity: Issues, Impact, Remediations and Significance 1st Edition. V L Media Solution.2013. 3. Bawa K.S., Primack, R.V. and Oommen, M.A. Conservation biology: A Primer for South Asia, ATREE, Bangalore.2011.
Reference books	1. Smith T M Smith R L. Elements of ecology, 8th edition, Benjamin Cummins.2012 2. Sharma.B.K. Environmental Chemistry,Krishna Prakash Media (P) Ltd.2019. 3. Cunningham, M.P. and Cunningham, M.A. Principals of environmental

science. Tata McGraw-Hill Publishing Company Ltd., New Delhi.2002.
4. Jeffries, M.J. and M.J. Jeffries. Biodiversity and Conservation, Routledge Taylor & Francis Group, UK.2005.

E-References

1. http://ndl.iitkgp.ac.in/document/N2tzeE1aMMpUMm04b2l1VVZEdSsvKzNKdEtyMHI2RkVFQko0ak42amJMRT0
2. https://ncert.nic.in/textbook/pdf/lebo115.pdf
3. https://WWW.researchgate.net/publication/277124537_Biodiversity_Conservation_in_India

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	gain knowledge on categories of biodiversity and conservation methods of biodiversity	**K2**
CO2	understand the centre's of origin of crop plants and biodiversity hotspots	**K2**
CO3	find the causes of species extinction and the value of IUCN categories	**K3**
CO4	gain knowledge on the role of remote sensing in biodiversity management	**K2**
CO5	have idea about cryobiology and role of biotechnology in conservation	**K1**

Mapping of COs with POs & PSOs:

CO	POs					PSOs				
	1	2	3	4	5	1	2	3	4	5
CO1	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	S	M	S
CO5	S	S	M	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark
No Correlation (N) - 0 mark

Course Code	U21BON311	FOREST BOTANY	L	T	P	C
NME - I			2	-	-	2

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objectives	• To understand the benefits of forest on mankind • To comprehend the forest resources and utilization • To know the role of forestry in Indian economy • To understand about forest law
Unit I	**Forest laws**
Necessity, general principles, Indian forest act 1927 and their amendment. Forest types of India-world. Forest influences and Protection-Social and community forestry - Role of forestry in Indian economy.	
Unit II	**Biodiversity conservation strategies**
Rare and endangered species - conservation strategies - exotics and its significance - tropical, temperate, evergreen, semi-evergreen, deciduous forests.	
Unit III	**Regeneration of forest**
Concept, scope and study of natural and artificial regeneration of forests. Social forest-Avenue plantation-Sacred plants-definition, importance of sacred trees.	
Unit IV	**Forest resources and utilization**
Forest products - timber, pulp wood, secondary timbers, non-timber forest products(NTFPs); Gums, resins, fibres, oil seeds, nuts, rubber, canes, bamboos, medicinal plants.	
Unit V	**Social and Agro forestry**
policy on Agro forestry and Social forestry-Tree production: seed orchards; Remote sensing and GIS in forestry.	
Text books	1. Mehta,T. A handbook of forest utilization, Periodical Expert book Agency, New Delhi.1981, 2. Dhiman, A.K, Sacred plants and their medicinal uses. Daya Publishing house, New Delhi.2003 3. Sagreiya, K.P. Forest and Forestry (Revised by S.S.Negi), National Book Trust, New Delhi.1994
Reference books	1.Tiwari, K.M, Social Forestry in India. Nataraj Publishers, Dehra Dun. 1983. 2. De Vere Burton L. Introduction to Forestry Science, Delmar Publishers, New York.2000
E-References	1.http://www.westbengalforest.gov.in/upload/development/cm4.pdf 2.http://herba.msu.ru/shipunov/school/biol_154/textbook/intro_botany.pdf

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand the importance of forest law and necessity	**K1**
CO2	know the different aspects of forestry	**K2**
CO3	learn about the forest resources and its	**K2**

		utilization	
	CO4	gain knowledge about the benefits of forest products to use health of human	**K3**
	CO5	learn and evaluate the tree production methods	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**					**PSOs**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	S	M	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	M	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark
No Correlation (N) - 0 mark

Course Code	U21BON312	MUSHROOM CULTIVATION	L	T	P	C
NME - II			2	-	-	2

Cognitive Level	K2: Understand K3: Apply
Learning objective	• To have knowledge on general identification characteristics of mushroom • To know about the types of edible mushroom • To know about the mushroom cultivation techniques • To learn the skills of mushroom cultivation • To understand the medicinal value of mushroom
Unit I	**Introduction to mushrooms**
History and Scope of mushroom cultivation - classification of mushrooms - Edible and Poisonous Mushrooms-Vegetative characters	
Unit II	**Nutritional Values of Mushroom**
Nutritional and dietary values of mushrooms as source such as protein, carbohydrates, fibre, vitamins and minerals, therapeutic properties.Mushroom cultivation techniques- Spawn production - culture media preparation- production of pure culture, harvesting. Sterilization of substrates- composting technology, mushroom bed preparation.	
Unit III	**Cultivation of edible mushrooms**
Substrate preparation, growth, packing, and maintenance of suitable environmental conditions for Button mushroom (*Agaricus bisporus*) and Oyster mushroom (*Pleurotus sajorcaju*). Factors influencing mushroom cultivation and harvesting.	
Unit IV	**Pest Management**
Pest management and problems in cultivation - diseases, pests and nematodes, weed moulds and their management strategies. Post harvest technology- Preservation of mushrooms - freezing, dry freezing, drying, canning, quality assurance and entrepreneurship.	
Unit V	**Value added products**
Value added products of mushrooms and mushrooms recipes- mushroom Soup, mushroom omelet, mushroom biryani, mushroom pickle. Medicinal values of mushrooms.	
Text books	1. C.D.Thapa Dr. V. Prakasam Sh. Mohinder Singh. Mushroom culture. College of Horticulture, YSPUH&F Nauni, Solan (HP). https://www.agrimoon.com/wp-content/uploads/Mashroom-culture.pdf.2016. 2. Tripathi. Mushroom Cultivation, D.P Oxford & IBH Publishing Co. PVT.LTD, New Delhi. .2005 3. Pathak Yadav Gour. Mushroom Production and Processing Technology, Published by Agrobios (India). 2010 4. V.N. Pathak, Nagendra Yadav and Maneesha Gaur.Mushroom Production and Processing Technology/ Vedams Ebooks Pvt Ltd., New Delhi.· 2000.
Reference books	1.Singh, M., Vijay, B., and Kamal, S., and Wakchaure, G.C. Mushrooms:Cultivation, Marketing and Consumption. Directorate of Mushroom Research,Indian Council of Agricultural Research, Solan, India. 2011. 2.S.Kannaiyan and K.Ramasamy.A hand book of edible mushroom. Today &Tomorrows printers & publishers, New Delhi.1980.

E-References	1.https://www.researchgate.net/publication/316967767_Mushroom_Cultivation_Book_Preprint_version 2.https://content.kopykitab.com/ebooks/2013/11/2269/sample/sample_2269.pdf		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	differentiate edible and poisonous mushrooms	**K3**
	CO2	know about the production methods of Spawn	**K2**
	CO3	explain the culturing methods of Mushrooms	**K3**
	CO4	know the value added products of mushrooms and mushroom recipes	**K2**
	CO5	uunderstand the medicinal values of mushrooms	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**					**PSOs**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	M	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	M
CO5	M	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark
No Correlation (N) - 0 mark

SEMESTER IV

Course Code	U21BOT41	MORPHOLOGY AND TAXONOMY OF ANGIOSPERMS	L	T	P	C
CORE-VI			5	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K6: Create
Learning objective	• To know the general morphological characters of Angiosperms • To know the different system of classification • To have knowledge on various aspects of plant nomenclature • To improve their skills to identify selected flowering plants with their salient features • To understand the economic importance of various groups of Angiosperms
Unit I	**General morphology of Angiosperms**
Stem, root, leaf and inflorescences. Modifications of stem, root, leaf and inflorescence.	
Unit II	**Taxonomy**
Scope and importance; Various Systems of Classification of Angiosperms – Artificial System (Linnaeus), Natural System (Bentham and Hooker), Phylogenetic System (Engler and Prantle) and Modern system (Taktajan's 1980).	
Unit III	**Botanical Nomenclature**
ICBN Principles, rules and recommendations, citation of names. Typification. Herbarium techniques and its uses. Cytotaxonomy, Chemotaxonomy, Numerical taxonomy and Molecular taxonomy.	
Unit IV	**Angiosperm Families**
General, vegetative and sexual characteristics of Rutaceace, Leguminosae, Cucurbitaceae, Apiaceae, Rubiaceae, Solanaceae, Amaranthaceae, Euphorbiaceae and their economic importance.	
Unit V	**Angiosperm Families**
General, vegetative and sexual characteristics of Asteraceae, Apcoynaceae, Acanthaceae, Verbenaceae, Orchidaceae, Liliaceae, Zingiberaceae, Poaceae and their economic importance.	
Text books	1. Parihar, N.S. An Introduction to Embryophyta, Pteridophytes. 5th Edition, Surjeet Publication, Delhi. 2019. 2. Sharma, O.P., Plant Taxonomy. Tata McGraw-Hill Education (Pvt) Limited, New Delhi. 2017. 3. Sharma, O.P. Pteridophyta. Tata McGraw-Hill Education, Delhi. 2012
Reference books	1. Vasishta, P.C., Sinha, A.K. and Anil Kumar. Botany for Degree Students, Pteridophyta. S. Chand &Company ltd., New Delhi. 2016. 2. Singh V and D.K.Jain, Taxonomy of angiosperms, Rastogi Publication, Meerut.2012. 3. Panday, B.P.Taxonomy of angiosperms, S. Chand & Co., (P) Ltd.2011. 4. Vasudevan Nair R. Taxonomy of Angiosperms, APH Publishing Corporation.2011. 5. Vardhana, R. Economic Botany. 1st ed. Sarup Book Publishers Pvt Ltd., New Delhi.2010.

E-References	1. https://WWW.researchgate.net/publication/267510854_The_Flowering_Plants_Handbook 2. http://ndl.iitkgp.ac.in/document/ZTVLVjRMQ01OV01qNkVJcUx4V2xnTTJJSDhBMkJMU3RONnArZEZ4UHMMdz0 3. http://ndl.iitkgp.ac.in/document/QkszM1UzbMVYMDZtVG44VXE0OUtrVjQMek94UU5sTVpnUUhTQ0dGeVhVUT0		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	learn the general morphology of flowering plants	**K2**
	CO2	know different systems of classification of angiosperm plants	**K1**
	CO3	understand the nomenclatural rules and herbarium techniques	**K2**
	CO4	identify plant species with specific key characters	**K3**
	CO5	establish the skills to prepare description of plant species	**K6**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	M	S	M	M	S	S	S	M	S	S
CO2	S	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	M	M	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark
No Correlation (N) - 0 mark

Course Code	U21BOP43	TAXONOMY OF ANGIOSPERMS-	L	T	P	C
CORE VII			-	-	4	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To learn the technical terms of Angiosperms • To develop skills on identification of angiosperm plants through morphological characters • To learn herbarium technique • To have knowledge on sexual characters of selected species
	1. Detailed study on vegetative and sexual features of selected plant families; Rutaceace, Leguminosae, Cucurbitaceae, Apiaceae, Rubiaceae, Solanaceae, Amaranthaceae, Euphorbiaceae, Asteraceae, Apcoynaceae, Acanthaceae, Verbenaceae, Orchidaceae, Liliaceae, Zingiberaceae, Poaceae 2.Two to three days to collect various angiosperm specimen 3.Visit to various botanical research institutes handling plant taxonomy research (BSI, JNTBGRI, IFGTB etc.) 4.Submission of 15 herbarium specimen and maintenance of record
Text books	1. Sivakumar, K. Algae- A Practical Approach. MJP Publishers, Chennai, India. 2016. 2. Gupta, V.K., Tuohy, M.G., Ayyachamy, M., Turner, K.M. and O'Donovan, A. Laboratory Protocols in Fungal Biology: Current Methods in Fungal Biology. Springer, London, UK. 2013. 3. Chmielewski, J. G. and Krayesky, D. General Botany laboratory Manual. AuthorHouse, Bloomington, USA. 2013.
Reference books	1. Bendre, A. M. A Text Book Of Practical Botany – 1. Rastogi Publications, Meerut, India. 2010. 2. McMahon, K., Levetin, E. and Reinsvold, R. Laboratory Manual for Applied Botany. McGraw-Hill Education, New York, USA. 2001.
E-References	1.http://assets.vmou.ac.in/MBO10.pdf 2.http://ndl.iitkgp.ac.in/document/NXpzbzZQcHVvTFUrTGdYcTF0VlQxczVoUDhzOE9FOXg2MnN1bHhjSUNmOD0 3.https://WWW.researchgate.net/profile/Barry-Rosen/publication/235654691_Aquaculture_Manual/links/02bfe512518c53a0de000000/Aquaculture-Manual.pdf
Course outcome	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	comprehend the morphological characters of angiosperm species	**K1**
CO2	understand the technique for the preparation of herbarium	**K2**
CO3	identify plant families by observing key characters	**K3**

	CO4	understand the economic uses of selected families	**K2**
	CO5	illustrate species by analyzing the characteristic features	**K3**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	M	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	M	S	S	S	M	S
CO3	S	S	M	S	S	M	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	M	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark
No Correlation (N) - 0 mark

Course Code	U21CHA44	PRACTICAL CHEMISTRY	L	T	P	C
ALLIED–IV			-	-	4	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To enable the students to acquire knowledge in Organic Estimation • To understand the basics of the course and gain knowledge in organic analysis
	Acidimetry and alkalimetry: Titration acids used: hydrochloric acid, sulphuric Standard solutions prepared: sodium carbonate, sodiumbicarbonate, oxalic acid. **Oxidation and reduction titration:** Oxidising agents: Potassium permanganate (permanganimetry). Reducing agents: Ferrous sulphate, ferrous ammonium Sulphate, oxalic acid . **Standard solutions prepared:** Ferrous Sulphate, ferrous ammonium Sulphate and oxalic acid. **Iodometry titrations**: titrations of liberated iodine against sodium thiosulphate using acidified potassium permanganate, potassium dichromate and copper Sulphate solutions. **Standard solutions:** potassium dichromate, copper sulphate.
Text books	1. Sundaram, Krishnan, Raghavan, Practical Chemistry (Part II), S. Viswanathan Co. Pvt., 1996. 2. B.S. Furniss, A.J. Hannaford, P.W. G. Smith, A.R. Tatchell, Vogel's Text Book of Practical Organic Chemistry. 5th Edn., Pearson Education, 2005.
Reference books	1. N.S. Gnanapragasam and G. Ramamurthy, Organic Chemistry – Lab manual, S. Viswanathan Co. Pvt., 1998. 2. Practical Chemistry by A.O. Thomas, Scientific Book Centre, Cannanore, 2003. 3. Basic Principles of Practical Chemistry, V. Venkateswaran, R. Veeraswamy, A. R. Kulandaivelu, Sultan Chand & Sons, New Delhi, 2nd Edn., 2004.

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	learn the concept of Titration methods and various titrations.	**K1**
CO2	understand the acidimetry and alkalimetry titrations	**K2**
CO3	learn the preparation of standard solutions	**K2**
CO4	learn the calculations of molarity, molality and normality of the solutions	**K2**
CO5	understand the concept of iodometry titrations	**K3**

Mapping of COs with POs & PSOs:

CO	POs								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	M	S	M	S	S	M	S	S
CO2	S	S	S	M	S	S	S	S	S	S	M	S	S
CO3	S	S	S	S	M	S	S	M	S	S	S	S	S
CO4	S	M	S	S	S	S	M	S	S	S	S	S	S
CO5	S	S	S	M	M	M	S	S	S	S	M	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

COURSE CODE	U21BOE421	WOOD TECHNOLOGY	L	T	P	C
CORE I			3	-	-	3

Cognitive Level	K2: Understand K3: Apply
Learning objective	• To comprehend the basic concepts and principles of wood technology • To understand the Microscopic structure of wood, chemical composition of wood. • To learn in detail about the Mechanical properties of wood and Wood preservation • To understand the use and scope of improved wood-Compressed wood, Chemically modified wood and densified wood
Unit I	**Microscopic structure of wood**
Vessels, Tyloses, Tracheids, Fibres, Wood parenchyma - Wood rays, Grain and Texture. Organization of the cell wall - Microfibrils - Orientation, cell wall pit – structure. Detailed anatomical structure of a few Indian hard woods, bamboos and canes.	
Unit II	**Chemical Composition of Wood**
Chemical composition of wood, structure and properties of Cellulose - Hemicellulose - Wood polysaccharides and Lignin. Distribution of chemical constituents in wood. Physical properties of wood - Colour - Lustre - Fluorescence - Odour and Weight	
Unit III	**Mechanical properties of wood**
Bending properties - Composition - Hardness - Shear. Properties of Dicot and monocot wood. Growth rings in wood - Annual rings, early wood and late wood, soft wood and hard wood, pycnoxylic and manoxylic wood. Dendro - chronology	
Unit IV	**Wood Preservation**
Wood preservation - Non-pressure processes - Pressure process - Chemical processing of wood - Commercial wood species and identification, Synthetic woods, Marine plywood, Fuel wood, pulp and paper making woods, matchstick wood. Economic importance of pulp and wood	
Unit V	**Wood Preservation**
Compressed wood, Impregnated wood, Compregnated wood, Heat stabilized wood, Chemically modified wood, densified wood. Uses and scope.	
Text books	1. Vaux, H. J. 1952. Textbook of Wood Technology. Vol. II. McGraw Hill, New York. 2. Brown .1981. Textbook of Wood Technology. Tata McGraw-Hill, New Delhi. 3. Brown, H. P. (1985). Manual of Indian Wood Technology. International Books and Periodicals Supply Service, New Delhi.

Reference books	1. Chowdhury, K. A. and Ghose, S. S. (1958). Indian Woods. Publication Division, Government of India, New Delhi 2. Franz, F. P., Kollmann and Wilfred A. Cote, Jr. 1968. Principles of Wood Science and Technology. Vol. I: Solid Wood. Springer-Verlag, New York. 3. Franz, F. P. Kollmann .1988. Wood Science and Technology. Vol. I and II. Springer Verlag, New York. 4. Pearson and Brown .1984. Commercial Timbers of India. Government of India Publication, New Delhi. 5. Wadoo MS. 1992. Utilization of Forest Resources. IDRIS Publ. 6. Wilson, K and White, D.J.B.1986. The Anatomy of Wood: Its Diversity and Variability. Stobart and son Ltd
E-References	1. https://is.muni.cz/th/gdxwb/Textbook_glossary_final.pdf 2. https://files.eric.ed.gov/fulltext/ED099473.pdf

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand the general anatomical features of wood	**K2**
CO2	enumerate the physical and chemical properties of wood	**K2**
CO3	acquire a deep knowledge on mechanical properties of wood	**K2**
CO4	learn and apply the wood preservation techniques	**K3**
CO5	have a clear idea about uses and scope of various wood	**K2**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	S	S	S	S	M	M	M	S
CO2	S	S	S	S	M	S	S	S	S	M	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S	S	M	S
CO4	S	S	S	S	S	S	M	S	M	S	S	M	S
CO5	S	S	M	S	S	S	S	S	S	S	S	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark No Correlation (N) - 0 mark

COURSE CODE	U21BOE422	SILVI CULTURE	L	T	P	C
CORE I			3	-	-	3

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To acquire knowledge on composition and structure of forest. • To know the techniques in establishment, growth and quality of forest vegetation. • To understand the role of forests in environmental sustenance. • To learn about the manipulations in management and establishment of forest vegetation.
Unit I	**Principles of silviculture**
Definition, objectives and scope of Silviculture. Status of forests in India and their role. General Silvicultural Principles : methods of propagation, grafting techniques; site factors; nursery and planting techniques-nursery beds, polybags and maintenance, water budgeting, grading and hardening of seedlings; special approaches; establishment and tending.	
Unit II	**Types of Trees**
Introduction to trees and their general classification under different forest types. Important tree families and their peculiar characters. Types of trees and canopy structure. Coniferous and broad leaved tree species. Trees in tropical, sub-tropica, temperate and alpine regions	
Unit III	**Forest soils**
Forests Soils, classification, factors affecting soil formation; physical, chemical and biological properties. Soil conservation - definition, causes for erosion; types - wind and water erosion; conservation and management of eroded soils/areas, wind breaks, shelter belts; sand dunes; Role of forests in conserving soils.	
Unit IV	**Forest Management**
Forest Management and Management Systems : Objective and principles; techniques; stand structure and dynamics, sustained yield relation; rotation, normal forest, growing stock; regulation of yield; management of forest plantations, commercial forests, forest cover monitoring. Approaches viz., (i) site-specific planning, (ii) strategic planning, (iii) Approval, sanction and expenditure, (iv) Monitoring (v) Reporting and governance.	
Unit V	**Injuries and Pest**
Injuries to forest - abiotic and biotic, destructive agencies, insect-pests and disease. Role of afforestation and forest regeneration in absorption of CO_2. effect of wild animals on forest regeneration, human impacts; encroachment, poaching, grazing, live fencing, shifting cultivation and control.	
Text books	1. Aranya Bhavan, Basu Ray Chaudhuri, N K Pandey, Chairman, SPMU, Forest Department. General silviculture, 2016. Published by Development Circle,Directorate of Forests, Government of West Bengal. 2. Shiva, M.P. A Handbook of Systematic Botany, 1986.IBD Publisher, Dehradun. Sagreiya, K.P. Forests and Forestry, 1997. National Book Trust India. 3. Stephen F, Textbook of silviculture, Copy Right 2021, Austin state university, Nacogdoches, Texes.

Reference books	1. Dwivedi, A. P. 1992. Principles and Practice of Indian Silviculture, Surya Publication, 420p. 2. Khanna, L. S. 1984.Principles and Practice of Silviculture, Khanna Bhandu, Dehra Dun. P. 476. 3. Ram Prakash and L.S. Khanna. 1991. Theory and Practice of Silvicultural systems. International Book Distributors, Dehra Dun. 298p. 4. Dwivedi, A.P. 1993. A Text Book of Silviculture, International Book Distributors, Dehradun.
E-References	https://www.uou.ac.in/sites/default/files/slm/FR-01.pdf https://www.ggu.ac.in/download/Syllabus/B.Sc.%20Forestry%20New%20CBCS%2023.09.19.pdf https://goalclaw.xyz/?asin=1119270952 https://royalvidslog.blogspot.com/2019/01/download-ecology-and-silviculture-of.html

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand the general features and classification of algae	**K2**
CO2	enumerate the life cycle of major classes of algae and their economic importance	**K2**
CO3	acquire a deep knowledge on principles of fungi classification to apply in the field	**K3**
CO4	know the life cycle of major classes of fungi and their economic importance	**K2**
CO5	have a clear idea about lichens including their economic importance	**K1**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	M	S	S	S	S	M	M	M	S
CO2	S	S	S	S	M	S	S	S	S	M	S	S	S
CO3	M	S	S	S	S	S	S	S	S	S	S	M	M
CO4	S	S	S	M	S	S	M	S	M	S	S	M	S
CO5	S	S	M	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark No Correlation (N) - 0 mark

Course Code	U21BON421	HORTICULTURE	L	T	P	C
NME - II			2	-	-	2

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To learn the basic of horticulture technique • To know the commercial importance of horticulture • To understand the different composting methods • To know the role of bonsai in plant propagation
Unit I	**Objectives**
Introduction to horticulture; nature and scope. Objectives of horticulture.	
Unit II	**Principles of Horticulture**
Principles of land scape gardening. Gardening: ornamental and indoor- Gardens kids gardens and vertical and roof top- gardens. Garden adornments. Role of orchids in gardening.	
Unit III	**Composting**
aerobic, anaerobic and vermicomposting; Mist chamber, green house and glass house. Effect of pollution on indoor plants. Commercial products of horticulture. Olericulture: Home and market - gardening and truck farming.	
Unit IV	**Floriculture**
Introduction, nature and scope. Fresh and dry flower arrangements. production of cut flowers, foliage potted plants and bedding plants. Future prospects of floriculture.	
Unit V	**Bonsai**
making and selection of plants for bonsai. Physical control of plant growth in bonsai preparation. Preparation of terrarium, Aquaponics and arbori culture. Components of high-tech farming	
Text books	1. Adams, C.R. and M. P. Early. Principles of horticulture. Butterworth – Heinemam, Oxford University Press. 2004. 2. Bansil. P.C. Horticulture in India. CBS Publishers and Distributors, New Delhi. 2008.
Reference books	1. Kumar, N. Introduction to Horticulture, Rajalakshmi Publication, Nagercoil. 2001. 2. Bhattacharjee.S.K. Amenity Horticulture, Biotechnology and Postharvest technology. Pointer publishers. Jaipur. 2006.
E-References	1. https://agrimoon.com/fundamentals-of-horticultur-pdf-book/ 2. https://www.iaritoppers.com/2019/06/Principles-Of-Plant-Breeding-ICAR-Ecourse-Free-PDF-Book-Download-e-krishi-shiksha.html

	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
Course outcome	CO1	understand the importance of horticulture technique for commercial production	**K2**
	CO2	describe the importance of gardening and types of gardens	**K3**
	CO3	know indoor and outdoor plants and their propagation	**K1**
	CO4	know the economic value of floriculture	**K1**
	CO5	make and selection of plants for bonsai	**K3**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO1	S	S	M	S	S	S	S	M	S	S	S	M	S
CO2	S	S	M	S	S	M	M	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	M	S	S	S	M	S
CO4	S	S	M	S	S	M	S	S	S	S	S	M	S
CO5	S	S	M	S	S	S	S	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BON422	POMOLOGY	L	T	P	C
NME-II			2	-	-	2

Cognitive Level	K1: Recall K2: Understand
Learning objective	• To gain knowledge on basics of pomology • To learn the cultivation techniques of fruit bearing plants • To acquire knowledge to establish commercial orchards thereby become successful entrepreneur
Unit I	**Introduction**
Importance, history, origin, area and distribution of fruit varieties and their classification. Climatic and soil requirements, propagation, root stocks and problem of multiplication	
Unit II	**Establishment of commercial orchards**
planting and aftercare. Nutrition management, nutritional disorders, training, pruning, irrigation, weed control and intercropping. Vegetative and reproductive phases, fruit set and fruiting.	
Unit III	**Disease Management**
Techniques for high productivity, Physiological disorders causes and remedies, Pest, diseases and their management, Post-harvest handling.	
Unit IV	**Classification of fruit species**
Description, classification and identification of fruit species and varieties with special reference to important fruits grown in India. Botanical description of families, genera and species covering various tropical, sub-tropical and temperate fruits and nuts upto varietal level; Cultivation fruit crops– Pineapple, Grapes and Guva - spacing, irrigation, field disease control.	
Unit V	**Systematic Pomology and its significance**
Industrial and export potential, Agri. Export Zones (AEZ) and industrial supports of the following crops Mango, Banana, Papaya, Sapota, Pineapple, Jackfruit, Annonaceous crops, Jamun, Tamarind, Avacado, Passion fruit, Mangosteen, Carambola, Bilimbi.	
Text Books	1. Bal, J.S. Fruit Production, Kalyani Pubulishers, New Delhi Bose. 1977. 2. Singh, Amar, Fruit Physiology land Production, Kalyani Publishers, New Delhi.1980. 3. Chattopadhyay, T.K. (ed). A Textbook on Pomology vol. II & III, Kalyani Publishers, Calcutta.1998.
Reference Books	1. Production Technology Of Fruit Crops,Tamil Nadu Agricultural University,2017, 2. Mitra, S.K., Rathore D.S., and Bose, T.K, Temperate fruits, Horticulture and Aallied Publishers, Kolkatta.1991. 3. TS.K.Mitra and D. Sanyal (Ed). Fruits-Tropical and SubTropical, Naya Udyog, Calcutta. 2001.
E-References	1. http://fvzqvwfwtbhuy.servehttp.com/pomology-book-pdf.html 2. http://cbseacademic.nic.in/web_material/publication/cbse/19Pomology-pdf 3. https://agrimoon.com/production-technology-of-fruit-crops-pdf-book/

	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
Course outcome	CO1	understand the scope and importance of Indian medicinal system	**K2**
	CO2	know the uses of traditional medicinal plants	**K1**
	CO3	learn the processing and preparation of Indian drugs	**K2**
	CO4	know the value added products obtained from medicinal plants K3	**K1**
	CO5	understand the preparation of herbal formulations	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**					**PSOs**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	M	S	S	S	S	M
CO5	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

SEMESTER V

Course Code	U21BOT51	GENETICS AND EVOLUTION	L	T	P	C
CORE -VIII			5	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To understand the basics of Mendelian genetics • To learn the genetic recombination and its effects • To learn the significance of plant genetic recombination • To comprehend the evolution and equilibrium concepts
Unit I	**Mendelian inheritance**
Laws of dominance, segregation and independent assortment. Monohybrid and Dihybrid Ratios. Incomplete dominance and co-dominance, lethal factor, complementary factor and epistasis (dominant), multiple alleles with reference to ABO blood group in man.	
Unit II	**Recombination**
Linkage and crossing over. Mapping of genes on the chromosomes. Cytoplasmic inheritance. Sex linked inheritance and diseases.	
Unit III	**Sex determination**
Mechanism of sex determination and sex determination in plants. Chromosomal aberrations; changes in chromosome structure, number, behavior and their genetic effects. Polyploidy and its types.	
Unit IV	**Gene Transfer & Microbial genetics**
Structure of Ti plasmid and applications of plant genetic recombination. Human Genome Project. Microbial genetics with reference to bacterial recombination: Transformation, transduction and conjugation**.**	
Unit V	**Evolution**
Introduction, evidences of evolution, Brief account of theories of evolution. Species concept, Speciation; population genetics and Hardy-Weinberg Equilibrium	
Text books	1. Fundamentals of Genetics by B.D.Singh - kalyani Publishers .January 2014. 2. Genetics By Veer Bala Rastogi –March 2019 MEDTECK 3. Boston. 3 Pierce, B. A. Genetics: A conceptual approach. 4 th ed. W H Freeman and Company Ltd. 2008.
Reference books	1. Verma, P.S. and Agarwal, V.K. Genetics. S.Chand Publications, New Delhi. 2012. 2. Pankaj Kumar. A textbook of Genetics. Lalitha Publishers, India. 2021. 3. Veer Bala Rastogi . Genetics, Medtech Publishers. Delhi. 2019. 4. Gardner, E. J., Simmons, M.J. and D. P. Snustad, Principles of Genetics. Miley India (Pvt.) Ltd. New Delhi. 2018. 5. Hartl, D.L and Jones E. W. Genetic analysis of Genes and Genomes. 2nd ed. Jones and Bartlett Pub, 2017. 6. Neil Ingram, Sylvia Hixson Andrews and Jane still, Evolution, Oxford Biology Primers, Paperback, 2021.

E-References	1. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvMmpzQ2loMHQvQUpTNDZXM2pZS1l6bFFuR0tnR0F6TE14RFJFYlNMNFI1c3ZYMMgrMg 2. http://ndl.iitkgp.ac.in/document/cGlkTnFCS2ZRN09ONGxmVjN4QUMyUT09 3. http://ndl.iitkgp.ac.in/document/K2F6YjJpSGxxVMx0MmxoM25GOUJXQzRnY2hqS1p2Mmg4Yi9QL2ZDRzBNaz0 4. https://epgp.inflibnet.ac.in/Home/VieMSubject?catid=4 5. https://teach.genetics.utah.edu/content/dna/tx-tl_teacher-guide.pdf 6. https://global.oup.com/ukhe/disciplines/bioscience/evolution/?cc=in&lang=en&		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	have a thorough understanding on Mendelian genetics and expression of alleles	**K1**
	CO2	comprehend the recombination of eukaryotic genome and diseases linked with sex chromosomes	**K2**
	CO3	attain knowledge on determination of sex and abnormalities of chromosomes K2	**K2**
	CO4	depict and explain plasmids and recombination phenomenon	**K2**
	CO5	relate population genetics with process of evolution	**K3**

Mapping of COs with POs & PSOs:

CO	POs								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	S	S	S	S	S	M	S
CO2	S	S	M	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	S	S	S	M	S
CO4	S	S	M	S	S	M	S	S	S	S	S	M	S
CO5	S	S	M	S	S	S	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOT52	PLANT PHYSIOLOGY	L	T	P	C
CORE-IX			5	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To learn the plant water absorption process • To obtain basic knowledge on photosynthetic and respiratory process • To study the importance of plant growth hormone, seed germination and fruiting physiological process
Unit I	**Absorption of water and minerals, transpiration**
Types, mechanism of stomatal movement. Factors affecting transpiration. Gas exchange, guttation. Mineral nutrients: Role of macro elements (N, P, K, Mg, Ca) and micro elements (Zn, Mo, B).	
Unit II	**Photosynthesis**
Photosynthetic pigments-red drop phenomena, Emerson's enhancement effect and electron transport system (Cyclic and Non-cyclic) and photophosporylation. Calvin cycle (C_3) and C_4 (Hatch and Slack Pathway) and Crassulacean acid metabolism (CAM).	
Unit III	**Respiration**
Aerobic and anaerobic respiration. Glycolysis, Kreb's cycle, electron transport system, oxidative phosporylation.	
Unit IV	**Nitrogen fixation**
Biological nitrogen fixation; symbiotic and asymbiotic N_2 fixation, symbionts, mechanism of biological N_2 fixation. Plant growth regulators; practical applications, physiological role of auxins, gibberellins, cytokinins, ethylene and abscissic acid.	
Unit V	**Seed dormancy**
Causes and methods to break seed dormancy - Physiology of seed germination. Fruiting- mechanism of fruiting – hormonal control of fruiting – climacteric rise .	
Text books	1. Arunkumar.V. Plant Biochemistry, A.P.H Publisheing, New Delhi,2010. 2. Jain, V.K. Fundamentals of Plant Physiology. S.Chand and co., New Delhi. 2017. 3. S.K.Sinha.A Textbook of Plant Physiology.Centrum Press.2013. 4. S.N.Pandey & B.K.Sinha, Plant Physiology. Vikas Publishing.2010 5. Gill, D.S. Plant Physiology, S.Chand and co., New Delhi. 2000.
Reference books	1. R.K. urray, D.K. Granner and V.M,Rodwell. Harper's Illustrated Biochemistry, 27th Edition. The McGraw-Hill companies, Inc.2009. 2. hilip stewart and Sabine Globig, Plant Physiology, Apple Academic Press.2021. 3. Lambers, Hans, Oliveira, Rafael S. Plant Physiological Ecology, Springer. 2019. 4. Lincoln Taiz, Eduardo Zeiger , Ian Max Møller, Angus Murphy .Fundamentals of Plant Physiology Paperback. Sinauer Associates Inc. 2018.

E-References	1. http://ndl.iitkgp.ac.in/document/djN4cHJoaFBISzk4NXpiOHZ3ckE4Zz09 2. http://ndl.iitkgp.ac.in/document/djN4cHJoaFBISzk4NXpiOHZ3ckE4Zz09 3. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvMmpzQ2loVUhyU29EcE5jMMVNMUh1Mm13MXp6MUhHNGpFMjlMK2FJNmdNNlYMS1I1Tg 4. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvMmpzQ2loMkNPL1RGQjdEVkorcjJaU0dkTkJqU0VYbEJZUnlvRDQxU2EMdVdoSMZpMQ 5. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvMmpzQ2loVm9lMXVCL1g4MFdpakIrUnQyUmVRZVpiNTRnMnFaUTRBcHl0MkREM1BkZM

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand the concepts of water and mineral absorption	**K2**
CO2	describe the mechanism of photosynthesis	**K3**
CO3	know the plant respiratory process and energy metabolism for respiration	**K3**
CO4	find the importance of nitrogen to plant and fixation of nitrogen and role of growth hormone	**K1**
CO5	get clear understanding of seed germination and fruiting mechanism	**K2**

Mapping of COs with POs & PSOs:

CO	POs								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	M	S	S	S	S	M	S
CO3	S	S	M	S	S	M	S	M	S	S	S	M	S
CO4	S	S	M	S	S	S	S	S	S	S	S	M	S
CO5	S	S	M	S	S	M	M	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOT53	PLANT BIOCHEMISTRY	L	T	P	C
CORE X			5	-	-	4

Cognitive Level	K1: Recall K2: Understand
Learning objective	• To understand the basic fundamentals of biochemistry. • To learn about the general properties of carbohydrates, proteins and lipids its role in the living beings. • To understand the major role of nucleic acids in life processes. • To understand the chemistry of biomolecules and its significance
Unit I	**Chemical Bonds & carbohydrate**
Basic concepts of atoms and molecules. Isomerism. Primary chemical bonds – covalent bond and hydrogen bond. Acid-base theories, pH, Buffers, oxidation –reduction. Carbohydrates: Classification, structure and properties of monosaccharides, disaccharides, oligosaccharides and polysaccharides.	
Unit II	**Amino acids and Proteins**
classification amino acids, physical properties of amino acids - Solubility, electrochemical properties, fundamental role of proteins in life - Composition of proteins - General properties of proteins - classification of the proteins on the basis of their biological functions- Criteria for the purity of proteins.	
Unit III	**Lipids**
Fatty acids - Classification, Hydroxy and keto derivatives and cyclic fatty acids - physical properties of fatty Acids - solubility, boiling point, absorption, Fats - Fatty acids esters of glycerol - Chemical structures. Physical and chemical properties of fats – Waxes, phospholipids, non-phosphorylated lipids and steroids.	
Unit IV	**Nucleic Acids**
fundamental role of nucleic acids in life processes- DNA and its types, RNA – types, functions. Structure of bases, nucleosides and nucleotides - bond linking the various bases. Isolation, separation and purification of plant DNA	
Unit V	**Vitamins**
Discovery and physico- chemical properties of vitamins, fat-soluble vitamins, vitamin A, D, E and K - Water soluble vitamins, vitamin B complex, vitamin C – Brief mention of source and physiological role.	
TextBooks	1. T. Devasena, Biomolecules by MJP Publishers,2011 2. Arihant, Experts Handbook of Chemistry, Arihant Publications,2020 3. P.K.Gupta , Biomolecules and cell Biology, Rastogi Publication, 2018
References	1. Lehninger, A.L , Biochemistry, 6th edition, Kalyani publisher, 2012. 2. Lubert Stryer, Biochemistry, 7th edition, W.H. Freeman and Company, New York, 2012 3. J.M. Berg, J.L. Tymoczko and L. Stryer, Biochemistry, W.H. Freeman, 2015 4. Mohan P Arora, Biomolecules, Himalaya publishing House, 2012 5. S. Azhagu Madhavan, P. Vinotha, V. Uma, Chemistry of Biomolecules, Notion Press, 2020
E-References Link	1.https://www.mdpi.com/journal/biomolecules 2.https://ncert.nic.in/textbook/pdf/lech205.pdf

	3.https://www2.nau.edu/lrm22/lessons/biomolecules/biomolecules.html 4.https://opentextbc.ca/biology/chapter/2-3-biological-molecules/		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	understand the foundation of life and structure and functions of carbohydrates	K1
	CO2	attain knowledge in structure, properties, role and classification of amino acids and proteins	K2
	CO3	know the structure, properties, role and classification of Lipids and fatty acids	K2
	CO4	learn the types of nucleic acids and its structure and biological importance.	K2
	CO5	gain knowledge on various types , functions, requirements and deficiency diseases of vitamins	K2

Mapping of CO with PO & PSO:

CO	**PO**								**PSO**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	M	S	S	S	M	M	S	S	S	M	S
CO2	S	M	S	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	M	S	S	S	S	M	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks; Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark; No Correlation (N) - 0 mark

Course Code	U21BOT54	PLANT ANATOMY AND EMBRYOLOGY	L	T	P	C
CORE XI			5	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To develop skill to distinguish monocot and dicot plants • To understand the structure of simple and complex tissues • To learn the internal organization of different parts of plants • To know the process of fertilization in plants
Unit I	**Simple tissue**
Structure, occurrence and function of Parenchyma, Collenchyma, Sclerenchyma. Complex tissues; Definition, Structure, Origin and function of Xylem & Phloem, Tracheary elements and Sieve elements.	
Unit II	**Secretory tissues**
Glandular trichomes, nectaries, hydathodes, schizogenous and lysigenous cavity, laticifers. Types of Vascular bundles (Conjoint, Collateral, Bi-collateral, Open, Closed, Radial, Concentric, amphicribal and amphivasal.) Stomatal types.	
Unit III	**Meristems**
Classification, distribution, structure, function. Meristerm Theories: Tunica – Corpus and Quiescent Centre. Root apex: Histogen theory & Korper-Kappe theory.	
Unit IV	**Anatomy of stem and Root**
Primary structure of monocot stem and root. Primary and secondary structure of dicot stem and root. Anomalous secondary growth in dicot stems *Boerhavia* and *Nyctanthes* and monocot stem; *Dracaena*. Structure of Monocot and dicot leaves. Brief account on Nodal anatomy	
Unit V	**Embryo Anatomy**
Structure of mature anther and ovule - double fertilization: Embryo: types of embryogenesis in monocot and dicot embryos. Polyembryony. Structure and types of Endosperm	
Text books	1. Singh.V.Text Book of Botany: Anatomy and Embryology of Angiosperms .Rastogi Publication.2017. 2. Pandey, B.P. Plant Anatomy. Chand & Co Ltd.2012. 3. Singh,Pande and Jain.Text Book of Botany:Angiosperms, Rajpal and sons Publishing. 2010 4. Vashista, P.C.. A text Book of plant Anatomy, S.Negin & Co.2001.
Reference books	1. Dr. K. N. Dhumal, Dr. H. S. Patil , Dr. B. N. Zaware , Dr. B. P. Shinde /,Dr. K. S. Bhosale.A Book of Plant Anatomy & Embryology and Plant Biotechnology. Edition Paperback. Nirali Prakashan.2019. 2. Bhojwani, S..S and Bhatnagar, S.P. The Embryology of Angiosperms,6th Edition Vikas Publishing House Pvt. Ltd., New Delhi. 2015. 3. Vimala singh and Alok Abhisek, **,**Plant Embryology and Experimental Biology**,** Educational Publishers and Distributors 291, Bank Enclave, Laxmi Nagar, Delhi – 2019 4. Esau, K. Plant Anatomy, Miley Eastern Private Limited. New Delhi.2006

E-References	1. http://ndl.iitkgp.ac.in/document/aFR5ZURTaDRVRjdrSDdvdkhSRkVNbmJtOXNSYlJQNkpIa1dQUXJoR1ZMaz0 2. http://ndl.iitkgp.ac.in/document/ZMsMc3RMeFNtMDhVVk1vV2x1NTkMZjM4RmprYys5cHQrQ3hveDcyOHlRdz0 3. http://ndl.iitkgp.ac.in/document/MHdqSlQ2MDR4UXhKcDNQTXI0akFXdTdlY1ZuMMxER2tkV2VkREg5QTVTQT0 4. http://ndl.iitkgp.ac.in/document/Sm0rdEpQN1Y1YU1UT0pEa3VvdktzY2xIUkM0MmFQVnlhbTQMV2V4Qjd0QT0

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	attain knowledge on different types and functions of simple and complex tissues	**K2**
CO2	understand the arrangement of vascular bundles and types of stomata	**K2**
CO3	describe classification and theories pertaining to meristematic tissues	**K1**
CO4	have clear picture on the internal structure of plant parts like leaf, stem and roots.	**K2**
CO5	explain reproductive structures and fertilization process in flowering plants	**K3**

Mapping of COs with POs & PSOs:

CO	POs								PSOs				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	M	M	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S	S	S	M	S
CO3	S	S	M	S	S	M	S	M	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S	S	M	S
CO5	S	S	M	S	S	M	M	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOP54	GENETICS & EVOLUTION,PLANT PHYSIOLOGY, PLANT BIOCHEMISTRY,PLANT ANATOMY AND EMBRYOLOGY	L	T	P	C
CORE-XII			-	-	5	4
Cognitive Level	K1: Recall K2: Understand K3: Apply					
Learning objective	• To acquire the knowledge on mendelian traits and pedigree analysis • To analysis the qualitative and quantitative analysis of biomolecules • To understand the transpiration rate and osmotic potential • To know the methods used for the sectioning and mounting of plant parts • To differentiate monocot and dicot plants anatomically					
	Genetics 1. Observation and record of simple mendelian traits 2. Pedigree analysis – chart preparation 3 Problems based on gene frequency – Hardy Weinberg Law **Plant Physiology and Biochemistry** 1.Determination of osmotic potential of plant cell sap plasmolytic method 2.Demonstration of transpiration by Ganong's photometer 3.Osmosis by potato osmoscope experiment 4.Preparation of buffers; phosphate and acetate buffer 5. Qualitative test for Carbohydrates 6.Qualitative test for lipids 7.Qualitative test for amino acids and protein 8.Separation of amino acids and sugars by thin layer chromatography or paper chromatography **Plant Anatomy and Embryology** 1.Study of simple tissues-Parenchyma, chlorenchyma, collenchyma and sclerenchyma 2. Internal structure of Dicot stem, Dicot root, Monocot Stem and Monocot root. 3. Anomalous secondary structures in *Boerhaavia* and *Nyctanthes* 4. Demonstration of pollen viability test 5. Structure of Anther and Ovule 6. Structure of dicot embryo					
Text books	1. Singh, R. J. Plant Cytogenetics. CRC press, US. 2016. 2. Jackson, S. A., Kianian, S. F., Hossain, K. G., and Walling, J. G. Practical laboratory exercises for plant molecular cytogenetics. In Plant Cytogenetics (pp. 323-333). Springer, New York, NY. 2012. 3. Maheswari, P. An introduction to the Embryology of Angiosperms. TATA McGraw-Hill Publishing Co., Ltd., New Delhi.1976 4. PatkiL.R,Bhalchandra B.L, JeevajiI.H. An introduction to Micro technique,S.Chand.1987. 5. Johansen, D.A. Plant Microtechnique, TATA McGraw Hill Book Co., Ins., New delhi.1998.					
Reference books	1. Bharadwaj, D. N. Breeding of field crops (pp. 1-23). Agrobios (India). 2012. Bala, M., Gupta, S., Gupta, N. K., and Sangha, M. K. Practicals in plant physiology and biochemistry. Scientific Publishers (India). 2013.					

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Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	explain the pedigree analysis	**K3**
	CO2	understand the osmotic potential of plant cell	**K2**
	CO3	perform qualitative and quantitative analysis of biomolecules, separate biochemical compounds by using chromatographic technique	**K3**
	CO4	practice sectioning and analyse internal part of dicot and monocot	**K3**
	CO5	learn to handle microscope ,micrometry and identify dicot and monocot embryo	**K1**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	M	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	S	M	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S	S	M	S
CO5	S	S	M	S	S	S	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOE531	ETHNO BOTANY AND ETHNOPHARMACOGNOSY	L	T	P	C
ELECTIVE- III			3	-	-	3

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To attain knowledge about ethnobotany and its significance • To understand the concept of traditional medicinal practices by Indian tribals • To know the value of ethnopharmacognosy • To apply the methods to transform ethnobotanical knowledge for the preparation of value added products
Unit I	**Ethnobotany**
Concept, scope and importance of ethno botany - sub-disciplines, inter- disciplines of ethnobotany, approaches in ethnobotanical studies.	
Unit II	**Ethnobotany and conservation of plants**
with special reference to India –conservation of selected plant species: sacred groves, forestry and unique ecosystems and their ethnobiolgical values.	
Unit III	**Tribes**
Major tribes of South India and their ethnobotanical and ethno-biological heritage – Parayar, Kurichiar, Paniyar, Karuman, Naikas, Shola Naikas, Thodas, Kothas, Kurumbas, Irullas, Kattu Naikas.	
Unit IV	**Tribal medicinal plants**
Plants used by tribals of Nilgiris, plants used by tribals of Kerala and Eastern Himalayas. Economic potential of NTFPs, Gender role in harvesting NTFPs, Good sustainable harvesting practice of some selected NTFPs.	
Unit V	**Ethnopharmacognosy**
Scope and importance of ethnopharmacognosy - Natural Plant Products – values of natural plant products – History of natural drugs. Plant with anti -tumor potential – Plant with anti- HIV potential – Plants with anti- inflammatory activity – Plants with anti- diabetic activity.	
Text books	1. Gokhale, S.B., Kokate, C.K. and Gokhale, A. Pharmacognosy of Traditional Drugs. 1st ed. Nirali Prakashan, Pune. 2016. 2. Gringauz. Introduction to Medicinal Chemistry: How Drugs Act & Why? Wiley India Pvt Ltd., Noida. 2012 3. Joshi, S.G. Medicinal Plants. Oxford & IBH Publishing C., Pvt., Ltd., 4. New Delhi. 2018.
Reference books	1. Kumar, N. A Textbook of Pharmacognosy. Aitbs Publishers, India. 2018. **2.** Premendra Singh Medicinal Plants: Conservation, Cultivation and Utilization. Daya Publishing House New Delhi.2013.
E-References	1. https://www.researchgate.net/publication/310772096_Ethnobotany_Ethnopharmacology_Bioprospectingand_Patenting 2. https://www.eolss.net/sample-chapters/C06/E6-151-02.pdf

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	comprehend the concept of ethnobotany and its related research	**K2**

	CO2	understand the concept and importance of sacred groves	**K2**
	CO3	know about different tribes in south India	**K1**
	CO4	describe the plants which used as traditionally for various treatments	**K2**
	CO5	know the plants with different pharamacological activities	**K1**

Mapping of COs with POs & PSOs:

CO	**POs**					**PSOs**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	M	S	S	S	S	S	M	S	S	M
CO5	S	S	S	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOE532	BIOFERTILIZER AND WASTE MANAGEMENT	L	T	P	C
ELECTIVE –III			3	-	-	3

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To learn mass cultivation of biofertilizers • To study the production of various manures • To understand and practice solid waste management
Unit I	**Biofertilizers**
Introduction, Scope, Advantages and limitations. Types of Biofertilizers; Based on nutrients and microbes. Mechanism of Symbiotic and Non- Symbiotic (Free living) nitrogen fixation. Root nodule formation	
Unit II	**Production**
Mass production of cyanobacterial biofertilizers *Nostoc* and *Anabaena*, bacterial biofertilizers- *Azotobacter*, *Azospirillum*, *Rhizobium* and *Pseudomonas* and duck weed fern (*Azolla*).	
Unit III	**Manures**
Composts, farmyard manure, oil seed cakes (Castor and Neem), green leaf manures, vermicompost and agro-industrial wastes	
Unit IV	**Municipal solid waste**
Sources and types of solid wastes, composition and its determinants. Factors influencing its generation	
Unit V	**Disposal of solid wastes**
refuse disposal –methods of refuse disposal. Sanitary landfills- methods of operation – advantages and disadvantages of sanitary landfills	
Text books	1. Abdin M.K., Kiran U. Kamaluddin & Ali, A. Plant Biotechnology: Principles and Applications. Springer. 2017. 2. Krohne D. T. Ecology: Evolution, Application, Integration. Oxford Univ. Press. 2017. 3. Poul V.I. Biodiversity: Issues, Impact, Remediations and Significance 1st Edition. V L Media Solutions. 2013.
Reference books	**1.** Krishnendu Acharya, Surjit Sen, Manjula Rai, Biofertilizers and Biopesticides, Technoworld Publishers, Kolkatta.2019. 2. Khosla, R. Biofertilizers and Biocontrol Agents for Organic Farming, Kojo Press, Delhi.2017 **3.** Panda. H., Manufacture of Biofertilizer and Organic Farming, Published by National Institute of Industrial Research.2011. 4. Subba Rao, N.S., Soil Microbiology. Medtech Publishers, Delhi.2017.
E-References	1. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvMmpzQ2loU1NPaEl6eMpVaXpnNGUMc21iQzZKbMlHL2Fxc1hFSUpPdGJVaVpXMVJ6T0pGTjNuU1NBZjdId08vQnZ1eThMQ3c9PQ 2. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvMmpzQ2loZDl5a

	M1MOM5LNlVrNittT3pLY0pSMMZyZmU1Q0MyNMdPdDdsS3RvcGF3LM		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	understand microbial nitrogen fixing process for different types of microbial biofertilizers	**K1**
	CO2	know the mass production of biofertilizers	**K2**
	CO3	understand the production of manures and composts	**K2**
	CO4	describe the composition and recycling of municipal solid Waste	**K3**
	CO5	have idea about disposal of solid wastes and sanitary landfills	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	M	S	M	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S	S	M	S
CO5	S	S	M	S	S	M	S	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOS531	ORGANIC FARMING	L	T	P	C
SBE - III			2	-	-	2

Cognitive Level	K1: Recall K2: Understand K5: Analyze
Learning objective	• To understand the concept of organic farming • To learn the organic farming techniques and apply to become potential entrepreneur • To create healthy people and healthy environment through organic food production
Unit I	**Types of Farming (Advantage & disadvantage of each system)**
Pure Organic Farming – Definition, Concept & Benefits Integrated Farming system (Combination of Organic and Inorganic) ,Mixed Farming, Advantages and disadvantages of Chemical fertilizer and pesticides.	
Unit II	**Organic Farming**
Introduction and Status, Organic Farming and its Components,Organic Farming Concepts and Principles,SWOT Analysis of Organic Farming, Developing organic farms, Important steps & methods	
Unit III	**Sustainable Agriculture**
Key Indicators of Sustainable Agriculture,Organic Farming and Climate Change, Principles of Compost Production , Vermicompost Production Technology, Enriched Vermicompost Production Technology,Vermicompost Quality and Marketing,Green Manure:Mulches.	
Unit IV	**Pest and Disease Management**
Pest and Disease Management in Organic Farming, level "C" Pest and Disease Management.Introduction to Organic Crop Management, Organic Vegetable Crop Management,Organic Vegetable Crop Management (Cereals)	
Unit V	**Organic Food and Human Health**
Quality of Organic Food, Natural Sources of Antioxidants for Health Defense , Antioxidant Capacity of fruits and vegetablesOrganic Standard, Organic Certification Process , Operational Structure of Organic Certification, Marketing of Organic Products	
Reference books	1. Lampkin, N. Organic Farming. Farming Press, Ipswich (ISBN 0 85236 191-1990 2. Lampkin, N & Measures, M .2004 Organic Farm Management Handbook. Organic Farming Research Unit, Aberystwyth (ISSN 1354 3768) & Organic Advisory Service, Berkshire (ISBN 1 872 064 388) .2004. 3. Younie, D & Wilkinson, J. M (eds) Organic Livestock Farming. Chalcombe Publications, Lincoln (ISBN 0 948617 45 .2001. 4. Younie, D., Taylor, B. R., Welsh, J. P & Wilkinson, J. M (eds) Organic Cereals and Pulses. Chalcombe Publications, Lincoln.2002.
E-References	1. https://drive.google.com/file/d/1vKgc32uFghQ1TUJ7OAZZo3xtJzEI2rbB/view 2. https://ecofriend.org/7-best-books-on-organic-farming-and-gardening/

	3. http://www.efrc.com/education_main.htm Henry Doubleday Research Association (HDRA) http://www.hdra.org.uk International Federation of Organic Agriculture Movements (IFOAM)		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	understand the disadvantages of chemical pesticides and fertilizers	**K2**
	CO2	practice organic farming methods	**K1**
	CO3	comprehend the sustainable agriculture	**K2**
	CO4	learn the pest management techniques	**K5**
	CO5	know the importance of organic food and marketing	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	S	M	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S	S	M	S
CO5	S	S	M	S	S	S	M	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOS532	FOOD PROCESSING AND PRESERVATION	L	T	P	C
SBE - III			2	-	-	2

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To understand the general principles of preservation • To know the principles of food freezing • To comprehend the processing of food and its importance • To learn the large-scale food processing technology
Unit I	**Food preservation**
Introduction- principles of preservation - classification of methods used for preservation - need and importance of preservation at domestic and large scale - Causes of food spoilage.	
Unit II	**Food spoilage mechanism**
Microbial contamination; Bacteria, fungi – Control of microbial contamination - Chemical deterioration – Enzymatic reactions – preservation – Refrigeration – Freezing – The freezing process – Industrial freezers – Quality of frozen foods – Thermal processing – Canning; Presterilization procedures, Sterilization, Quality of canned food	
Unit III	**Food preservatives**
Blanching – Controlling water activity – Dehydration – Fermentation and pickling — Chemical preservation: Organic chemical preservatives, inorganic chemical preservatives – Food irradiation – Biological effects of irradiation;	
Unit IV	**Methods of food handling and storage**
Nature of harvested crop, plant and animal; storage of raw materials and products using low temperature, freezing of raw and processed foods	
Unit V	**Large-scale food processing**
Milling of grains and pulses; edible oil extraction; Pasteurisation of milk and yoghurt; canning and bottling of foods; drying – Traditional and modern methods of drying, dehydration of fruits	
Text books	1. Subbulakshmi, G., and Shobha A. Udipi "Food Processing and Preservation".New Age Publications. 2006. 2. HUi, Y.H. "Handbook of Vegetable Preservation and Processing". Marcel Dekker. 2003. 3. Karnal, Marcus and D.B. Lund "Physical Principles of Food Preservation". Rutledge.2003.
References Books	1. Gould, G.W. "New Methods in Food Preservation". Springer,1995. 2. VanGarde, S.J. and Woodburn. M "Food Preservation and Safety Principles and Practice". Surbhi Publications, 2001. 3. Sivasankar, B. "Food Processing & Preservation", Prentice Hall of India, 2002. 4. Khetarpaul, Neelam, "Food Processing and Preservation", Daya Publications, 2005.
E-Reference links	1. http://www.cold.org.gr/library/downloads/Docs/Handbook%20of%20Food%20Preservation.PDF 2. https://www.researchgate.net/publication/270099729_Handbook_of_Food

	_Preservation/link/549fe1990cf257a635fe8afe/download		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	learn the need and importance of preservation	**K1,K2**
	CO2	understand various microbial contamination in food	**K2**
	CO3	learn the deterioration of fermented and pickled food products	**K1**
	CO4	use the methods of food handling and storage	**K3**
	CO5	understand the pasteurisation of milk and yoghurt	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	S	S	S	M	S	M	S	S	S	S	S	S
CO2	M	M	S	M	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	M	S	M	S	S	M	S	S
CO4	S	M	S	S	M	S	S	S	S	S	S	S	M
CO5	M	S	M	M	S	M	M	M	S	M	M	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

SEMESTER VI

Course Code	U21BOT61	BASICS OF PLANT BIOTECHNOLOGY	L	T	P	C
CORE - XIII			4	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To know the scope and techniques of Plant Biotechnology • To learn the role of important plant hormones • To acquire a basic knowledge on Plant tissue culture
Unit I	**Plant genome organization**
Structure of representative plant genes and gene families in plant – Organization of Chloroplast genome and Mitochondrial genome.	
Unit II	**Molecular biology and gene rearrangement**
Mechanism of T-DNA transfer to plant – Ti plasmid vectors and its utility – plant viral vectors	
Unit III	**Genetic engineering of plants**
Construction of genome libraries and cDNA libraries. Molecular breeding – recombinant DNA – Transgenic plant and applications	
Unit IV	**Plant hormones**
Auxin, IAA, GA, Cytokinins and Abscissic acid (ABA) - molecular basis of action – Phytochrome – role in photo – morphogenesis – regulation of gene expression – stress induced promoter switches in the control of gene expression. Ethylene and fruit ripening	
Unit V	**Plant tissue culture**
Cells suspension cultures– haploid plants – cloning of hosts – micro propagation – somatic embryogenesis – protoplast isolation and applications	
Text books	1. Chawla, H.S.. Introduction to Plant Biotechnology. Oxford and IBH Publications, Delhi.2020 2. Satyanarayana, U. Biotechnology. Books and Allied Ltd. Kolkata.2020. 3. Singh, B.D. Biotechnology: Expanding Horizons, Kalyani Publishers, Delhi.2015. 4. Slater, Plant Biotechnology: Genetic Manipulation of Plants. Oxford Pub. Delhi.2008.
Reference books	1. Kojima, Lee, H. and Kun, Y. Photosynthetic microorganisms in Environmental Biotechnology. Springer – Verlag. 2001 2. Trivedi, P.C. Applied Biotechnology and plant genetics, Dominant publishers and distribution. 2000. 3. Ignacimuthu. Applied plant Biotechnology. Tata McGraw – Hill. 1996. 4. Grierson and Convey, S.N. Plant molecular Biology. Backie. 1988.
E-References	1. http://ndl.iitkgp.ac.in/document/Rm5qb3lqRngwWDZ2Tnl6UXl4VU9YSWo3RFBPdTVoNlFQR3BIQ2Y0cHl4OC96NGJyc2E0MFJQLzVQVjAvNWRocTNQNG9JMWFBNFUvZTY2WjROUmFVQUE9PQ 2. https://nptel.ac.in/content/storage2/courses/102103045/download/mod1.pdf

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	understand the organization of plant genome and important genes	**K2**

	CO2	describe the process of T-DNA transfer and role of vectors in gene transfer	**K3**
	CO3	understand the construction of genome libraries and molecular breeding	**K2**
	CO4	know the molecular basis of plant growth hormones and phytochromes	**K1**
	CO5	know the procedure for the basic tissue culture techniques	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**					**PSOs**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	S	M	S
CO5	S	S	M	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOT62	ENVIRONMENTAL BIOLOGY AND PHYTOGEOGRAPHY	L	T	P	C
CORE - XIV			5	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To understand the basic components of ecosystem • To attain knowledge on different kinds of producers and consumers • To learn the importance of ecosystems and vegetation. • To understand and get awareness on causes and effects of pollution
Unit I	**Ecology**
definition, introduction and scope. Brief account on autecology and synecology. Biotic and abiotic factors. Positive and negative interactions of biotic factors	
Unit II	**Ecosystem Concept**
structure and function of ecosystem. Biomass. Ecological pyramids. Productivity: primary, secondary and gross. Food chain, food web and energy flow. Structure and functions of pond ecosystem	
Unit III	**Vegetation**
Development of vegetation. Plant succession: hydrosere and xerosere. Ecological classification of plants; hydrophytes, xerophytes, mesophytes and halophytes	
Unit IV	**Pollution**
Types of pollutants. Causes, effect and control of atmospheric, soil, industrial and agricultural pollution	
Unit V	**Phytogeography**
Vegetational types of Tamilnadu: Evergreen, deciduous, scrub and mangrove forests. Phytogeographical regions of India	
Text books	1. Dr. Namita Joshi , Dr. P. C. Joshi , A Text Book Of Ecology And Environment Paperback .Himalaya Publishing House.2011. 2. Sharma, P.D,Ecology and Environment (BC-69) Paperback-i, Rastogi Publications.2019.
Reference books	1. Eugene Odum, Fundamentals of Ecology. Cengage Learning India Private Limited, Delhi.2018. 2. Keddy, P.A. Plant Ecology: Origins, processes, consequences. 2nd ed. Cambridge University Press. ISBN. 978-1107114234.2017. 3. Brian, K.H. and Benedict, H.. Evolution. 5th ed. Jones & Bartlett Publishers. 2014 4. Shukla, R.S and Chande I.P.S Plant Ecology and Soli Science, S. Chand & Co Ltd.,2005. 5. Sharama, J.P. Environmental Studies, Laxmi Publications (P) Ltd. New Delhi.2004.
E-References	1. https://epgp.inflibnet.ac.in/Home/VieMSubject?catid=4 2. https://WWW.researchgate.net/publication/325780661_FUNDAMENTALS_OF_ECOLOGY_AND_ENVIRONMENT 3. http://Miienvis.nic.in/MriteReadData/Publication/19_Grassland%20Habitat_2016.pdf

	4. https://cdn.cseindia.org/attachments/0.81111800_1563776216_Brochure-Zanzibar-decentralised-pilot-project-report.pdf		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	acquire knowledge on ecology and its components.	**K2**
	CO2	describe the concepts of ecosystem and dependence of organisms in energy flow	**K3**
	CO3	have clear understanding on formation of vegetation	**K2**
	CO4	understand the causes and control of various types of pollution	**K2**
	CO5	become aware of vegetational types of Tamilnadu and geographical zones of India	**K1**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	M	S	S	S	M	S
CO3	S	S	M	S	S	S	M	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	S	S	S	S	M	S
CO5	S	S	M	S	S	M	S	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOT63	FUNDAMENTALS OF MICROBIOLOGY AND PLANT PATHOLOGY	L	T	P	C
CORE-XV			5	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To enrich the knowledge on Microorganisms • To learn different types of bacteria and fungi and their nature • To understand the processing of milk and dairy products. • To know fermentation processes and industrial products of commercial importance
Unit I	**Bacteria**
Morphology, different shapes and arrangement, ultra structure. Reproduction of bacteria: Sexual reproduction - conjugation, asexual methods of reproduction. Types of nutrition in bacteria. Viruses – general morphology and ultra structure	
Unit II	**Fungi**
life cycle of typical fungi, identification. Rhizospere organisms- mycorrhiza- types and its advantages, VAM fungi. Edible and Ppoisonous mushrooms. Fungal toxins	
Unit III	**Food Microbiology**:
Physical and chemical composition of milk. Pasteurization. Dairy products. Manufacture of cheese. Microbial flora of fruit and vegetables	
Unit IV	**Industrial microbiology**
Fermentation technology; structure of bioreactor, aerobic and anaerobic fermentation. Production of ethanol, penicillin, vitamin B12 and industrial enzymes – cellulose and lipase	
Unit V	**Plant Pathology**
Bacterial diseases: Paddy blast and citrus canker. Fungal diseases: Tikka disease of ground nut and red rot of sugarcane. Viral diseases (bunchy top of banana). Diseases control methods (physical, chemical and biological)	
Text books	1. Tortora, G.J., Funke, B.R. & Case, C.L. Microbiology an Introduction. 13th Edition. Pearson Education, Inc. 2019. 2. Cowan, M.K. & Smith H. Microbiology: A Systems Approach. 5th Edition. Mc Graw Hill Edn. 2018. 3. Bauman, R. W. Microbiology: with diseases by body system 4th Edn. Pearson Education, Inc. 2015. 4. Stanbury, P.F., Whitaker, A. & Hall, S.J. Principles of Fermentation Technology, Butterworth-Heinemann publications. 2016. 5. Singh R.S. Introduction to Principles of Plant Pathology. 5th Edition. Medtech Publisher. 2017. 6. Dube H.C. Modern Plant Pathology.3rd Edition, Agribios, New Delhi. 2014. 7. Sharma, P. D, Plant Pathology. Rastogi Publishers New Delhi.2013.
Reference books	1. Talaro, K. P. & Chess, B. Foundations in microbiology. 10th Edition. Pearson Education, Inc. 2018. 2. Pommerville, J. C. Alcamo's Fundamentals of Microbiology, 11th Edition. Jones & Bartlett Learning. 2017. 3. Madigan M. T., Bender K.S., Buckley D.H., Sattley W.M., & Stahl D.A. Brock Biology of Microorganisms. Pearson Education, Inc. 2017. 4. Mehrotra R.S. Plant Pathology. 3rd Edition. McGraw Hill Education.2017.

E-References	1. https://nptel.ac.in/courses/102/103/102103015/ 2. https://nptel.ac.in/content/storage2/courses/102103013/pdf/mod7.pdf 3. https://WWW.researchgate.net/publication/340660994_Plant_Pathology_at_a_Glance 4. https://WWW.moscmm.org/pdf/Ananthanarayan%20microbio.pdf		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	have a better knowledge on structure, shapes and reproduction of bacteria and virus	**K1**
	CO2	identify and describe fungi and have knowledge on edible and poisonous mushrooms	**K2**
	CO3	know the production of dairy products and diversity of microorganisms in food products	**K2**
	CO4	understand fermentation technology and production of industrial products using microbes	**K2**
	CO5	describe causes and control measures for important plant diseases	**K3**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	S	M	S	S	S	M	S
CO2	S	S	S	S	S	M	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	M	M	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	M	S	S	M	S	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOT64	BIOSTATISTICS, BIOINSTRUMENTATION AND BIOPHYSICS	L	T	P	C
CORE-XVI			4	-	-	4

Cognitive Level	K2: Understand K3: Apply
Learning objective	• To know basic statistical analysis • To perform preparation table and graphs which are helpful in research studies • To know the principles and application of Instruments used in the field of Biology • To understand the concepts of Photobiology
Unit I	**Data collection & Graphical Representation**
Data collection, sampling, classification, tabulation and graphical representation. Significance of figures. Frequency distribution: Measures of central tendency, mean, median, mode, standard deviation and variance.	
Unit II	**Correlation and Regression**
Explanation, types of correlation – Positive and negative correlation. Methods of studying Correlation using Karl Pearson's Coefficient of Correlation. Chi-square test and student's T-test.	
Unit III	**Microscope & Centrifuge**
Principle and application of light, phase contrast, fluorescence, scanning and transmission electron microscopy, cytophotometry and flow cytometry. pH and buffers. Centrifugation: Basic principles and application of differential, density and ultracentrifugation.	
Unit IV	**Colorimetry**
Parts and functions of colorimeter. Beer Lambert's Law. Spectroscopy: UV-visible, spectroscopy. Principle, methodology and applications of thin layer chromatography and HPLC. Electrophoresis: Principle and applications of Native, SDS and agarose.	
Unit V	**Photobiology**
Electromagnetic spectrum, lLight emission, fluorescence, phosphorescence and bioluminescence. Bioenergetics - Laws of thermodynamics– High energy compounds– ATP bioenergetics.	
Text books	1. Chap T.Le. Eberly, L.E. Introductory Biostatistics, 2nd Edition, Wiley and Sons, Hoboken. 2016. 2. Veer Bala Rastogi, Biostatistics. 3rd edition. Medtech. 2015. 3. Biju Dharmapalan. Scientific Research Methodology. Narosa Publising House, New Delhi.2012. 4. Norman Bailey, T. J. Statistical methods in Biology. Cambridge University Press. 2012.
Reference books	1. Antonisamy B, Prasanna S. Premkumar, Principles and Practices of Biostatistics, Elsevier India.2017. 2. Hanmanth Rao, P and K. Janardhan, Fundamentas of Biostatistics. DreamTech Press, Chennai 2019. 3. Veerakumari, L. Bioinstrumentation, MJP Publisher, Chennai.2011. 4. Upadhyay, A., Upadhyay, K. & Nath, N. Biophysical Chemistry –Principles and techniques. Himalaya Publishing House. 2017. 5. Yeung, E. C. T., Stasolla, C., Sumner, M.J., Huang, B.Q. Plant Microtechniques and Protocols, Springer. 2015.

	6. Wilson, K. & Walker, J. Principles and Techniques of Biochemistry and Molecular Biology (Seventh Edition). Cambridge University Press, Yow York.2010.		
E-References	1. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3469943/ 2. https://nptel.ac.in/content/storage2/courses/102103044/pdf/mod2.pdf 3. http://Meb.mit.edu/5.33/WWW/lec/spec1.pdf		
Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	perform basic statistical calculations and representation of data in the form of table and figures	**K3**
	CO2	understand and do correlation and regression analysis	**K2**
	CO3	know the principles and applications of different types of microscopes and centrifuges	**K2**
	CO4	learn the components and procedure for the operation of spectroscopy, TLC, HPLC and SDS	**K2**
	CO5	understand the electromagnetic spectrum and thermodynamic principles	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	M	S	S	S	S	S
CO3	S	S	M	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S	S	M	S
CO5	S	S	M	S	S	S	M	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOP65	PRACTICAL -PLANT BIOTECHNOLOGY, ENVIRONMENTAL BIOLOGY,MICROBIOLOGY AND PLANT PATHOLOGY	L	T	P	C
CORE- XVII			-	-	5	4

Cognitive Level	K2: Understand K3: Apply
Learning objective	• To perform and understand procedure for plant tissue culture • To learn Staining of Bacteria • To understand different types vegetation • To find out important plant diseases
	1. Demonstrate the procedure for plant tissue culture 2. Demonstration of sterilization technique 3. Spotters related to Plant Ecology and Phytogeography Theory Paper 4. Gram's staining experiment 5. Plant Pathology – Citrus Canker, Red rot of Sugarcane, Paddy blast and Bunchy top of Banana 6. Spotters related to Microbiology and Plant Pathology 7. Preparation and submission of record note
Text books	1. L.M. Prescott, J.P. Harley and D.A. Klein, Mc Graw Hill, Boston. Microbiology Sixth edition.2005. 2. A.A. Salyers and B.D.Whitt. Microbiology – Diversity, Disease and the Environment, Fitzerald Scientific Press, Maryland.2001.
Reference books	1. Rangaswamy, G. Diseases of Crop Plants in India. Prentice Hall of India Pvt.Ltd.1972. 2. Manju Bala, Sunita Gupta and N.K. Gupta. Practicals in Plant Physiology and Biochemistry, Scientific Publishers, Delhi.2012
E-References	1. https://www.researchgate.net/publication/306018042_Microbiology_Laboratory_Manual 2. https://microbiologyonline.org/file/7926d7789d8a2f7b2075109f68c3175e.pdf 3. http://ndl.iitkgp.ac.in/document/Qkh4R2FGUkRNZjFicFUvMmpzQ2loUjc4dmd5U2dETTcrUno5d2wxwitxblN0MEt5NlNVYVpBUk8vcjNZQVlpMg 4. https://ncert.nic.in/textbook/pdf/ievs101.pdf

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	gain knowledge on mass multiplication of tissues	**K2**
CO2	handle instruments used for sterilization	**K2**
CO3	illustrate the methods used for vegetation analysis	**K2**
CO4	differentiate gram positive and negative bacteria using staining techniques	**K3**
CO5	identify the plant diseases and pathogens	**K3**

Mapping of COs with POs & PSOs:

CO	POs								PSOs				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO1	S	S	M	S	S	S	S	M	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S	S	S	M	S
CO3	S	S	M	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S	S	M	S
CO5	S	S	S	S	S	S	S	M	S	S	S	S	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOE641	FORESTRY	L	T	P	C
ELECTIVE IV			3	-	-	3

Cognitive Level	K1:Recall K2:Understand K3:Apply
Learning objective	• To know about Silviculture in forest • To understand the technique of measuring the trees by using various parameters • To comprehend the forest management system • To understand the importance of trees and ecological balance • To obtain the knowledge about economic values of timbers in forest.
UNIT – I	**Regeneration of forest**
Factors influencing vegetation- Regeneration of forest, methods of propagation, Grafting, nursery and Planting techniques – clear felling coppice and conversion systems – Silviculture management in India	
UNIT – II	**Survey of forest trees**
Methods of measuring diameter, girth, height and volume of trees form factors volume of estimation of stand annual increment, methods of forest survey - sampling methods and sample plots.	
UNIT – III	**Forest managements in India**
Sampling method and sample plot. Forest survey - map reading management of forest plantations - commercial forests - forest cover monitoring.	
UNIT – IV	**Agro forestry**
Scope and necessity, social / urban forestry. Tribal participation in forest management Soil conservation- causes of erosion. Water shed management and environmental function of forests.	
UNIT –V	**Harvesting Practices**
Logging and Extraction, non timber forest products - wood seasoning and preservation. Anatomical structure of wood - Defects and abnormalities, Timber identification. .	
Text Books	1. Tiwari KM and Singh RV.social forestry plantations. Oxford and IBH Publishing Co., New Delhi. 1980. 2. Stebbin EP A.Manual of Elementary Forest Zoology for India International Books Distributions Dehra Dun. 1977.

Reference Books	1. Puri GS. Meher VM Gupta RK and Puri S. Forest ecology Oxford and IBH Publishing Co., New York. 1981. 2. Sukachev V and Dlis N.Fundamentals of forest Biocenology, Oliver and Boyd Edinburgh. 1964. 3. Warning RH and schesinger WH. forest Ecosystems: concepts and Management Academic Press New York. 1985.
E-References	1. https://www.scientificpub.com/upload/pdf/486.pdf 2. http://drive.oiipdf.com/dl.php?f=487fb0d4-e754-469d-8b45-4b9929d8d58e.pdf&n=Ministry+of+Agriculture+and+Forestry:+Management+of+Biosecurity+Risks
Course out come	Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	acquire knowledge of factors influencing vegetation and its management	**K2**
CO2	know the technique of measuring the trees by using various parameters	**K2**
CO3	gain the knowledge of forest survey	**K2**
CO4	know the scope of agro forestry	**K1**
CO5	apply the harvesting practices and identification of timber	**K3**

Mapping of COs with POs & PSOs:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	M	M	S	S	S	M	M	M	M	S	S	M	M
CO2	S	M	S	S	S	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	M	S	M	S	S
CO4	M	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	M	S	S	M	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) -1 mark No Correlation (N) - 0 mark

Course Code	U21BOE642	SEED TECHNOLOGY	L	T	P	C
ELECTIVE - IV			3	-	-	3

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To know physical and mechanical seed separation. • To learn the functions of seed processing machines • To understand seed processing technology • To acquire knowledge on seed storage methods
Unit I	**Seed processing**
Importance of seed processing. Physical methods used to separate seeds. Preparing seeds for processing. Licensing of machines.	
Unit II	**Seed drying**
Importance and advantages of seed drying, methods of seed moisture measurements. Theory of seed drying (wet dry seeds). Advantages of mechanical drying equipments. Dehumidification and drying of heat sensitive seeds.	
Unit III	**Seed processing machines**
Principle, construction, working, adjustments, cleaning and uses of seed processing machines viz. i) Air screen cleaner cum grader ii) Specific gravity separator, aspirators, pneumatic aspirators, stoner iii)Roll mill iv) Magnetic separators and v) Spiral separators, dropper best separator, electrostatic separators.	
Unit IV	**Seed Treatment**
Principle, construction, working, adjustments and uses of Slurry seed treater, Mist-o- matic seed treater. Storage and labeling of treated seeds. Seed users safety. Seed conveyors and elevators.	
Unit V	**Seed storage**
Structures and their management: Packing and marketing of seeds, bagger weigher, bag closing, portable and conveyor type of bag closer. Labeling and maintaining lot identity, lot numbers, seed pellets, handling and stacking. Maintenance of seed processing record.	
Text books	1. Agarwal, L., Seed Technology.Oxford & IBH Publishing Co Pvt.Ltd, Delhi.2018. 2. S.M. Henderson & R. Perry. Agricultural process Engineering, Avi Publishing CoInc.; 3rd Revised edition.1976. 3. Carl W. Hall. Drying Farm crops, Agricultural Consulting Associates; 6th printing edition.1967. 4. A Chakravarty. Post Harvest Technology & cereals , oil seeds. pulses & Oxford &IBH Publishing Co Pvt.Ltd.1989.
Reference books	1. ICAR, Handbook of Agriculture, Directorate of Information and Publication of Agriculture (DIPA).1961. 2. Hunt D. Farm power & machinery management, Iowa State University Press. 1977. 3. Prem Singh and Arya. Vegetable breeding and seed production; Kalyani Publ.Ludhiana. 1999.
E-References	1. http://www.jnkvv.org/PDF/30032020194456Principles_of_Seed_Technology_Dr_Rudrasen_Singh.pdf 2. https://ir.library.msstate.edu/bitstream/handle/11668/13653/1960-15-CALIBRATING%20THE%20MIST-0-

	MATIC%20SEED%20TREATER%20AND%20WHY.pdf?sequence=1&isAllowed=y 3. http://www.jnkvv.org/PDF/17042020094358SEED%20TREATMENT.pdf

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	learn the physical separation of seeds and licensing of machines	**K2**
CO2	understand the seed drying process and nature of heat sensitive seeds	**K1**
CO3	learn the principles and operation procedure of major seed processing machines	**K2**
CO4	know the slurry and Mist-o-matic seed treater and seed user safety.	**K3**
CO5	attain knowledge on seed storage and packing of seeds	**K2**

Mapping of COs with POs & PSOs:

CO	POs					PSOs				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	M	S
CO3	S	S	M	S	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	S	M	S
CO5	S	S	M	S	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Course Title & Code	U21BOS641	HORTICULTURE TECHNIQUE AND PLANT BREEDING	L	T	P	C
SBE - IV			2	-	-	2

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To learn the cultivation of important fruit tree • To study and practice the grafting techniques • To make students interested in gardening • To learn the commercial production of Flowers
Unit I	**Horticulture**
Importance and Scope of Horticulture, Classification of horticultural crops – fruits and vegetable crops. Basic climatic, soil, Water and nutritional requirements of horticultural crops. Cultivation of important fruit trees – Mango and Banana.	
Unit II	**Plant propagation methods**
cutting, layering, grafting, budding, stock-scion relationship. Use of plant growth regulators in Horticulture. Garden designs, types of gardens – formal, informal and kitchen garden, units of garden.	
Unit III	**Garden maintenance**
weeding, top dressing methods of pruning, topiary. hedge, border, topiary arches. Lawn making: types of lawn grasses and maintenance.	
Unit IV	**Floriculture**
Cultivation of commercial flowering plants – Rose, Jasmines and Chrysanthemum. Nursery maintenance. Cut flowers and flower decoration arrangement.	
Unit V	**Principles and objectives of plant breeding**
Selection methods, (pure line, clonal, mass) Hybridization: Types and procedure for hybridization. Somatic hybridization: Heterosis, hybrid vigor. Anther culture and its role in plant breeding.	
Text books	1. Gupta, S. N. Handbook of Horticulture, 1st Edition, Jain Brothers. 2018. 2. Shry, C. & Reiley. Introductory Horticulture; 9th Edition. Cengage Learning. 2016. 3. Singh, J. Fundamentals of Horticulture, Kalyani Publishers. 2014. 4. Chopra, V. L. Plant Breeding Theory & Practice Oxford & Ibh Publishing Co Pvt Ltd.2012.
Reference books	1. Tiwari A.K. and R. Kumar Fundamentals of Ornamentals, Horticulture and Landscape Gardening. New India Publishing Agency, New Delhi.2012. 2. Peter K. V. Basics of Horticulture. New India Publishing Agency, New Delhi. 2015. 3. Reddy, M. and A. Rao, Plant Breeding in Horticulture. Pacific Book International, NewDelhi.2010.
E-References	1. https://ncert.nic.in/textbook/pdf/ievs101.pdf 2. https://agritech.tnau.ac.in/pdf/HORTICULTURE.pdf 3. https://agriicarjrf.com/Mp-content/uploads/2018/07/Instant-horticulture.pdf

	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
Course outcome	CO1	classify fruits and vegetables and also understand the cultivation of mango and banana	**K1**
	CO2	develop skill in horticulture techniques like grafting, layering, budding and garden designing	**K2**
	CO3	maintain garden and access skills on lawn making	**K3**
	CO4	cultivate commercial flowers and flower decoration	**K3**
	CO5	know the plant breeding process and method of hybridization	**K2**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S	S	S	S
CO2	S	S	M	S	S	S	S	M	S	S	S	S	S
CO3	S	S	S	S	S	M	M	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	M	S	S	M	S	M	S	S	S	M	S

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark No Correlation (N) - 0 mark

Course Code	U21BOS642	MICROTECHNIQUE AND HISTOCHEMISTRY	L	T	P	C
SBE - IV			2	-	-	2

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To know the scope of histochemistry in biological application • To understand the technique used for killing and fixing of tissues • To know the preparation of specimen for light microscope and electron microscope • To understand methods used for the detection of primary and secondary metabolites
Unit I	**Histochemistry:**
Scope of histochemistry in Biology. Killing and Fixing;Principles and techniques of killing and fixing; properties of reagents; properties and composition of important fixatives - Carnoy's Fluid, FAA, FPA, Chrome acetic acid fluids, Zirkle- Erliki fluid.	
Unit II	**Tissue dehydration**:
Reagents, infiltration and embedding; hand and serial sections, squashes, smears and maceration. Mounting: Techniques, common mounting media used - DPX, Canada balsam, Glycerin jelly and Lacto phenol. Cleaning, labeling and storage of slides.	
Unit III	**Microscope:**
Tissue processing technique for light microscope and electron microscope. Microtomy-Rotary, Sledge, Freezing, Cryostat and Ultratome.	
Unit IV	**Stains:**
Classification and chemistry of biological stains. General and specific vital stains and flurochromes. Micrometry, camera lucida, photomicrography.	
Unit V	**Detection and localization of primary metabolites:**
Carbohydrates (PARS reaction), Proteins (Coomassie brilliant blue staining), Lipids (Sudan Black method). Detection and localization of secondary metabolites- alkaloids, terpenoids, phenolics.	
Text books	1. Yeung E.C.T., Stasolla C., Sumner M. J. & Huang B. Q. Plant Microtechniques and Protocols. Springer Nature.2015. 2. Prasad M. K. & Prasad M. K. Emkay Publications 2000. 3. Kierman, J.A. Histological and Histochemical Methods. Butterworth Publ. London. 1999.
Reference books	1. Toji Thomas Essentials of botanical microtechnique (II Edn). Apex infotech publishing company. 2005. 2. Ruzin, Z. E. Plant Microtechnique and Microscopy. Oxford Press, New York. 1999.
E-References	1. .https://www.researchgate.net/publication/309118583_Techniques_in_Anatomy_Cytology_and_Histochemistry_of_Plants

Course outcome

Upon completion of this course, the students will be able to

CO	Course Outcomes	Knowledge Level
CO1	know the properties and composition of different fixatives	**K1**

	CO2	describe the principle and working mechanism of microtome	**K2**
	CO3	prepare permanent slides for different tissues	**K3**
	CO4	understand different mounting media	**K2**
	CO5	know the different types of sectioning	**K3**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	M	S	S	M	M	S	S	S	S	M	S
CO2	S	S	M	S	S	S	S	S	S	S	S	M	S
CO3	S	S	M	S	S	M	S	M	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S	S	M	S
CO5	S	S	M	S	S	M	M	S	S	S	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (M) - 1 mark
No Correlation (N) - 0 mark

Course Code	U21BOV51	SPIRULINA CULTIVATION	L	T	P	C
VALUE ADDED COURSE			2	-	-	2

Cognitive Level	K1: Recall K2: Understand K3: Apply
Learning objective	• To understand the need of non-conventional food • To know about the application of SCP and mass cultivation of spirulina • To become successful SCP entrepreneur
Unit I	**Algal biomass as non- conventional food**
Introduction, Concept and need, Advantages, disadvantages and Sources of non-conventional food	
Unit II	**Introduction to SCP production**
Historical use and rediscovery of *Spirulina* importance – morphology, taxonomy and habitat of *Spirulina* – biochemical composition including proximate composition – amino acids – unsaturated fatty acids – minerals and vitamins. Human health benefits of *Spirulina*.	
Unit III	**Spirulina cultivation - single cell protein**
SCP--Introduction, Systematic position, thallus structure, Merits of Spirulina cultivation, Methods of cultivation- Small scale cultivation, Mass cultivation, Harvesting of Spirulina, Flow chart of Spirulina cultivation, Limiting factors for Spirulina cultivation, Spirulina products –Powder, Biscuits, Tablets	
Unit IV	**Spirulina cultivation steps**
Principle, Requirement, chemicals, Sample or Inoculum of Spirulina, procedure (steps involved in Spirulina cultivation), observations, Harvesting, results and records, precautions Visit to a Spirulina cultivation laboratory in nearby area (Students are expected to prepare a model of Spirulina cultivation laboratory, a visit report and to submit the same at the time of practical examination.	
Unit V	**Spirulina cultivation**
Natural production – laboratory cultivation – small scale commercial production – commercial and mass cultivation (tank construction, culture medium, strain selection, scaling up of the process) – importance of light and pH in *Spirulina* cultivation – harvesting, drying and packing	
Textbooks	1. UmarBacha, Muhammad Nasir, Single Cell Protein: Production && Evaluation for Food Use Evaluation for Food Use,Lambert Publication,2011 2. Robert Henrikson,Spirulina - World Food: How this micro algae can transform your health and our planet,2010 3. Amos Richmond ,Qiang Hu, Handbook of Microalgal Culture: Applied Phycology and Biotechnology,Wiley,2013
References	1. Paul M. Coates, Joseph M. Betz, Marc R. Blackman Encyclopedia of Dietary Supplements, 2010. 2. Biswas S., Datta M. and Ngachan S.V, Mushrooms: A Manual for

	Cultivation, PHI, 2012. 3. Aaron Baum, Grow Your Own SpirulinaSuperfood: A Simple How-To Guide Kindle Edition, 2013. 4. Aaron Baum, Grow Your Own Spirulina Superfood: A Simple How-To Guide, 2013. 5. Selvendran D, Large Scale Algal Biomass (Spirulina) Production in India. In: D. Das Algal Biorefinery: An Integrated Approach, Springer. 2015.
E-references	1. https://www.researchgate.net/publication/329170462_IPR_Biosafety_Bioethics 2. https://biocyclopedia.com/index/biotech_biosafety_ipr_ipp.php 3. https://link.springer.com/chapter/10.1007/978-981-10-2961-5_14

Course outcome	Upon completion of this course, the students will be able to		
	CO	**Course Outcomes**	**Knowledge Level**
	CO1	understand the need of algal mass	**K1**
	CO2	get knowledge on morphology, taxonomy biochemical aspects of spirulina	**K2**
	CO3	understand the various methods involved in spirulina cultivation	**K2**
	CO4	learn the techniques of of spirulina cultivation for SCP production	**K3**
	CO5	get thorough knowledge on natural production, mass cultivation and process	**K3**

Mapping of COs with POs & PSOs:

CO	**POs**								**PSOs**				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**1**	**2**	**3**	**4**	**5**
CO1	S	M	S	S	S	S	M	S	S	S	S	S	M
CO2	S	S	S	M	S	M	S	S	M	S	S	M	S
CO3	M	M	S	S	M	S	M	S	S	M	S	S	M
CO4	S	S	S	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	S	M	S	S	M	S	M	S	M

Strongly Correlating (S) - 3 marks Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark No Correlation (N) - 0 mark

Department of Geography

M. Phil. Geography (Full Time) Programme

(For the candidates admitted from the academic year 2008-2009 onwards)

Syllabus (Semester – I & II)

Semester - I	Title of the Course	Marks			Credits	Hours
		IA	UE	TOTAL		
Core - 1	Research Methodology	40	60	100	4	
Core - 2	Quantitative Techniques in Geography	40	60	100	4	
Core - 3	Professional Skills	40	60	100	4	

Semester - II	Title of the Course	Marks			Credits
		IA	UE	TOTAL	
Core - 5	Elective (Any one) *i) Water Resources* *ii) Disaster Management* *iii) Land Evaluation* *iv) Agro Climatology* *v) Urban Studies*	40	60	100	4
Dissertation	Dissertation and Viva-Voce Dissertation – 150 Viva-Voce – 50	200 (150 + 50)			8

Question Paper Pattern (Course I – IV)

The candidate has to answer **five** questions out of the **eight** questions (5 x 12= 60)

Grading of Dissertation: As done for other regular M.Phil. Courses offered in MTWU

Elective Subject: One from the elective papers list may be selected by the students depending on the area of their research

Teachers: Only teachers with Ph.D. or M.Phil. Qualification and having atleast two years of teaching PG courses can handle classes and guide the Dissertation work.

Pass Percentage: 50% of the marks in Subjects.

Eligibility of Admission: Candidates who have completed M.Sc (Geography) and having atleast 55% of marks in their PG course are eligible for admission.

Note: Only degrees obtained after 10+2+3+2 years for M.Sc will be considered.

Question Pattern

Title of the Paper

Time: 3Hrs Max: 60 Marks

Answer any five Questions

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

M.Phil GEOGRAPHY

(2015-16 Onwards)

SEMESTER - I

CORE – I - RESEARCH METHODOLOGY

Unit 1: **Meaning of Research:** Need for scientific research – types of research – approach to geographical research: traditional and scientific – identification fields, sub fields and themes.

Unit 2: **Logic in Research**: Hypotheses, concepts and facts, principles, law, theory and their implications in geographical research – the science of geography – role of models – research trend in geography.

Unit 3: **Research Design**: Selection of the topic – statement of the problem – formulation of hypotheses, testing of hypotheses. – time schedule – literature survey and role of internet and bibliography.

Unit 4: Data Acquisition and Analysis: Collection of data – sources of data: primary and secondary – structuring the data – data transformation – sampling techniques – interpret the results - quantitative revolution in geography.

Unit 5: **Thesis Writing:** Organization of the thesis: the preliminaries, the text and the reference materials – drafting of thesis: first, second and final – final evaluation – language and presentation (form and style) – writing of abstract, research papers for seminar and journal publications.

References:

1. Anderson, J., Durston, B.H. and Poole, M., (1970). Thesis and Assignment Writing, Wiley Eastern Ltd., New Delhi.
2. Cooray, P.G., (1992). Guide to Scientific and Technical Writing, Hindagala, Srilanka.
3. Davis, J.C., (1986). Statistics and Data Analysis in Geology, John Wiley & Sons, New York.
4. Davis, W.K.D., (1972). The Conceptual Revolution in Geography, University of London Press Ltd., London.
5. Hammond, R. and McCullagh, P., (1978). Quantitative Techniques in Geography: An Introduction, Clarendon Press, Oxford.
6. Hanag, L.L., and Lounsbury, J.F., (1971). Research Methods in Geography, Brown Company Publishers, Iowa.
7. Kothari, C.R., (1990). Research Methodology: Methods and Techniques, Wishwa Prakasha, New Delhi.
8. Misra, R.P., Research Methodology: A Hand book, Concept Publishing Company, New Delhi.

9. Norcliffe, G.B., (1982), Inferential Statistics for Geographers: An Introduction, Hutchinson, London.
10. Yeats, M.H., (1974). An Introduction to Quantitative Analysis in Human Geography, Mc Graw Hill, New York.

SEMESTER I

CORE - II QUANTITATIVE TECHNIQUES IN GEOGRAPHY

Unit 1: Development of Geographical Method: Science of geography – use of mathematics – transformation of space – perception and decision making in geography.

Unit 2: Data Collection: Sources of data - approaching a geographical problem – Sampling – Data collection methods - geographical research projects – aim, method and implications – sources and problems in collecting data.

Unit 3: Data Description and Presentation: Nature of geographical data - describing numerical distribution – point, line and shapes - classifying data – mapping distributions – mapping flows - symbols and graphs.

Unit 4: Data Use and Interpretation: Probability - hypothesis testing – inferential tests - estimates form samples – correlation – regression

Unit 5: Data Processing: Geographical data explosion – use of computers in data processing – spatial and non-spatial data – modern methods in spatial data collection, correction and verification – image processing – information extraction – GIS layers – multi criteria approach - information synthesis

References:

1. FitzGerald Brain P (1974) Development in Geographical method, Science in Geography – 1, Oxford University Press, Oxford.
2. Doaugherty Richard (1974) Data Collection, Science in Geography – 2, Oxford University Press, Oxford.
3. Davis Peter (1974) Data Description and Presentation, Science in Geography - 3, Oxford University Press, Oxford.
4. McCullagh Patrick (1974) Data Use and Interpretation, Science in Geography – 4, Oxford University Press, Oxford.
5. Kumaraswamy. K (2005) Remote Sensing for Environmental Studies, Department of Geography, Bharathidasan University, Tiruchirappalli
6. Lillesand T. M and R. Kiefer, (1987) Remote Sensing and Image Interpretation, Third Edition, John Wiley and Sons, New York.
7. Burrough P A and P A McDonnell (2000) Principles of Geographical Information systems, Oxford University Press, London.

SEMESTER – I

CORE - III REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM

Unit 1: Geoinformatics: Meaning – components – quantitative revolution – geographic data matrix – developments – application trends.

Unit 2: Remote Sensing: Meaning – definition – remote sensing system – development of aerial and satellite remote sensing – photogrammetry – types of satellites – resolution aspects – applications.

Unit 3: Digital Image Processing: Pixel – DN values – spectral reflectance curve – preprocessing – geometric correction and radiometric correction – classification – unsupervised – supervised – ground truth data collection – applications.

Unit 4: Geographical Information System: Definition – components – developments – projection system – raster and vector data format – GIS analysis – Single and multilayer – network – Digital Elevation Model (DEM) – virtual GIS – applications.

Unit 5: Global Positioning System: Definition – development – segments – space, control and user –positing methods advantages and limitations - applications

References:

1. Sobins F. F. Jr (1987) Remote Sensing: Principles and Interpretation, Second Edition, W. H. Freeman and Company, New York.
2. Kumaraswamy. K (2005) Remote Sensing for Environmental Studies, Department of Geography, Bharathidasan University, Tiruchirappalli.
3. Lillesand T. M and R. Kiefer, (1987) Remote Sensing and Image Interpretation, Third Edition, John Wiley and Sons, New York.
4. Burrough P A and P A McDonnell (2000) Principles of Geographical Information systems, Oxford University Press, London.
5. Haywood.L, Comelius.S and S. Carver (1988) An Introduction to Geographical Information Systems, Addison Wiley Longmont, New York.
6. Agarwal N.K (2006) Essentials of GPS, Second Edition, Geodesy and GPS Publishers, Hyderabad.
7. Ganesh A., and R. Narayanakumar (2006) GPS Principles and Applications, Satish Serial Publishing House, New Delhi.

SEMESTER II

AREA PAPER – I POPULATION GEOGRAPHY (Optional)

Unit 1: Nature, scope and significance of population geography – Source of population data – Reliability of population data. Distribution and density of world population – Factors and pattern distribution

Unit 2: Dynamics of population – Fertility – Its measures and determinants and world pattern – Mortality – Its measures and determinants and world trend – world population growth and its trend – Theories of population growth – Malthus, Ricardo and Marx – Migration types – Determinants– Consequences of migration – Laws of migration – Policies of migration

Unit 3: Population composition characteristics – Age, Sex, Rural, Urban, Occupation Education – Population resources relationship – Population resources region, Population policies.

Unit 4: Population – Development – Environment Interrelations – A Geographical Overview of World population – Population of India – Features and Trends – The Working population – The main occupation types and their Evolution.

Unit 5: Population – Impacts of development and disaster – Issues and Strategies – Disaster reduction strategies.

References

1. Chandna R.S – Geography of population concepts, Determinants and pattern, Kalyani Publishers, New Delhi, 1980.
2. Clark John. I. – Population Geography, Pergamon Press Ltd. Oxford,1981
3. Gosh, B.N – Population Geography, Sterling Publication, 1987
4. Beauji – Garneir.J. – Geography of population, Longman group Ltd,1978
5. Mohammad Izhar Hassan – Population Geography, Rawat Publications, New Delhi, 2009.
6. Kayastha, S.L. – Geography of Population, Rawat Publications, New Delhi, 2007
7. Siya Ram Sharma – Population Geography, Murari Lal & Sons, New Delhi, 2008.
8. Asha.A.Bhende & Tara Kanitkar – Principles of Population Studies, Himalaya Publishing House,1978

SEMESTER II

AREA PAPER – II URBAN GIS (Optional)

Unit 1: Basis Concept: Urban– Urban morphology – Urban hierarchy– Urbanization process conceptual modeling of urban process –Urban indicators and monitoring – Urban information system.

Unit 2: Data Source and Collection: Platforms- scale and resolution – Scope and limitations – Interpretation from Areal and satellite images–GPS survey for urban data collection – Cadastral data – Mobile mapping lidar, digital image processing technique; Image classification– Image fusion – Feature extraction.

Unit 3: Urban Mapping: Urban infrastructure – Utility mapping – Change analysis – 2D and 3D – CBD – Fringe dynamics – Slums – Urban Sprawl.

Unit 4: Urban administration : Municipal and local administration – Electoral application – Solid waste management – Water supply and sanitation – Recreation site identification – Network analysis – Optimum route / Shortest route – Traffic and parking studies – Accident analysis – Vehicle tracking – Case studies.

Unit 5: Urban Management : Community based planning – Social service delivery – Environmental quality – Healthcare services – Homeland security – Emergency management and disaster response – Archaeology – location based services (LBS) – Virtual 3D city modeling and applications.

References:

1. Jean – Paul Donnay, Mike J Barnsely and paul A Longley., (2001) Remote sensing and urban anlaysis, Taylor and Francis, London.
2. Harold Carter.., (1995) The Study of urban Geography, Arnold, A Division of HodderHeadline, PLC, London.
3. Sokhi BS and Rashid S M., (1999) Remote sensing of Urban Environment. Manak publication Private Limited.
4. William E Huxhold., (1991) an Introduction to Urban Geographic Information Systems. Oxford University Press.
5. Timothy.L.N and Piotr Jankowski (2010) Regional and Urban GIS A Decision Support Approach, The Guilford press, Newyork.
6. Julina and John Ziegler (2006) GIS for the Urban Environment, ESRI Press, Redlands, USA.
7. Cory Fleming Ed. (2005) the GIS Guide for Local Government Officials, ESRI Press, Redlands, USA.
8. Ayse Pamuk (2006) Mapping Global Cities, GIS Methods in Urban Anlaysis, ESRI Press, Redlands, USA.

SEMESTER II
AREA PAPER – III LAND EVALUATION (Optional)

Unit I **The nature and principles and process of land evaluation: LE definition, Actors, need, aim, objectives land evaluation and land use planning, principles, land evaluation process, approaches , levels of detail: frame work, guidelines evaluations.**

Unit II **Concepts : Land use and land utilization Types, land resources survey: Physical, economical and social, levels of intensity , selection of land units (genetic and Parametric) Land qualities and land characteristics , land use requirements : crop requirements, management requirements and conservation requirements , land qualities and their assessment, matching of LUR and LQ land evaluation table, comparison of land use with land , land improvements , structure of the suitability classification.**

Unit III **GIS and Land Resource Survey: Land capability, physical land suitability, soil erosion and model, groundwater suitability, watershed and land use planning: database – thematic layers – weightage , ranking and rating scale – integration – suitability classification, decision making.**

Unit IV **GIS and Agricultural land use: Crop suitability for irrigated and rain fed agriculture (Rice, Banana, Groundnut and cotton) agro climatic land suitability, forestry and grazing: database – thematic layers – weightage , ranking and rating scale – integration – suitability classification, decision making.**

Unit V **GIS and Non – agricultural land use : wildlife conservation, tourism development urban fringe development : database - thematic layers – weightage , ranking and rating scale – integration – suitability classification, decision making.**

References:

Christian, C.S., (1957).The conclpt of land uints and land system, Proc. 9th pacific science congress, 20: 74 -81

SEMESTER II

AREA PAPER – IV DISASTER STUDIES (Optional)

Unit 1

Disaster and GIS: Meaning and types of hazards, disasters and catastrophes- Disaster management; Earthquakes: causes and effects-measurements-earthquake zones of the world and in India-vulnerability and microzonation; Volcanoes: Causes and effects- Volcanic zones of the world and in india-Volcanic hazards; landslides: Causes and effects- landslide prone zones in India- Gis case studies for earthquake, Volcano and landslide.

Unit 2: Cyclone and Flooding: Cyclone: Origin and types- effect on land and sea-damage assessment; Flooding: Topography, land use and flooding – space-time integration –GIS based parameters and layers – flood prone area analysis and management – risk assessment – GIS case studies for cyclones and floods.

Unit 3: Drought and Desertification : Drought : Types – factors influencing drought – variable identification – vegetation index – land use / ground water level changes – soil erosion – delimiting drought prone areas – short term and long term effects – Desertification : processes – over utilization of water and land resources – GIS based management strategies–GIS case studies for drought and desertification.

Unit 4: Anthropogenic Disasters: Atmospheric disasters **:** ozone layer depletion – green house / global warming– acid rain – snow melt – sea level rice – related problems ; Nuclear, Chemical / Industrial and Mining disasters: Types – consequences – major disaster of the world and India ; marine Disasters : Oil spill and chemical pollution – coastal erosion and deposition – coastal Zone management strategies – GIS case studies for anthropogenic disasters.

Unit 5: Biological Disasters and Disaster Management Issues: Diseases and human health: Epidemics– disease spread– GIS analysis; ecological degradation– bio-diversity loss– population extinction– conservation; Biodiversity Gap Analysis; Coral / mangrove depletion– forest fire impacts– overlay analysis– GIS in environmental modeling– GIS case studies; Disaster Management: United Nations, Central and state Governments of India in Disaster Management – Institutional and Policy Framework- Disaster Prevention and Mitigation- Preparedness.

References:

1. National Disaster Management Division(2004) Disaster Management in India- A Status Report, Ministry of Home Affairs, Government of India, New Delhi
2. Matthews, J.A., (2002) Natural Hazards and Environmental Change, Bill McGuire, Ian Mason.

3. Skeil, A (2002) Environmental Modeling with GIS and Remote sensing, John wiley and sons, New York.
4. Singh, R.B (Ed.) (1996) Disasters, Environment and Development, Oxford & IBH, New Delhi.
5. Barrett E.C., and L.F.Curtis,(1992)Introduction to Environment Remote sensing, Chapman and Hall, London.
6. UNDRO(1995) Guidelines for Hazard Evaluation Procedures, Unites Nations Disaster Relief Organization , Vienna.
7. Nagarajan,R,. (2004) Landslide Disaster Assessment and Monitoring, Anmol Publication, New Delhi
8. RamKumar, Mu., (2009) Geological Hazards; Causes, Consequences and Methods of Containment, New India Publishing Agency, New Delhi.

SEMESTER II
AREA PAPER –V WATER RESOURCES (Optional)

UNIT – I

Introduction: Hydrology – development of scientific of hydrology - importance of water – occurrence of water – hydrological cycle, precipitation – variation in precipitation distribution - analysis and interpretation of precipitation data - areal assessment of precipitation.

UNIT – II

Evaporation and Evapotranspiration: Concept of potential evapotranspiration – factors controlling evapotranspiration - measurements of evaporation and evapotranspiration – computation – relationship between actual and potential evapotranspiration – spatial variation – interception process – determination of interception – variations.

UNIT – III

Groundwater: Infiltration process – methods of determining infiltration rate – soil moisture – measurement – variations – groundwater – origin and occurrence – storage – types of aquifers – groundwater movement – groundwater level – groundwater quality – Mapping methods.

UNIT – IV

Water Resources Management: Approaches to planning and development of water resources – evaluation of surface water resources and groundwater – assessment of water quality for various uses – water supplies and utilization – problems – policies and management.

UNIT – V

Application of GIS in Water Resources: GIS for surface water modeling – groundwater modeling - flood plain mapping – water quality monitoring – water resource planning and management – Hydrologic Information System.

References:

1. Ayodade, J. O., (1988) Tropical Hydrology and Water Resources, Macmillan Publishers, London.
2. Olson, R.E., (1970) A Geography of Water Resources, WMC Brown Company Publishers, Iowa.

3. Rao, K. L., (1975) India's Water Wealth: Its Assessment, Uses and Projections, Orient Longman, New Delhi.
4. Sewell, W.R.D., (1975) Geography of Water Resources, Prentice Hall, New York.
5. Todd, D.K., (1959) Groundwater Hydrology, McGraw Hill Book Company, New York.
6. UNESCO (1978) World Water Balance and Water Resources of the Earth, UNESCO, Leningrad.
7. Ward, R.C., (1970) Principles of Hydrology, McGraw- Hill Book Company, London.
8. Lyon, J.C., (2003) GIS for Water Resource and Watershed Management, Taylor and Francis, New York.

SEMESTER II
AREA PAPER –VI AGRO CLIMATOLOGY (Optional)

Unit1: Remote sensing in Meteorology – Meteorological satellite characteristics – TIROS, NIMBUS, NOAA – TIROS N, SEASAT , GOES, METEOSAT, INSAT-Role of LANDSAT, SPOT and IRS – In collecting meteorological – Agricultural data – Atmospheric temperature retrieval techniques and surface radiation studies – Wind measuring techniques from satellite data.

Unit2: Satellite Remote Sensing System in Cloud classification– Rainfall monitoring methods: Cloud indexing method, Life –history method and Bio-spectral methods – Interpretation of Satellite meteorological images for weather and cyclones – Rainfall forecasting.

Unit 3: Remote Sensing in drought analysis and mapping: Aridity and drought measurement methods – Estimation of soil moisture and evapotranspiration – Spectral behavior of different crops and vegetation in VIS, NIR, MIR, TIR and Microwave regions – Vegetation indices.

Unit4: Remote sensing in crop identification and area estimation – Sampling techniques – Vegetation indices and crop yield modeling – Monitoring – Assessing crop water availability – Crop stress assessment and monitoring – Nutrient estimation and management strategies.

Unit 5: Water management – Demand and utilization pattern – Water shed – Command area – Precision agriculture – Crop calendar and crop suitability analysis – Suitable land use practices – Integration field and remote sensing data.

References

1. Applied Remote Sensing C.P.L.O., Longman scientific and Technical Publications.
2. E.C. Barrett & L.F. Curtis, Introduction to Environment Remote Sensing, Chapman and Hall, London.
3. Engman, E.T. And Gurney, R.J. Remote Sensing in Hydrology.
4. Govardhan, V. Remote Sensing in water management in command areas.
5. M.D. Steven and J.A. Clark, Applications of Remote sensing in Agriculture.
6. Bramdi, Henoy Willnois; Air Weather service, 1976. Satellite metrology
7. Stanley Q. Kidder and Thomas, H. Vonder Haar satellite Meterology –An Introduction, – oxlando, Academic Press, 1995.
8. The use of satellite data in rainfall monitoring, E.C. Barrett and D.W Martin, Academic Press, New York.

SEMINAR: 5 MARKS (EACH 1 MARK)

- SUBJECT MATTER
- COMMUNICATION SKILL
- LOGICAL PRESENTATION
- RESPONDING TO QUESTIONS
- USAGE OF TEACHING AIDS

- To finalize the marks for test, three internal examinations will be conducted and average of best two internal marks will be computed. The internals shall be conducted for 50 marks and shall be converted to 15.
- The final marks will be computed by adding up the marks for test with the assignment, seminar and attendance. The marks in fraction will be rounded off.
- Dissertation viva voce examination will be held along with university practical examination to ascertain the knowledge of the candidate in their research work.
- The semester exam will be conducted at the end of semester.

INTERNAL EXAMS QUESTION PATTERN (M.PHIL)

2 Questions * 15 marks = 30 MARKS

UNIVERSITY EXAMS QUESTION PATTERN (M.PHIL)

5 (Either or) Questions * 12 marks = 60 MARKS

DISSERTATION EVALUATION CRITERIA

Dissertation Evaluation	-	100 Marks
Internal	-	100 Marks
External	-	100 Marks

Average of Internal and External will be taken for Evaluation

Split Up for Internal	- 100 Marks
Topic Approval	- 100
Synopsis	- 10
Review I	- 20
Review II	- 20
Review III	- 20
Final Review	- 20

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL – 624102

SYLLABUS (2021-2022)

M.Sc GEOGRAPHY
(CHOICE BASED CREDIT SYSTEM)
(Full Time)

SYLLABUS, REGULATION AND SCHEME OF EVALUATION

Mother Teresa Women's University, Kodaikanal
Department of Geography
Choice Based Credit System (CBCS)
(2021-2022 onwards)
M.Sc. Geography

1. About the Programme

The Masters Programme hosted in the Department of Geography is designed to reflect the knowledge of theories, concepts, techniques and technologies in human and physical aspects of geography. Geography is the study of physical environments and human habitats. It deals with people and places. It covers issues such as global warming and climate change, food and water resources, management of ecosystems, human modifications of land, regional economic disparities, and urban infrastructure from various theoretical positions. Both a physical and a social science, it provides a unique opportunity to obtain a broad exposure to modes of analyzing the many ecological and cultural problems of contemporary society. The department is based in the Faculty of Science, Technology and Education and offers degrees at the Masters (M.Sc.), and Research (Ph.D.) levels.

The department's master's programme – "Master of Science in Geography", is a two-year program, spread over four semesters. The 'Master of Science in Geography' programme offered by the department, "aims at empowering students with knowledge and skills for spatial thinking and analysis, to navigate real world problems, and contribute to society in a meaningful way".

Eligibility:

A candidate who has passed B.Sc degree in Geography course of this university or any other university accepted by the syndicateas equivalent there subject to such conditions as may be prescribed therefore, will be eligible for admission to the M.Sc coursein Geography.

General Guidelines for PG Programme:

Duration: M.Sc in Geography course shall extend through a period of 4 consecutive semesters and duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

Medium of instruction: English

Evaluation:

Evaluation of the candidates shall be through Internal and External assessment. The ratio of formative and summative assessment should be 25:75 for both Core and Elective papers.

Evaluation Pattern

	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**13**	**25**	**13**	**25**
External	**38**	**75**	**38**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz (5) = 25**
- **External Theory: 75**

Question paper in External examination for core and elective papers carrying 75 marks will be in the format below: (3 hours)

S.No	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions, 2 Questions from each Unit	**10**
2	**B**	**5*4=20** (From each Unit either or Choice)	**20**
3	**C**	**3*15=45** (Open Choice) (Any three Question out of 5, one Question from each Unit)	**45**
Total			**75**

Project Report

A student should select a topic for the Project Work at the end of third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages.

Evaluation:

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks, Viva: 75 Marks)

Minimum credits required to pass - 90.

4. Classification of Successful candidate:

% of Marks scored	Division
50 – 59	Second class
60 – 74	First class
75 and above	First class with Distinction

5. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination, Students who have earned 74% to 71% of attendance to be applied for condonation in the prescribed form with the prescribed fee. Students who have earned 70% to 65% of attendance to be applied for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Students who have attended below 65% are not eligible to appear for the examination and they shall re-do the semester(s) after completion of the course, with the prior permission of the Controller of the Examination, and The Registrar of the University.

6. Any Other Information:

In addition to the above regulations, any other common regulations pertaining to the PG Programmes are also applicable for this programme.

Maternity Leave – The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and The Registrar.

M.Sc GEOGRAPHY CURRICULUM

Sl. No	Course Code	Course Title	Credits	Hours		CIS	ESE	Total
				L	P			
SEMESTER – I								
1	P21GET11	Core I –Advanced Geomorphology	4	5	-	25	75	100
2	P21GET12	Core II –Applied Climatology	4	5	-	25	75	100
3	P21GET13	Core III –Hydrology and Oceanography	4	5	-	25	75	100
4	P21GET14	Core IV – Geography of India	4	5	-	25	75	100
5	P21GEP11	Core V –Practical – I – Terrain and Climatic Data Analysis	4	-	6	25	75	100
6	P21CSS11	Supportive course I – Lab – Computer Skills for Web Designing and Video Editing	2	-	4	25	75	100
		TOTAL	**22**	**30**				**600**
SEMESTER – II								
1	P21GET21	Core VI – Agricultural Geography	4	5	-	25	75	100
2	P21GET22	Core VII – Urban Geography	4	5	-	25	75	100
3	P21GET23	Core VIII – Medical Geography	4	4	-	25	75	100
4	P21GET24	Core IX – Transport Geography	4	4	-	25	75	100
5	P21GEP22	Core X – Practical– II Socio Economic Data Analysis	4	-	6	25	75	100
6	P21GEN21	Elective I – NME– Geography of India for Competitive Examinations	4	4	-	25	75	100
7	P21GES22	Supportive Course II – Lab – Application of GIS and GPS	2	2	-	25	75	100
		TOTAL	**26**	**30**				**700**
SEMESTER – III								
1	P21GET31	Core XI – Geographical Thought	4	5	-	25	75	100
2	P21GET32	Core XII – Remote sensing, GIS and GPS	4	5	-	25	75	100
3	P21GET33	Core XIII – Cartography and Quantitative method	4	5	-	25	75	100
4	P21GET34	Core XIV – Population Geography	4	5	-	25	75	100
5	P21GET35	Core XV – Research Methodology	4	4	-	25	75	100
6	P21GEP33	Core XVI– Practical – III – Cartography and Geo informatics	4	-	4	25	75	100
7	P21WSS33	Supportive Course III– Women Empowerment	2	2	-	25	75	100
		TOTAL	**26**	**30**				**700**

SEMESTER – IV								
1	P21GEE411/ P21GEE412/ P21GEE413/ P21GEE414	Elective – I– Social Geography/ Cultural Geography / Regional Planning and Management / Geography of Settlements	4	4	-	25	75	100
2	P21GEE421/ P21GEE422/ P21GEE423/ P21GEE424	Elective –II – Geography of Economic Activities/ Environmental Geography / Natural disaster Management / Geography of Tourism	4	4	-	25	75	100
3	P21GER41	Project	8	22	-	25	75	100
		TOTAL	**16**	**30**		**-**	**-**	**300**
		GRAND TOTAL	**120**	**90**				**2300**

Non Major Elective

The candidates who have joined the PG Programme, can also undergo Non Major Elective offered by other Departments.

Additional Credit Courses (Mandatory)

1. **P21GEI21 –**Internship/Industrial Training – Two Credits – (End of Second Semester)
2. **P21GEO31 –**Online Courses (MOOC Courses) – Two Credits – (Third Semester)
3. **P21GEV11 –**Value Added Program I – Two Credits(First Semester) – Thematic Cartography
4. **P21GEV41 –**Value Added Program II – Two Credits (Fourth Semester)–Application of SPSS in Geography

*Those who have CGPA 9 and want to do the project in Industry / Institution during 4th semester, these two elective papers in IV semester can be opted in third semester itself.

*For Elective – I / Elective - II, the students can also take either one 4-credit course or two 2-credit courses in MOOC, with the approval of Departmental Committee.

Non Major Elective

P21GEN21 – Geography of India for Competitive Examinations

Outside Class Hours (Attendance compulsory, Certificate Mandatory)

- Health, Yoga and Physical fitness.
- Library information access and utilisation
- Employability Training.
- Students Social Responsibility.

PROGRAM OUTCOMES

A geography degree will provide you with the knowledge and skills you need to begin a variety of rewarding careers. Geographers work as urban planners, GIS technicians and analysts, disaster preparedness planners, teachers, environmental scientists, remote sensing analysts, transportation planners, demographers, hydrologists and in a variety of other areas

Students who complete Geography courses will examine the spatial organization of physical features and human activities at a variety of spatial scales from local to global. Students will be able to locate features on the surface of the earth, explain why they are located where they are, and describe how places are similar and/or different. Students will also examine human interactions with the environment and describe how physical and cultural landscapes change through time. Students completing physical geography courses will be able to describe the processes that drive earth's climate, create landforms, and govern the distribution of plants and animals. Students completing human geography will analyze and describe cultural phenomenon such as population, development, agriculture, language, and religion.

PO1	Ability of Problem Analysis: Student will be able to analyses the problems of physical as well as cultural environments of both rural and urban areas. Moreover, they will try to find out the possible measures to solve those problems. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO2	Application of GIS and modern Geographical Map Making Techniques: They will learn how to prepare map based on GIS by using the modern geographical map-making techniques. Application of modern instruments: Students will be able to learn the application of various modern instruments and by these; they will be able to collect primary data.
PO3	Development of Observation Power: As a student of Geography Course, they will be capable to develop their observation power through field experience and in future, they will be able to identify the socio-environmental problems of a locality.
PO4	Development of Communication Skill and Interaction Power: After the completion of the course, they will be efficient in their communication skill as well as power of social interaction. Some of the students are being able to understand and write effective reports and design credentials, make effective demonstrations, and give and receive clear instructions.
PO5	Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them. Understand Environmental Ethics and Sustainability: Understand the impact of the acquired knowledge in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.
PO6	Self-directedandLife-longLearning:Acquiretheabilitytoengageinindependent and life-long learning in the broadest context social, environmental and technological changes

PROGRAMME SPECIFIC OUTCOMES

The M.Sc. in geography program offers students the opportunity to advance their career aspirations through advanced study in the classroom and in the field. The programme in geography is tailored to meet the students' specific educational, research and professional goals in mind. It focuses on spatial studies, qualitative as well as quantitative, and emphasizes on human-environment relationship.

PSO1	Designandconductindependentresearchintheirchosenfieldinthediscipline.Demonstratek nowledgeofconcepts, methods and theories designed to enhance understanding of the natural world and human society.
PSO2	Communicate the results and significance of their research in both written and oral form. Evaluate how historical events have been influenced by, and have influenced, physical and human geographic factors in local, regional, national and global settings.
PSO3	Examine social and environmental processes, with a particular focus on space and place, critical theory, practical application, analysis and intervention in chosen field within the discipline of Geography. Evaluate causes, consequences and possible solutions to persistent, contemporary and emerging global issues
PSO4	Follow established ethical guidelines for research and teaching. Have an in-depth understanding of and mastery of the literature in, at least one particular geographic subfield
PSO5	Classify processes of environmental change and evaluate the relationship between human beings and their surroundings, bringing to bear knowledge from many disciplines.
PSO6	A geographer has better job opportunities in government departments, Cartographer, Researcher, Teacher/Professor, Competitive Examinations, Government employer, GIS specialist, Climatologist, Transportation Manager, Surveyor, GPS Surveyors.

SEMESTER – I

Course Code	P21GET11	ADVANCED GEOMORPHOLOGY	L	T	P	C
CORE -I			5	-	-	4

Learning Objectives:

1. The objectives of this course are to introduce the concepts in Geomorphology in adequate manner, many facets of surface relief features.
2. Students will understand the fundamental concepts of spatial interaction and diffusion, which explain how human activities are influenced by the concept of distance.
3. Students will be exposed to the nature of physical systems such as geomorphologic processes and natural hazards.
4. Students will learn how human, physical and environmental components of the world interact.
5. Students will also learn the relevance of applied aspects of Geomorphology in various fields

Unit I **Fundamental Concepts** **12 hours**

Nature – Scope and Content – Fundamental Concepts – Recent Trends

Unit II **Geomorphic Process & Theories** **12 hours**

Endogenic – Diastrophism – folds, faults – continental Drift theory – Platetectonics – Mountain Building theories – geosynclinals theory of Kober, thermal contraction theory of Jeffrey, and thermal convection theory of Holmes – earth quake and volcanoes – Exogenic process – Weathering – Mass Movement – Soil formation.

Unit III **Gradational Process** **12 hours**

Work of River, Normal cycle of erosion by Davis – Peneplain concept – Modification of the cycle – concept of Penck and King

Unit IV **Evolution of Landforms** **12 hours**

Aeolian landforms – Erosional and depositional – Glacialland forms – Erosional and Depositional – Underground water and karsts topography – landforms developed in limestone regions – Waves – erosional and depositional features – coast – Johnson's classification of coast.

Unit V **Development of slopes** **12 hours**

Ideas of Wood, Davis, Penck and King – Climatic geomorphology – Morphogeneticregions – Applied Geomorphology – Mineral exploration, Engineering, hydrology.

TEXT BOOKS:

1. Dayal, P., A Text book Geomorphology, Shukla Book Depot, Patna, India, 1990
2. Pitty,A.F., The Nature of Geomorphology, Methuen and Co. Ltd., London, 1982
3. Thornbury, W. D. Principles of Geomorphology, John Wiley and Sons, New York, I960

4. Kale, V. S. and Gupta, A. Introduction to Geomorphology, Orient Longman, Calcutta, 2010
5. Singh, Savindra, Geomorphology, Prayag PustakBhawan, Allahabad, 2002.

REFERENCE BOOKS:

1. Balbir Singh Negi, Physical Geography, S.J Publications Meerut, 1993
2. Das Gupta, A., and Kapoor, A.N, Principles of Physical Geography, S.C. Chand & Company Ltd, 2001.
3. Lobeck. A.K., An Introduction to the study of Landscapes, McGraw –Hill Book company, 1939
4. Thorn Bury.D., - Principles of Geomorphology, Wiley Eastern Ltd, New Delhi, 1984

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson the students will have knowledge of physical geography in relation to its nature and scope, the concepts of origin and evolution of topography.	**K2**
CO2	The students will be able to describe scientific ideas and theories about the development of the landscapes.	**K3**
CO3	The students will be able to explain the position of geomorphology in physical geography along with the divisions of geomorphology in relation to structural, fluvial, arid, glacial, coastal or tropical morphology.	**K4**
CO4	The students will be evaluating the impacts of human activities on natural environments.	**K5**
CO5	The students will be able to apply the knowledge about global issues to local circumstances to evaluate the local effects of the issues.	**K5**

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	2
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GET12	APPLIED CLIMATOLOGY	L	T	P	C
CORE II			5	-	-	4

Learning Objectives:

1. The broad objective of the course is to introduce to the students the fundamentals of atmospheric phenomena, global climate systems and climate change.
2. Students will learn how climatic variability and change are central to the issue of current and future global environmental change.
3. To grasp the techniques for modeling the climate, covering both theoretical and technical aspects.
4. Students will understand the Humidity, precipitation and atmospheric disturbances.
5. To be able to analyses and interpret climatic data.

Unit I **Atmosphere Composition and Structure** **12 hours**

solar radiation – Temperature – factors controlling the distribution of temperature – horizontal, vertical distribution of temperature – heat balance of the earth – Atmospheric Pressure – distribution – General circulation of the atmosphere – wind – systems – planetary – seasonal and local winds.

Unit II **Atmospheric Moisture** **12 hours**

Humidity, evaporation – condensation – clouds – Precipitation – types and forms – distribution – Air mass – classification – fronts – Thunderstorms – jet streams – Elnino and La Nina .

Unit III **Climatic Classification** **12 hours**

Empirical and generic climatic classification – Koppen and Thornthuwaite – World Climatic regions – Climatic changes – evidences and theories

Unit IV **Applied climatology** **12 hours**

Micro climate –agro climatology – concepts –elements – temperature –wind – rainfall –water budget –artificial rainfall.

Unit V **Urban climatology** **12 hours**

Micro climatic changes– global warming – heat island – health hazards – pollution –rainwater harvesting – man′s impact on climate.

TEXT BOOKS:

1. Lal. D.S., Climatology, Chatianya Publishing House, Allahabad, 1998
2. Howard J. Chritchfield, General Climatology, Prentice, Hall of India Pvt Ltd, 1987
3. Glen. T. Trewartha and LyesH.Horn, An Introduction to Climate, International student Edition, McGraw Hill International Book Company, 1980.

4. Critchfield, H. J. General Climatology, Prentice Hall, Englewood Cliffs, 1998
5. Smith, K., (1975). Principles of Applied Climatology, McGraw Hill Book Co., London.

REFERENCE BOOKS:

1. Trewartha, G.T., An Introduction to Climate, McGraw Hill Book Co., New York, 1968.
2. Woolridge and Morgan, Physical basis of Geography, Palala Press Indian Edition, 2015.
3. Ayoade, J.O. Introduction to Climatology for the Tropics, John Wiley and Sons Ltd., New York, 1983.
4. Oke T.R., Mills G., Christen A. and Voogy J.A., Urban Climates, Cambridge University Press, Cambridge, 2017.
5. Jones and Bartlett Learning, Climatology, 4th editions, Louisiana State University, Baton Rouge, 2017.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	The learners will have the basic concepts of climatology and its geographical significance along with knowledge of earth's atmosphere in respect to structure, composition and characteristics.	**K2**
CO2	Know something of the way various human activities are increasing emissions of the natural greenhouse gases	**K4**
CO3	They aware of the difficulties involved in the detection of any unusual global warming and background noise of natural variability.	**K2**
CO4	Understand that although a growing scientific consensus has become established through the IPCC, for the climate.	**K2**
CO5	Understand the mean global atmospheric circulations and disturbances, world climate systems, climatic variability and change.	**K4**

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**

***Strongly Correlating – 3,** **Moderately Correlating – 2,**
Weekly Correlating – 1, **No Correlation – 0**

Course Code	P21GET13	HYDROLOGY AND OCEANOGRAPHY	L	T	P	C
CORE -III			5	-	-	4

Learning Objectives:

1. Describing and analyzing the concepts of Hydrology and Oceanography
2. Students understand the essential components and function of the hydrologic parameters including precipitation, evaporation/evapotranspiration, overland flow and surface storage, groundwater flow and storage, and channel flow, runoff and water quality
3. Study about the stream flow measurement and basin morphology.
4. Studying the characteristics and distribution of global oceans.
5. Students will understand the effects of tsunami, waves and tides.

Unit I **Hydrological Cycle** **12 hours**

Sub cycle – elements – precipitation, evaporation, infiltration, run off.

Unit II **Drainage Basin** **12 hours**

Characteristics, human impact on hydrological systems – Construction of dams and reservoirs – capacity changes – river draining – principles of water balance and it application.

Unit III **Ocean of the World** **12 hours**

Atlantic, Indian and Pacific Ocean – relief temperature, salinity and density of ocean water – distribution

Unit IV **Ocean Water & Currents** **12 hours**

Movements of ocean water – Waves, tides, Tsunami – currents of Atlantic, Pacific and Indian oceans

Unit V **Ocean Resources** **12 hours**

Ocean deposits – Origin Types and Distribution – Coral reef – conditions for growth – types and distribution – theories.

TEXT BOOKS:

1. H.M. Raghunath., Hydrology Principles, Analysis and design, Wiley Eastern Limited, New Delhi, 1986.
2. Richard J.Chorley., Introduction to Physical Hydrology – Methuen & CO LTD – 1977.
3. Grant Gross – Oceanography, Prentice – Hall International Editions , 1987
4. Sharma.R.C., and M.Vital – Oceanography for Geographers , Chatianya publishing house, Allahabad , 1987
5. Paul R. Pinet – Oceanography, West Publishing Company, 1992

6. Lal. D.S. (2003) Oceanography, Sharada Pustak Bhavan, Allahabad, 2003.

REFERENCE BOOKS:

1. King Cuchalaine A.M. Oceanography for geographers, Edward Arnold publications, London. (2000)
2. Savindra Singh, Physical geography, Prayog Pustak Bhavan, Allahabad, (2004)
3. Siddharth, Oceanography: A brief introduction, Rawat Publishers. New Delhi. (2005)
4. Sharma RC, Oceanography for Geographers, Chaitanya Publishers, Allahabad, (2000)
5. Yadav A.S. Geography of Minerals of Oceans, concept Publishers, New Delhi, (2002).
6. Basu S.K. Hand book of oceanography, Global vision, Delhi. (2003)
7. Garisson Tom, Oceanography, Cole, Wadsworth, New York. (1999).

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	At the end of the course students will different physical aspects of water and the ocean as a natural resource.	**K2**
CO2	They will learn some strategies of water resource management and conservation of water.	**K2**
CO3	Students will be able to understand the variations of the global hydrological cycle and emphasizing the significance of groundwater quality and its circulation.	**K2**
CO4	They will have knowledge of the bottom relief of oceans, their waves and current in relation to origin, type, characteristics and impact of ocean waves and current on the environment.	**K4**
CO5	Students also will be learning about why physical oceanography is important in the earth system and learn about the interactions with other components of the system, particularly the atmosphere.	**K2**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	2	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	2	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GET14	GEOGRAPHY OF INDIA	L	T	P	C
CORE -IV			5	-	-	4

Learning Objectives:

1. Students will get an introduction to the main regions of the India in terms of both their uniqueness and similarities.
2. Students will be exposed to historical, economic, cultural, social and physical characteristics of India.
3. Students will learn the relationships between the global, the regional and the local, particularly how places are inserted in regional and global processes.
4. In addition to the ability of understanding and reading maps, students will develop cartography skills and will be able to create maps on their own.
5. Students will be introduced to demographic, social and cultural attributes such as migration, social relations and cultural identity.

Unit I **Induction and Physiographic Aspect** **12 hours**

Location – Structure and relief – Drainage pattern – Climate – Rainfall distribution – Climatic types.

Unit II **Irrigation, Soils and Agriculture** **12 hours**

Soils – Naturals vegetation – Need for conservation of soils and forests – Agriculture types and regions – Irrigation – Types and multipurpose projects – Distribution of food and commercial crops – Rice, Wheat, Cotton, Sugarcane, Tea, Coffee and Jute.

Unit III **Resources & Industries** **12 hours**

Power resources – Hydel, Thermal, Atomic –Mineral resources – Iron ore, Manganese, Mica, Bauxite and Copper. Major industries – Cotton, Iron and Steel, Sugar, Cement – Small scale and cottage industries.

Unit IV **Transport and Communication & Population** **12 hours**

Land, Water and Air – Ports and Harbors – Economic significance – Trade – volume– direction. Population – Distribution and density – growth –Trends – Problems.

Unit V **Regionalization of Tamil Nadu** **12 hours**

Resources of Tamil Nadu – Climate, Water, Soil, Forest, Population, Power – Industrial regions.

TEXT BOOKS:

1. Gopal Singh, Geography of India, Atma Ram, India, 1976.
2. Nag, P. and Roy, P., Geography of India, Concept Publications, New Delhi, 1998.

3. Tirtha, R., Geography of India, Rawat Publications, Jaipur, 1996.
4. Majid Hussain, Geography of India, McGraw, 2009.
5. Hill India Rajaram K, Geography Of India, Spectrum Books (P) Ltd, 2015.

REFERENCE BOOKS:

1. Ranjit Tirtha and Gopal Krishnan, Geography of India Rawat Publications, Jaipur, New Delhi, 1996.
2. Prithvish Nag and Smita Sengupta, Geography of India, Concept Publishing Company, New Delhi, 1999.
3. C.B. Mamoria, Geography of India, Shivalal Agarwala & Company, Agra, 1975.
4. R.L. Singh, India A Regional Geography, National Geographical Society of India, 1971.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Identifying and explaining the Indian Geographical Environment, from global to local scales.	**K2**
CO2	Applying geographical knowledge to everyday living.	**K3**
CO3	They understand the Mineral and Power Resources of India.	**K2**
CO4	Showing an awareness and responsibility for the environment and India.	**K4**
CO5	Evaluating the impacts of human activities on natural environments special reference to India.	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	2	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEP11	TERRAIN AND CLIMATIC DATA ANALYSIS	L	T	P	C
CORE -V			-	-	6	4

Learning Objectives:

1. Students will learn how terrain data analysis, profiles and slope analysis.
2. Students will learn Strahelr′s method, Bifurcation ratio and Miller′s ratio and understanding the Drainage basin analysis.
3. Students will acquire climatic data analysis.
4. Students will learn rainfall variability.
5. Students will learn Water balance, Aridity Index and NDVI Index.

Unit I **Terrain Data Analysis** **12 hours**

Profiles – Serial, Super imposed – projected and Composite – Slope analysis – Smith, Wentworth and Robinson Methods.

Unit II **Drainage Basin Analysis** **12 hours**

Stream Ordering – Strahelr′s method – Bifurcation ratio, drainage density – shape of the drainage basin – Miller′s circulatory ratio.

Unit III **Climatic Data Analysis** **12 hours**

Climatic diagram – E.E. Fosters Climograph, Climatograph

Unit IV **Thermo Isopleths** **12 hours**

Rainfall distribution – dispersion – rainfall variability.

Unit V **Water Balance** **12 hours**

Aridity Index – NDVI Index.

TEXT BOOKS:

1. R.L. Singh _ Elements of Practical Geography, Kalyani Publishers, New Delhi, 1998.
2. F.J.Monkhouse and H.RWilkinson, Mapsand Diagrams, B.I. Publications, Madras, 2001.
3. Gopal Singh – Map work and Practical Geography, Vikas publishing house Ltd, 1996.
4. V.P. Subrahmanyam and Subramaniam,A.R. Application of water balance concept for a climatic study of droughts in south India, 1964
5. Monkhouse F.J and Wilkinson HR Maps and Diagrams, their compilations and concentration, Muthuen & Co. London, 1952.

REFERENCE BOOKS:

1. Harwel JD, Newson MD. Techniques in Physical Geography, Mc. Millan Edu. Ltd. London, 1973
2. Mishra RP. And Ramesh A, Fundamentals of Cartography, Prasaranga, University of Mysore, Mysore. 1968
3. Robinson & Marison, Elements of Cartography, USA. 1995.
4. R.L. Singh Practical Geography, Sharada Pustak Bhavan, 11, University Road, Allahabad, UP – India, 2010

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will learn about the profiles, Smith, Wentworth and Robinson Methods.	**K4**
CO2	Students will understand the climatic diagram.	**K2**
CO3	Students will gain a level of understanding about Drainage basin analysis such as drainage density and shape of drainage basin.	**K2**
CO4	Students will understand the rainfall distribution, rainfall dispersion and rainfall variability.	**K4**
CO5	Students will be exposed to the Water balance.	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21CSS11	COMPUTER SKILLS FOR WEB DESIGNING AND VIDEO EDITING	L	T	P	C
Supportive Course I			5	-	-	2

Learning Objectives:

1. Prepare students develop an effective web page using HTML tags
2. Create a table within a web page
3. Insert heading levels within a web page.
4. Insert ordered and unordered lists within a web page.
5. Publish a web page.
6. Learn how to combine basic design principles in video editing.
7. Generate a video by applying her knowledge.
8. Present the edited video and Record short clips by using camera.

Unit I **Basics of Hardware and Software** **6 hours**

Basics of Windows Operating System – Windows Utilities. Internet: Concept of Internet, Applications of Internet, Connecting to the Internet, Troubleshooting – World Wide Web – Web Browsers – Search Engines: Accessing Web Browser, Downloading Web Pages, Printing Web Pages – Understanding URL – Surfing the Web: Using e-Governance Websites.

Unit II **Hyper Text Markup Language (HTML)** 6 **hours**

Structure of HTML Script – Components: Text, Table, Image, Hyperlinks, Types of Lists – Headers and Footers. Forms in HTML: Label – Text Field – Radio Group – Text Area – Buttons.

Unit III **Open Element** **6 hours**

Introduction Creating and Saving a Project - Basic User Interface Elements – Media Elements – Images – Carousels - Image Gallery – Videos – Project Preview in Browser.

Containers and Groups: Accordion Group – Collapsible Panel – Group of Elements – Back-End and Full Stack Development.

Unit IV **Video Recording** **6 hours**

Grabbing all computer activities like playing video games, browsing the net, making voip calls, and more - Record the desktop screen in custom or full-screen mode - Capture the computer screen with voice narrations, system audio, and PIP effects - Include annotations such as colorful texts, shapes, lines, arrows, and drawings - Edit the video by cropping, trimming, adding subtitles, applying watermarks - Conversion of Recorded Video to MP4, VOB, MTS, DV.

Unit V **Video Editor** **6 hours**

New Video Project – Sort Video Projects – Store Board – Project Library – Video Editing Tools: Filters, Trim, Split, Text, Motion, 3D Effects, Speed - Screen Direction - Sound Design – Continuity – Titling - Picture Management - Color Correction - Special Effects.

TEXT BOOKS:

1. Anne Boehm & Zac Ruvalcaba, HTML5 and CSS3, 4th Edition, 2018.
2. Aaron Goold, Video Editing Handbook, ISBN : 1521721041,2017

Learning Outcomes:

After the completion of the course, Students will be able to

1. Enrich Fundamentals of Computers, Components of a Computer System and Software
2. Drafting of Letters and reducing. Insertion of Objects: Equation Editor, Organizational Chart
3. Representation of Financial/numeric data in Spreadsheet
4. Understand the basics Database Management
5. Emphasis on New Video Project.

SEMESTER- II

Course Code	P21GET21	AGRICULTURAL GEOGRAPHY	L	T	P	C
CORE -VI			5	-	-	4

Learning Objectives:

1. The objectives of this course are to acquaint the students with the spatial organization of agriculture and processes determining the agricultural pattern and processes.
2. The students will develop on in-depth knowledge about the dynamic of land use, cropping pattern and the factors involved in-change of agricultural landscape.
3. Students will learn determinates of agriculture.
4. Students will understand the Agricultural productivity and measurements of agriculture.
5. Students will be able to explain the agriculture region in world, India and Tamil Nadu.

Unit I **Defining the Field** **12 hours**

Nature, Scope and significance of Agricultural Geography – Approaches to the study of Agricultural Geography – Agricultural types and their Characteristics –Elements of Agriculture – Land, Labour , Capital, Market.

Unit II **Determinants of Agriculture** **12 hours**

Physical, Economic, Social Institutional and technological factors – Green Revolution – First and Second – its implications.

Unit III **Theory of Agricultural** **12 hours**

Von Thunen's Theory of Agricultural location and its modification – Application of Von Thunen′s theory to present day agricultural location – land use – types – land use survey – land capability classification – Remote sensing in land use analysis.

Unit IV **Agricultural productivity & Regionalization** **12 hours**

Determinants and –measurements–Regionalization– cropping Pattern, – crop combination Analysis – Weaver, DoiRafiullah, Crop Diversification – Bhatia.

UNIT V **Agricultural Regions** **12 hours**

Agricultural Regions of the World – India and Tamil Nadu – Whittlessey′s agricultural classification.

TEXT BOOKS:

1. Hussain, M. – Agricultural Geography Inter, India Publications, New Delhi, 1964
2. Singh Jasbir, and Dhillon - Agricultural Atlas of India - A Geographical Analysis, Vista Publishers, Krukshetra, 1987.
3. Symons,I – Agricultural Geography, G. Bells & Sons, London, 1999.

4. Mohammad Shafi, Agricultural Geography, Dorling Kindessley (India) Pvt. Ltd. New Delhi, 2006.
5. Negi. B.S. Indian Agriculture: problems, Progress & Prospects, Vikas publishing house Pvt. Ltd. S. Ansari Road, Daryagani, New –Delhi, 2003.

REFERENCE BOOKS:

1. Majid Hussain, Agricultural Geography, Ed Anmol Publishing Pvt. Ltd. Ansari Road, Daryagani, New Delhi, 2000.
2. Singh & Dhillion, Agricultural Geography, Prayog Pustak Bhavan, 20 A, University Road, Allahabad, UP, 2000.
3. Asbir Singh, Agricultural geography, Prayog Pustak Bhavan, 2001.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	The students shall get to know about the spatial organization of agricultural activities in world and India.	**K2**
CO2	They knowledge about the origin, location, distribution of the agriculture and its dynamics and impact of climate change and economic liberalization on agricultural pattern and process.	**K4**
CO3	Students will apply appropriate theories to analyze and modify communication.	**K3**
CO4	Students will be learning about land use and agriculture.	**K4**
CO5	To demonstrate the ability to analyze data and appropriate statistical conclusions.	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	2
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GET22	URBAN GEOGRAPHY	L	T	P	C
CORE -VII			5	-	-	4

Learning Objectives:

1. Explaining the nature scope and development of urban geography, urbanization of in developed countries of India
2. Describing the demographic structure and cities and population growth
3. Identification the urban land uses and functional classification demographic of town basic and non-basic concept.
4. Describing the urban expansion, umland demarcation, urban centers, rank size rules and central base theory. And land
5. Explaining the urban problems, slumbs, pollution, transport, urban migration and land use changes.

Unit I **Introduction** **12 hours**

Nature, Scope and Development of urban Geography – Urbanization –Factors – Urbanization in developed countries and India.

Unit II **Demographic structure of cities** **12 hours**

Age and sex structure –population – growth, density, and occupational structure.

Unit III **Urban Land Use & Classification** **12 hours**

Urban land use models – C.B.D. – Delimitation – Economic base – Functional classification of towns and cities – Basic and non-Basic concepts.

Unit IV **Urban Expansion & Concept** **12 hours**

Vertical and Horizontal – Urban sprawl – Urban fringe –Urban renewal – Suburbs - Growth and characteristics – City regions concept – Umland demarcation – Hierarchy of Urban centers – Rank size rule –Central Place Theory.

Unit V **Urban Problems** **12 hours**

Slums – Pollution – Transport – Urban Planning – Rural settlement – types and patterns distribution – Urban migration, land use changes – land acquisition and characteristics.

TEXT BOOKS:

1. Friedmann, J. Life space and economic space: Contradictions in regional development, 1988.
2. Friedmann, J. (ed.) Life Space and Economic Space: Essays in Third World Planning, 2007.
3. Hardoy, J. E., Mitlin. D. Satterthwaite. D. Environmental Problems in Third World Cities, 1992.

4. Earthscan, Great Britain. Harold Carter, The Study of Urban Geography, Arnold, London, 1995
5. Harvey, D. Social Justice and the City. London: Edward Arnold, 1973.
6. Jensen, J.R. Remote Sensing of the Environment: An Earth Resource Perspective, Prentice-Hall, NJ, USA, 2007.

REFERENCE BOOKS:

1. Marcotullio, P. McGranahan. G. Scaling Urban Environmental Challenges: From Local to Global and Back, Earth scan, Great Britain, 2007.
2. Michael. Urban Geography: A Global Perspective, Taylor & Francis, Great Britain. Ramachandran R 1992, Urbanization and Urban Systems in India, Oxford University Press, Delhi, 2009.
3. Singh R Y, Geography of Settlement, Rawat Publication, Jaipur, 2002.
4. Singh S B, "New Perspectives in Urban Geography, M.D Publication, New Delhi, 1996.
5. Sivaramakrishnan, Urbanization in India, Concepts Publishing Company, New Delhi, 1996.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After the lesson students will able to knowledge development of urbanization.	**K2**
CO2	Student will be understand the world demographic structure of cities	**K2**
CO3	Students will learn and explain the functional classification towns, and basic and non-basic concept.	**K2**
CO4	Student will be understands the urban settlements and hierarchy of urban centers, central place theory.	**K4**
CO5	Students will learn urban problems, types of and pattern, distribution acquisition and characteristics.	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GET23	MEDICAL GEOGRAPHY	L	T	P	C
CORE -VIII			5	-	-	4

Learning Objectives:

1. The broad objective of the course is introduced to the student the concept of health and Disease, climate and Disease.
2. To guide students to learn the Nutrition Deficiency related Disease and the Geographical perspectives of communicable and non-Communicable Disease.
3. Student will be exposed the Disease Ecology, Disease diffusion and the Dynamics of major Disease.
4. Student will understand the Medical Geography, medical Statistics and disease measurement and analysis.
5. To know the hierarchy of Medical services and GIS in public surveillance and monitoring.

Unit I **Perspectives on Health** **12 hours**

Nature, scope and development of Medical Geography – Traditional and contemporary approaches – Concept of Health and Diseases – Reproductive Health – Climate and Health – Human diseases – Classification – Infectious, Degenerative and chronic, inherited and genetic diseases.

Unit II **Diseases Pattern** **12 hours**

Nutrition - Deficiency related diseases - Geographical perspectives of Communicable and Non-communicable diseases - Epidemic, Endemic and Pandemic nature of diseases - Major Tropical diseases - Malaria, Filariasis and Leprosy Cancer and Heart attack - Social diseases - HIV IAIDS, STD.

Unit III **Disease Ecology** **12 hours**

Determinants of diseases - Interplay of environmental, cultural, socio-economic and ecological factors – Gender and health – Diseases of the rich and poor - Disease diffusion – Concepts – Dynamics of major diseases – Migration and Disease – Travel Medicine.

Unit IV **Medical Cartography** **12 hours**

Measurement techniques of diseases Disease mapping techniques at macro, meso and micro levels – Medical statistics – Epidemiological methods in disease measurement and analysis – Measurement of Morbidity and Mortality.

Unit V **Health Care Delivery System and GIS Technics** **12 hours**

Health care delivery system - Hierarchy of medical services – Planning for manpower, infrastructure and service facilities of health care – Rural and urban disparities – Health education – Improved Health care delivery system – GIS in Public Health surveillance and monitoring Environmental and Health data management.

TEXT BOOKS:

1. Textbook of Social and Preventive Medicine - Park, 19" edition, Bhandi, 2007 Geography and Health - Hussain, A, Mahaveer & Sons, New Delhi, 2007.
2. Geography of Health: A Treatise on Geography of Life and Death in India - Misra, R.P., Concept Publishing Company, 2007.
3. Tribal Health and Medicines - Kalla & Joshi, Concept Publishing Company, 2004. and
4. Health and Diseases: Dynamics and Dimensions - Surendra Singh & Misra, New Royan Book Company, 2000.

REFERENCE BOOKS:

1. Aikat, B.K. Tropical diseases in India, Arnold Meinemann, Delhi, 1stEdition,1985
2. Akhtar Rais, Environmental population and health problems, Ashish,1990 Publishers Home, New Delhi.
3. Ansari, S.H. "Spatial Organization of health care facilities in Haryana" NGJI, Vol 51, PP 3-4, 51- 61.2005

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	The focus of medical Geography is on the geographical patterns of health and diseases from the view point of the populations.	K2
CO2	Medical Geography seeks to improve our understanding of the various factors which affect the health of the population.	K3
CO3	Medical Geography helps researchers to understand the power of mapping their study data and understanding health and disease.	K3
CO4	Understanding of the health problems based on the various geographic factors influencing them.	K4
CO5	It focuses on the topics of disease diffusion and human ecology, role of geographical information systems for health and healthcare disparities and various methods for analyzing health/disease data.	K5

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	2	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GET24	TRANSPORT GEOGRAPHY	L	T	P	C
CORE -IX			5	-	-	4

Learning Objectives:

1. The broad objective of the course is to appraise the students about the geographic relevance of transportation.
2. The students will understand the various models of global relevance and modal characteristics of modes.
3. Students will learn how structural analysis of transport networks for accessibility and connectivity.
4. Students will be evaluating the development of Urban and Regional transport planning.
5. Students will learn the relevance of applied manual uses of geographical models.

Unit I **Introduction** **12 hours**

Nature, scope and significance of Transport Geography – Different types of transportation – Their merits and demerits – Choice of mode of Transport.

Unit II **Transportation Terminal and Freight Distribution** **12 hours**

Terminal charges and operating charges – Tapering cost structure – Variation in freight structure on distance, commodity, size and elasticity of demand – Long haul advantage

Unit III **Transportation network** **12 hours**

Nodes and links – Connectivity – Accessibility – Centrality Structural analysis of transportation network – Graph theoretic measures – Stages of development of network – Measures of nodal accessibility – Matrix measures - Shortest path – Desire line – Detour index.

Unit IV **Theories & Model** **12 hours**

Theories of Spatial interaction – Interaction models – Gravity models – Ullman's triad – Critical appreciation of gravity model – Flows in the network – Intensity of flow – Allocation model for transportation

UNIT V **Transportation and Spatial Structure** **12 hours**

Hinterlands – Regional specialization – Idealized process of transport development – Interdependence of transport and economy – Role of transport in socio-economic integration – Rural and Urban transport – Problems – Urban and Regional transport planning

TEXT BOOKS:

1. Transport and Developing Countries - Hillings, H, Rouledge, 1996
2. Geography of Transportation, Naresh Kumar, Concept Publication, 1991

3. Transport for the Space Economy: A Geographical Study -Hay, A, Macmillan, 1973 Transportation Geography: Comments and Readings - Eliot Hurst, M.E., 1971

REFERENCE BOOKS:

1. Taafee E.1., and H.L. Gauthier, Geography of Transportation, Prentice Hall Foundation of Economic Geography Series, 1970
2. Lloyd, P .E., and P. Dicken, Harper and Row, Location in Space: A Theoretical approach to Economic Geography, 1969

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students shall learn about the significance of transport in multifaceted development.	K2
CO2	Students will be learning the significance of various models.	K2
CO3	Students will understand the role of theories related to transport networks.	K3
CO4	They will be able to grasp the techniques for Accessibility, connectivity and measures transportation network.	K4
CO5	Students will be applying the various approaches of transport in daily life.	K5

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	2	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	2	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEP22	SOCIO ECONOMIC DATA ANALYSIS	L	T	P	C
CORE -X			-	-	6	4

Learning Objectives:

1. The objective of this course is to provide an understanding for the graduate business student on Population data, Simple line graph, Semi log, Log Log graph, Lorenz curve, Age and sex pyramid, Triangular graph and Population Potential map.
2. To calculate and apply measures of Transport analysis, Connectivity measures, Accessibility measures and Distance Matrix, Detour index
3. To apply the Agricultural Data Analysis, Weaver′s, Doi and Rafiuallah′s methods, crop diversification Bhatia′s method
4. Students will demonstrate the ability to analyse the Index of Industrial Diversification, Hierarchy of Industrial centers,
5. Students will be able to Nelson′s and Rafiullah′s methods, Nearest Neighbor Technique

Unit I **Population data** **12 hours**

Growth– Simple line graph – Semi log –Log Log graph – Lorenz curve – Age and sex pyramid – Triangular graph– Population Potential map.

Unit II **Transport Analysis** **12hours**

Connectivity measures – Alpha, Beta and Gamma indices. Accessibility measures – Binary matrix, shortest path matrix, Associated Numbers, Shymbel Index, Distance Matrix – Detour index.

Unit III **Agricultural Data Analysis** **12 hours**

Cropped areas of individual crops – crop ranking – crop combination analysis – Weaver′s, Doiand Rafiuallah′s methods – crop diversification Bhatia′s method

Unit IV **Index of Industrial Diversification** **12 hours**

Hierarchy of Industrial centers –RankSize rule

Unit V **Functional Classification** **12 hours**

Nelson′s and Rafiullah′s methods – Nearest Neighbor Technique.

TEXT BOOK

1. F.J.Monkhouse & H.R.Wilkinson, Maps and Diagrams, Dirton Co- New York, 1971

REFERENCE BOOKS:

1. R.L Singh, Elements of Practical Geography–Kalyani Publishers New Delhi, 1979
2. Kansy, Y., The Structure of Transportation Network, 2001.
3. Tafee, E.J. & H.L Gauthier–Geography of Transportation, Prentice Hall, New York, 1998.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Apply statistical techniques to a variety of socio economic data	K2
CO2	Demonstrate understanding of basic concepts of Transport analysis and statistics embedded in their courses.	K2
CO3	Interpret statistical output to the agricultural data analysis aid in decision making in the Agricultural activities	K3
CO4	Evaluating the impacts of human activities and the industries activities	K4
CO5	Applying the knowledge of global issues to a unique scientific problem of agricultural data analysis	K5

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	2
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEN21	GEOGRAPHY OF INDIA FOR COMPETITIVE EXAMINATIONS	L	T	P	C
ELETIVE – I (NME)			5	-	-	4

Learning Objectives:

1. This course provides an insight into different aspects of physiography, climate, regional variability and culture in India
2. Describing the Importance of the value of Regional and Regionalization of Indian.
3. Students can acquire an overall knowledge of agriculture, region, industry, transport and trade of India.
4. Students will understand the social distribution of population and transportation network of their country.
5. They understand the economic resources of India.

Unit I **Induction** **12 hours**

Location – Continent of unity in diversity- Relief – drainage-climate-soil – types and distribution - Natural vegetation- types and distribution

Unit II **Irrigation** **12 hours**

Irrigation - Need for Irrigation – Types – canal – tank - well - Multipurpose projects

Unit III **Agriculture** **12 hours**

Agriculture – types - Major crops- rice, wheat, millets, cotton, oilseeds, tea, coffee and jute – Agricultural regions - problems – Animal husbandry.

Unit IV **Minerals** **12 hours**

Minerals – coal, oil, iron ore, manganese , bauxite, copper – Power resources – Hydel, thermal and atomic - Industries-Iron and Steel, Cement, Textile, Sugar , Paper, Shipbuilding – Small scale and Cottage Industries.

Unit V **Population** **12 hours**

Population Growth – distribution- density and problems.- Transport and trade.

TEXT BOOKS:

1. Thorn Bury D. Principles of Geomorphology, Wiley Eastern Ltd. New Delhi – 1984.
2. Dayal P. A Text book of Geomorphology, Shukla book Deprt, Patna – 1995.
3. Lal. D.S., Climatology , Chatianya Publishing House, Allahabad, 1990
4. Howard J. Chritchfield, General Climatology, Prentice – Hall of India Pvt Ltd, 1987
5. Sharma.R.C., and M.Vital – Oceanography for Geographers , Chatianya publishing house , Allahabad, 1987

6. Trivedi, R.N - A Text Book of Environmental Sciences, Anmol Publications Pvt.Ltd New Delhi, 1997

REFERENCE BOOKS:

1. Sexna, H.M – Environmental Geography, Rawat Publications Jaipur, 1999
2. F.J. Monkhouse and H.R Wilkinson, Maps and Diagrams, B.I. Publications, 1998,
3. Gopal Singh – Geography of India, Atma Ram & Sons, New Delhi, 1995
4. Sharma T.C. and Countinho. O – Economic and Commercial Geography of India, Vikas publishing house Pvt Ltd, New Delhi, 1998
5. C.S.Agarwal & P.K.Grag – Text Book of Remote Sensing – Wheeler Publishing 2000

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	The student will get familiarized with the geographic dimensions of India in terms of its political and administrative characteristics; aspects of its regional vitality; and formation of regions.	**K2**
CO2	The student will understand climatic condition and seasons in India.	**K3**
CO3	They understand globalization and Indian economy and also understand the regional distribution of resource.	**K2**
CO4	They understand the population problems in India. Access the population policies and reaction the countries.	**K4**
CO5	Applying the knowledge of global issues to a unique scientific problem.	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	2
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GES22	APPLICATIONS OF GIS & GPS	L	T	P	C
SUPPORTIVE COURSE II			5	-	-	2

Learning Objectives:

1. Study GIS data model and nature of GIS & remote sensing.
2. Apply basic graphic and data visualization concepts such as color theory, symbolization, and use of white space.
3. Demonstrate proficiency in the use of GIS tools to create maps that are fit-for-purpose and effectively convey the information they are intended to.
4. Demonstrate confidence in undertaking new (unfamiliar) analysis using GIS, troubleshoot problems in GIS, and seek help from software/website help menus and the GIS community to solve problems.
5. Gather and process original data using a Global Positioning System (GPS) or other Global Navigation Satellite Systems (GNSS).

Unit I **Identification of spatial data** **6 hours**

Point, line and polygon features, representation of spatial features: Raster and vector data model, data structure.

Unit II **Map Analysis** **6 hours**

Overlay analysis, change analysis and buffer analysis. Scanning, integration of attribute data. Geographic analysis, digital terrain models- Application.

Unit III **Introduction to Arc-View, GIS software** **6 hours**

Digitizing, attribute data editing, query building and executing, typology, symbology and layout.

Unit IV **Data Representation** **6 hours**

Dot map, choro-pleth, located bar and pie maps.

Unit V **Introduction of GPS** **6 hours**

Introduction to GPS, finding latitude, longitude and altitude, tracking in GPS, routing in GPS.

TEXT BOOKS:

1. Peter A. Burrough and Rachael A. McDonnell, Principles of Geographic Information systems, Oxford University Press, New York, 1998.
2. Aronoff S, Geographic Information System, A Management Perspective, WDL Publications, Ottawa, Canada, 1989.
3. Ian Heywood, Sarah Cornelius, Steve Carver, An Introduction to Geographic Information System, Pearson Education Ltd., India, 2003.

REFERENCE BOOKS:

1. Chrisman N.R. Exploring Geographic Information System, Wiley, New York, 1997.
2. Lillesend TM & Kiefer R.W, Remote Sensing & Image Interpretation, John Wiley & sons, New York, 2004.
3. Luedev D.R. Aerial Photographic Interpretation Mc. Graw Hill Company, New York, 2000

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be understand data structure in GIS	**K2**
CO2	Acquire knowledge about Roster & Vector data Models, etc.	**K3**
CO3	Analyze geographical change analysis using geo processing tool	**K3**
CO4	Production of thematic maps in Arc GIS	**K4**
CO5	Collecting points and tracking the routes in GPS	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

SEMESTER –III

Course Code	P21GET31	GEOGRAPHICAL THOUGHT	L	T	P	C
CORE XI			5	-	-	4

Learning Objectives:

1. Main objectives of this course are to acquaint the students with the philosophy.
2. Also teach the Methodology and historical development of geography as a professional field.
3. The idea is to address the spirit and purpose of the changing geographies and to what we as geographers contribute towards knowledge production.
4. The course aims at developing critical thinking and analytical approaches.
5. Students will acquire an understanding of and appreciation for the relationship between geography and culture.

Unit I **Development of Schools of Thought** **12 hours**

Contributions of Greek, Roman, Arab, Chinese and Indian scholars to geography – Beginning of modern Geography – Varenions, Kant, Alexander Von Humboldt, Carl Ritter – German, French, British and American schools of Geographical thought.

Unit II **Trends in Geography** **12 hours**

Major geographic traditions – earth science, man – environment relationship – area studies spatial analysis.

Unit III **Concepts** **12 hours**

Dualism in Geography, physical Vs human, regional Vs systematic, determinism Vs possibilism, qualitative Vs quantitative, ideographic Vs nomothetic

Unit IV **Models & Theories** **12 hours**

Forms of explanations in geography – Models, Theories and laws in geography.

Unit V **Perspectives in geography** **12 hours**

Possibilism, behaviouralism, humanism – Marxism and structuralism, feminism postrodemisim.

TEXT BOOKS:

1. Dikshit R. D., Geographical Thought: A Contextual History of Ideas, Prentice– Hall India, 1997.
2. Hartshone R., Perspectives of Nature of Geography, Rand MacNally and Co, 1959.
3. Holt-Jensen A., Geography: History and Its Concepts: A Students Guide, SAGE, 2011.
4. Johnston R. J., Geography and Geographers, Anglo-American Human Geography since 1945, Arnold, London, 1997.
5. Kapur A., Indian Geography: Voice of Concern, Concept Publications, 2001.

REFERENCE BOOKS:

1. Negi B.S. Geographical thought – Karinath Ramnathmeerat 1994.
2. Freeman. R. Hundred Years of geography – Hutchinson London 1970
3. Martin Geoffrey J., 2005: All Possible Worlds: A History of Geographical Ideas, Oxford, 2001.
4. Soja, Edward, Post-Modern Geographies, Verso, London. Rawat Publ., Jaipur and New Delhi, 1997.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	This should enable the student to critically look at the contents of other courses at Postgraduate level as logically integrated with the broad currents of thought the subject has witnessed in the distant and recent past.	K2
CO2	Gain knowledge about development of geographical thought.	K2
CO3	They can understand the major current philosophical and theoretical debates in geography.	K4
CO4	Students will demonstrate an understanding of current research within the breadth of geography, as well as more in depth knowledge of research in their specialty areas.	K2
CO5	Students will develop a solid understanding of the concepts of "space," "place" and "region" and their importance in explaining world affairs.	K3

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	2	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	2	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GET32	REMOTE SENSING, GIS AND GPS	L	T	P	C
CORE XII			5	-	-	4

Learning Objectives:

1. The aim of this course is to apprise the students to various aspects of Aerial photographs.
2. Also introduce about Remote Sensing and GIS.
3. It will be teach about the important elements of the Geospatial technology.
4. This course introduce about the earth revolutionary and rotation system.
5. It gives the technical knowledge of satellite system.

Unit I **Basic Concepts** **12 hours**

Remote Sensing- definition - Types – Basic Principles – Ideal Remote Sensing System – Aerial Photography – Types of Photographs – Photo Mosaics – elements – photo Interpretation – Limitations of Aerial Photographic Technique – Photogrametry.

Unit II **Satellite Remote Sensing** **12 hours**

Spaceborne Remote Sensing – EMR – Platforms – Sensors – Resolution – Spectral signatures – visual image interpretation – Fundamentals – equipments – digital image processing.

Unit III **Development of Remote Sensing Programs in the World** **12 hours**

USA, USSR, FRANCE, U.K and India – Development of remote sensing in India

Unit IV **Application of Remote Sensing** **12 hours**

Land form inventory – water resources – urban studies, waste land management, disaster management, land use planning.

Unit V **GIS Data Structures** **12 hours**

GIS – Definition – Basic Principles – Elements – DBMS – Geographic Database – GIS – Hardware and Software – Use of GIS – Application of GIS – resource mapping – natural hazards , flood and drought management in India – GPS – Historical development – components – differential GPS – applications

TEXT BOOKS:

1. Campbell J. B., Introduction to Remote Sensing, Guildford Press, 2007.
2. Jensen J. R., Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, 2004.
3. Joseph, G. Fundamentals of Remote Sensing, United Press India, 2005.

4. Nag P. and Kudra, M., Digital Remote Sensing, Concept, New Delhi, 1998.
5. Rees W. G., Physical Principles of Remote Sensing, Cambridge University Press, 2001.

REFERENCE BOOKS:

1. LanHeywod, Sarah Cornelines, An Introduction to Geographical Information System I Addison, Wesley, Longman Ltd,2000
2. C.S.Agarwal & P.K.Grag, Text Book of Remote Sensing, Wheeler Publishing, 2000
3. Gampbell. James B.I Introduction to Remote Sensing, The Guild Press , New York, 2017
4. Curran, Fundamentals of Remote Sensing, Longman, London, 2006
5. Lillesend TM & Kiefer R.W, Remote Sensing & Image Interpretation, John Wiley & sons, New York, 2004.
6. Luedev D.R. Aerial Photographic Interpretation Mc. Graw Hill Company, New York, 2000

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will demonstrate knowledge of the foundations and theories of geographic information systems (GIS) and use the tools and methods of GIS.	**K2**
CO2	Students will demonstrate their competence to work individually and as a team to develop and present a client-driven GIS solution.	**K2**
CO3	Student will be familiar with modern techniques in Geography.	**K4**
CO4	Students will demonstrate their competence to work individually and as a team to develop and present a client-driven GIS solution.	**K2**
CO5	Students will be prepared to apply their skills in professional careers.	**K5**

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	2	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GET33	CARTOGRAPHY AND QUANTITATIVE METHODS	L	T	P	C
CORE XIII			5	-	-	4

Learning Objectives:

1. Students can able to identify the fundamentals of maps, geographic coordinates and their mapping procedures.
2. Students will be able to understand the map symbols, layout and printing process and their combinations.
3. Students can be able to know the various research methodology tests in a given procedure.
4. To understanding the data collection methods, types and other statistical procedures.
5. Students can acquire knowledge about various methods of statistical calculations in SPSS and other software′s

Unit I

Introduction to Cartography: **12 hours**

Meaning, Scope and Development of Cartography – Fundamentals of Map Projections – Types – Uses and choice of map Projection – Compilation and Generalization of Maps – Compilation of Base Maps.

Unit II **Quantitative Techniques in Cartography** **12 hours**

Simple and Complex – Thematic maps – Qualitative and Quantitative- Point, line, Area and Volume Symbols – Map Design and Layout – Lettering and Toponomy – Tools and Techniques for map drawing – map construction and production – photographic and non – photographic processes, printing processes – stencil cutters.

Unit III **Hypothesis Testing** **12 hours**

– Needs & Types – Significance & Confidence Level –Parametric – Non Parametric Produce – Chi Square Testing, T – test-Test

Unit IV **Data Collection** **12 hours**

Sources of data – secondary , primary and spatial data – data processing – measures of central tendency – mean , median , mode – standard deviation – coefficient of variation.

Unit V **Data Analysis** **12 hours**

Cor-relation – Pearson′s product movement correlation – Spearman′s rank correlation – Regression analysis – residual mapping – factor analysis – ANOVA

TEXT BOOKS:

1. Monkhouse F.J. and Wilkinson H.R.-Maps and Diagrams-Dirton Co., Newyork, 2006
2. R.P.Mishra and A.Ramesh – Fundamentals of Cartography-Concept publishingCompany, New Delhi, 2000.
3. Raise E.-Principles of Cartography M.C.Graw Hil, 1996.
4. Robinson A.H. and R.D.Sale-Elements of Cartography-Hjohn Wiley and Sons,NewYork, 2007.

REFERENCE BOOKS:

1. Singh R.L. and P.K.Dutt-Elements of Practical Geography, 1993..
2. Subramaniam - Introduction to Computer, 2011.
3. M.D. Zulfequarahamad Khan –Text Book of Practical Geography, Concept Publishing Company, New Delhi, 2009.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be acquiring knowledge about scope and development of cartography, Projections and compilation of maps	K2
CO2	Students will have ability to identify the different kinds of maps with using cartographic symbols, map design and layout procedures and photo printing process	K3
CO3	Students can evaluate the different techniques of hypothesis to justifying the various testing methods	K4
CO4	Students obtain the different kinds of data sources and analysis of various statistical methods.	K4
CO5	After complete the lesson they will get the capacity of statistical analysis with suitable software's	K5

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GET34	POPULATION GEOGRAPHY	L	T	P	C
CORE XIV			5	-	-	4

Learning Objectives:

1. This course introduces the history of population, methodology of population geography, sources & types of population data and spatial distribution of population with causative factors.
2. Get knowledge about the various theories and concepts related to population
3. The study of the population is an essential component in the planning of current various human related issues.
4. They get knowledge about various kinds of demographic problems eg. Zero, under & decline population.
5. Population Geography also deals with population policies in developed & developing countries

Unit I **Introduction** **12 hours**

Nature, scope and significance of population geography – Sources of populations data – Reliability of population data. Distribution and density of world population – Factors and pattern distribution.

Unit II **Dynamics of Population** **12 hours**

Fertility – its measures and determinants and world pattern - mortality – its measures and determinants and world trend – world population growth and its trend – theories of populations growth – Malthus , Ricardo and Marx.

Unit III **Demographic Transition** **12 hours**

Migration types – determinants – consequences of migrations – laws of migration – policies of migrations.

Unit IV **Populations Composition Characteristics** **12 hours**

Age, sex, rural, urban, occupation education – literacy – determinants and world pattern

Unit V **Population Resource and Policies** **12 hours**

Population resource relationship – Optimum population under population –over population – population policies.

TEXT BOOKS:

1. Jones, H.R., Population Geography, Paul Chapman, London, 2000.
2. Mamoria, C.B. India‟s Population Problems, Kitab Mahal, New Delhi, 1981.
3. Mitra, Ashok, India‟s Population Problems and Control (Vol. I &II), Kitab Mahal, New Delhi, 1978.

4. Chandna R.S Geography of Population Concepts, Determinants and patterns, Kalyani Publishers., NewDelhi 1980
5. ClarkJohn.I.-Population Geography Pergamum Press Ltd. Oxford 1981
6. Gosh,B.N –Population Geography, Sterling Publications.1987
7. Beauju-Garneir.J–Geography of Population, Longman group Ltd, 1978

REFERENCE BOOKS:

1. Beaujeu, Garnier, J. Geography of Population, Longman, London, 1966.
2. Bogue, D.J. Principles in Demography, John Wiley, New York, 1969
3. Chandna, R .C. Geography of Population, Kalyani Publ., New Delhi, 2000.
4. Clarke, J.I. Population Geography, Pergamon Press, Oxford,1972
5. Garnier, B. J.Geography of Population, Longman, London, 1970.
6. Ghosh, S. Settlement Geography, Orient Longman Ltd. , Kolkata, 1998.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson the students can develop their understanding of the distribution of the population and its various characteristics including population growth, density, fertility, mortality, death rate, birth rate etc.	**K2**
CO2	They can understand the negative or positive effects of population distribution and growth in the society and can create awareness among the people of society regarding this.	**K2**
CO3	Students will be analyzing the global trend and patterns of population growth in developing countries and migration patterns.	**K4**
CO4	Students will be evaluating the population growth theory and migration theories.	**K4**
CO5	Students will understand the population policies and their importance in different countries.	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	3	3	2
CO2	3	3	3	3	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	3	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GET35	RESEARCH METHODOLOGY	L	T	P	C
CORE XV			5	-	-	4

Learning Objectives:

1. The broad objective of the course is should understand a general definition of research design.
2. Students should know the introduction of research, motivation in research, types of research, the significance of the research, research process and criteria of good research.
3. Students should be familiar with ethical issues in educational research, including those issues that arise in using quantitative and qualitative research.
4. Students should know the primary characteristics of quantitative research and qualitative research
5. Students should be familiar with how to write a good introduction to an educational research study and the components that comprise such an introduction.

Unit I **Introduction** **6 hours**

Research meaning and need for scientific research – Approaches to research – interdisciplinary and trends in geography

Unit II **Research Design** **6 hours**

Research design – Identification selection and definition of problem – Selection of Topic – Formulation of Hypothesis – Testing of Hypothesis

Unit III **Sampling Techniques** **6 hours**

Sampling Techniques – Types – Construction of Schedule Questionnaire – Quantitative Techniques used to analysis the data

Unit IV **Data Collection** **6 hours**

Collection of data – sources of data – primary, secondary, data – data transformation, tables charts diagrams and maps

Unit V **Report Writing** **6 hours**

Library and thesis writing – bibliography – cards – glossary – appendix – languages presentation – review of work done in the field – review of books and journals – writing of project reports.

TEXT BOOKS:

1. B.N.Ghosh,,scientificmethodandsocialresearch,strellingpublishing,pvtlimted,1982
2. Good and Hatt,methodinsocialresearch,McGrawhillbookcompany,1981
3. Gilbert, N. Researching Social Life, Sage, London, 2001.
4. Flowerdew, R. and D. Martin, Methods in Human Geography: A Guide for students doing a research project, Prentice Hall, New York, 2005.

REFERENCE BOOKS:

1. Clifford, N.J. and G. Valentine, Key methods in Geography, Sage, London, 2003.
2. Leedy, P. D. and J.E. Ormrod, Practical Research: Planning and Design, 2001.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students should be able to distinguish a purpose statement, a research question or hypothesis, a research objective and the utility of a hypothesis in scientific research.	**K2**
CO2	Students should be able to identify independent, dependent, features development of research and sampling design and its basic types.	**K2**
CO3	Students should be able to distinguish the interpretation, report-writing techniques and mechanics of writing of Report.	**K3**
CO4	Students should be able to design a good quantitative purpose statement and good quantitative research questions and hypotheses.	**K4**
CO5	Students will be able to understand the research problems, the link between quantitative research questions, data collection and how research questions are operationalized in educational practice.	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	2	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEP33	CARTOGRAPHYAND GEO INFORMATICS	L	T	P	C
CORE - XVI			-	-	4	4

Learning Objectives:

1. Students will have a general understanding of the various thematic maps and how to represent the different symbols in a statistical representation.
2. Students will be able to understand the Survey of India topo sheets and the observation of different kinds of colours and symbols in interpretation.
3. Students will be able to identify the different elements with regarding the remote sensing datas
4. Students can acquire knowledge of remote sensing data processing technique with help of various softwares.
5. At the end of the lesson students can get a clear idea about cartographic techniques and GIS based software′s.

Unit I **Statistical Data Analysis** **12 hours**

Preparation of Thematic Maps – Representation of Statistical Data by Point, Area, Line and Volume Symbols.

Unit II **Soil Interpretation** **12 hours**

Interpretation of Survey of India Toposheet.

Unit III **Satellite Image Interpretation** **12 hours**

Visual Interpretation of satellite imagery, identification of features through signatures, color identifications. Preparation of thematic maps using the satellite imagery.

Unit IV **Aerial Photo Interpretation** **12 hours**

Elements of aerial photographs, stereographic interpretation of aerial photographs and manual preparation of land use maps.

Unit V **Digital Image Processing** **12 hours**

Digital image processing technique.

TEXT BOOKS:

1. Robinson Arthur H et al, Elements of Cartography, 6th edition, Wiley India pvt. Ltd, 2010
2. Misra.R.P and A.Ramesh, Fundamentals of cartography, Concept Publishing Company, New Delhi, 2000.
3. Erwin and Raisz, Principles of cartography, Mcgraw Hill book company 1962

REFERENCE BOOKS:

1. Robinson.H., Elements of Cartography, John Wiley and Son INC,1960
2. Rampal K K, Mapping and Compilation, Concept Publishing Company, New Delhi, 1993
3. Monhouse, Map and diagrams, Methuan, 1971
4. RL Singh, Elements of practical geography, Students to friends Allahabad 1968

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be identify the kinds of thematic maps and how to drawn point, line and area symbols in correctly in statistical method.	**K2**
CO2	Students will develop the skills about Indian Toposheet interpretation with help of interpretation keys	**K3**
CO3	Students will develop a solid understanding of the concepts of aerial and satellite image interpretation and their importance in explaining by their elements	**K3**
CO4	They got the capability of using various GIS software′s to analyze and processing the digital satellite images	**K4**
CO5	After complete the lesson they got the potential of mapping techniques and image interpretation with suitable software′s	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	2	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	2	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21WSS33	WOMENEMPOWERMENT	L	T	P	C
Supportive Course III			5	-	-	2

Learning Objectives:

1. To understand about Women Empowerment
2. To Highlight the various types of empowerment
3. To motivate learners to participate in developmental programmes
4. To sensitize other women too to make aware of empowerment opportunities
5. To Transform women to get real empowerment

Unit I **Introduction** **6 hours**

Empowerment – Meaning and concept of empowerment – Individual and collective empowerment – Framework for empowerment – Choices women can make for empowerment – Constitution of India – Social Legislation – The Five Years Plans- Welfare approach – Women in Development – Equity approach – Empowerment approach – Indian Women Today – Concept of Agency – Empowerment indicators.

UNIT II **Social Empowerment** **6 hours**

Meaning – Importance and framework – Demography, education, health and nutrition, environment, violence against women – problems and rights of the girl child – Media – Science and technology – Women in difficult circumstances.

UNIT III **Economic Empowerment** **6 hours**

Women in labour force participation – Women and domestic work – Home based work – Work in organized and unorganized sector – Women in agriculture – industry and service sector – women entrepreneurs – Women self-help groups (Micro credit), Gender and poverty – Globalization and women

UNIT IV **Political Empowerment** **6 hours**

Need of women in politics – Dominant women in politics – political participation in grass root level-Barriers for participation of women in local governments – Reservation policy for women in politics – Legal empowerment.

UNIT V **Decision Making** **6 hours**

Capacity building for empowerment of women – Gender training and capacity building – Training methodology – women Leadership – Group dynamics – Problem solving – Conflict resolution – Group discussions – Crisis management.

TEXT BOOKS:

1. Government of India, Planning and Commission, Five Year Plans, the Tenth Five- Year Plan. (1951-56 to 2012-17)
2. Meena Priyadharshini S,"SocialempowermentofWomen",24/7publications, Kolkatta, 2017.
3. Judge, P.S., "Mapping Social Exclusion in India: Caste, Religion and Borderlands", Cambridge University Press, Delhi, 2014.

REFERENCE BOOKS:

1. Haque, T, "Empowerment of Rural Women in Developing Countries: Challenges and Pathways", New Delhi: Concept Publishing Company, 2015.
2. Ramachandran, Vimala and Kameshwari Jandhyala (ed). Cartographies of Empowerment: The Mahila Samkhya Story. New Delhi: Zubaan, 2012.

Learning Outcomes:

1. Understand Social, Economical and Political Empowerment
2. Make aware of importance of Women Empowerment
3. Understand the women development agents
4. Critically analyze the life style and challenges of women

SEMESTER IV

Course Code	P21GEE411	CHOICE -I	L	T	P	C
ELECTIVE – I		SOCIAL GEOGRAPHY	5	-	-	4

Learning Objectives:

1. Understanding the concept of space and place, religions and language groups.
2. Explaining the Human health and Health care planning.
3. Explaining the concept of culture, cultural regions and cultural imperialism.
4. Recognize the difference between boundary and land boundary.
5. Understanding the connection between Hartland theory and Rimland theory and contemporary politics.

UNIT I **Introduction of Social Geography** **12 hours**

Social Geography – Nature and scope – social structure and processes – concept of space and place –social wellbeing – quality of life – social exclusion, derivation and discrimination issues relating to under privileged groups–spatial distribution of social groups in India, tribes, castes, religions and language groups.

UNIT II **Concept of Culture And Cultural Regions in World** **12 hours**

Concept of culture, culture complex, culture areas and cultural regions, cultural heritage, cultural interactions, cultural diffusion and cultural ecology – cultural imperialism.

UNIT III **Health Factors** **12 hours**

Health – factors affecting human health – nutritional status, diseases – etiological condition, classification and distribution patterns, – Health care planning and policies in India, prospects of medical tourism in India.

UNIT IV **Development of Political Geography** **12 hours**

Concept of boundaries and frontiers, heart land and rim land theories – conflicts – resource, regional and ethnic human rights and conflicts resolution – recent trends and development in Political Geography.

UNIT V **Geo-Politics of World** **12 hours**

Geopolitics of climatic change, geopolitics of World Resources – regional organizations of cooperation (SAARC, ASEAN, OPEC, EU)

TEXT BOOKS:

1. Majid Husain – Human Geography – Rawat Publications 1994.
2. GillianC.Morgan –Human and Economic Geography, Oxford University Publications 1999.

REFERENCE BOOKS:

1. AimeVincentPerpillou-Human Geography, Longman Group limited London 1977.
2. C.Daryll Forde-Habitat, Economy and Society, Methuen Publishers 1977.
3. Chandna – Population Geography, Kalyani Publishers, 2015.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson, the students will have acquired Knowledge about the spatial distribution of social groups, religions and language groups.	K2
CO2	Students will understand an overview of the culture complex, cultural heritage and cultural imperialism.	K2
CO3	Students will understand the factors affecting human health, disease and Planning.	K3
CO4	Students will have basic concepts about boundaries and frontiers.	K2
CO5	Students will learn about the political geography.	K2

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	2	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEE412	CHOICE -II	L	T	P	C
ELECTIVE – I		CULTURAL GEOGRAPHY	5	-	-	4

Learning Objectives:

1. Understand and apply relevant geographic themes, such as location, place, region, movement, and human-environment interaction
2. Develop geographical skills and knowledge helpful for understandinglocal, national, and world events and issues
3. Develop skills for the observation and documentation of ordinary landscapes
4. Develop map-based knowledge of key location in world regions
5. Provide a broad overview of the key concepts and approaches in social and cultural geography.

UNIT I **Introduction** **12 hours**

Nature of cultural geography – Concept and meaning of culture – elements of culture, convergence and divergence of culture–cultural change.

UNIT II **Cultural Diversity** **12 hours**

Cultural diversity: Human races – Caucasoid, mongoloids and negroids – World′s major regions–major languages of the World, and India′s cultural Regions. Ethnic groups, case study, bushman, pygmies and eskimos, tribals of India.

UNIT III **Major Human Activities and Cultural and Occupations of Man; 12 hours**

Agriculture including its origin & diffusion, industrialization and its impact on culture and modernization broad features and impact in culture.

UNIT IV **Culture and Social Well-Being** **12 hours**

Culture and social well-being: Cultural indicators and human development index (HDI) at global, India Level.

UNIT V **Human Settlements** **12 hours**

Rural and urban settlement patterns. Economic and social characteristics – Impact of technology on human settlements. Emerging issues of aged population and their care.

TEXT BOOKS:

1. Ahmad, A, Social Geography, Rawat Publication, New Delhi, 2019
2. Ahmed, A. (ed) Social Structure and Regional Development: A Social Geography. Perspective, Rawat Publications, Jaipur, 1993.
3. Anderson, K. Domosh M., Pile, S., Thift, N (eds). Handbook of Cultural Geography. Sage Cosgrove Denis (1984) Social Transformation and Symbolic Landscape, Croom Helen, London, 2002.

REFERENCE BOOKS:

1. Crang, Mike. Cultural Geography, Routledge, London Feasibility reports, 1998.
2. KILA Pannikar, K.M. Geographical Factors in Indian History, Bharatiya Vidya Bhavan, Bombay Pannur writings. Africa in Kerala. Ente Hridathile Adivasi Personality of India, 1959.
3. Rachel, Pain. (eds). Introducing Social Geographies, Arnold Hodder goup, London & Oxfod University Press, 2001.
4. Raza, M. and Ahmed, A.. An Atlas of Tribal India, Concept Publishing Co, Delhi, 1990.
5. Robertson Iaian and Penny Richards, Studying Cultural Landscapes, Oxford University Press, London and New York, 2003.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Critically understand the key concepts of Social and Cultural Geography	**K2**
CO2	Apply concepts and evaluate emerging issues in contemporary cultural context	**K2**
CO3	Acquire a general understanding of the major concepts and approaches in the fields of social and cultural geography.	**K2**
CO4	Gain an appreciation for the role that social power plays in the formation of socio-spatial identities and the processes of place-making.	**K4**
CO5	Develop the ability to critically assess the material and symbolic aspects of cultural landscapes.	**K2**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**

***Strongly Correlating – 3** **Moderately Correlating– 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEE413	CHOICE -III	L	T	P	C
ELECTIVE – I		REGIONAL PLANNING AND DEVELOPMENT	5	-	-	4

Learning Objectives:

1. The regional planning should make the ecology and environment sustainable. Achieve effective land use planning on regional level
2. Promote affordable housing of all types on regional scale. Assure regional renewal in all inner-city areas.
3. To achieve quality education on all levels and to all residents. Assure appropriate job creation and job training
4. Maximize airport system balance for all types and sizes throughout region. Focus on tax base sharing in all forms.
5. Create and maintain a quality region-wide health care system . Minimize public sector budgetary waste and balance budgets

UNIT I	**Concept of region** **12 hours** Types, hierarchy and characteristics of regions, delineation methods of regions – Formal, functional and nodal. Geography and regional planning. Concept and scope of regional planning. Regional approaches. Principles, methods, techniques of regional planning, need for planning.
UNIT II	**Conceptual and theoretical frame work of regional planning** **12 hours** Growth pole and growth foci. Planning processes: Sectoral, multilevel, decentralized planning. Integrated area development planning (IADP). Planning for tribal and hill areas, drought prone areas, command areas and watershed. Planning for metropolitan region: CDP, satellite towns, urban green belt.
UNIT III	**Concept of development, indicators of development** **12 hours** Regional imbalance. Regional development strategies. Problems and issues in regional planning. Sustainable development of regions. Regionalization of India: Based on natural, economic and administration (macro and meso levels only).
UNIT IV	**Theories of regional development** **12 hours** Central place theory, diffusion theory (Hegerstand′s). The role of locational theories in regional planning process.
UNIT V	**An evaluation of regional disparities / imbalances** **12 hours** backward regions of India. Identification of backward areas, planning backward area. Causes and consequences regional disparities. Measures of disparities. Harnessing the information through GIS, remote sensing, GPS for regional planning and development.

TEXT BOOKS:

1. Isaac, Thomas and Richard, W. Franke. (Eds.) Local Democracy and Development: People‟s Campaign for Decentralization in Kerala, New Delhi: Leftward. Jaipur: Rawat Publications, 2000.
2. John, M.S. and Jos Chathukulam. Building Social Capital through State Initiative – Meghalaya), Man and Development, 2002.

REFERENCE BOOKS:

1. Action Programme for the 11 FYP, New Delhi: Planning Commission, 2011.
2. Participatory Planning in Kerala, Economic and Political Weekly, Vol. XXXVII, No.20, 18 May, 2002.
3. Rai, Manoj, et. al. (Eds.). The State of Panchayats: A Participatory Perspective, New Delhi: Samskriti, 2001.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Understand the significance of decentralized planning. Understand the planning process at each level of Local Institutions.	K2
CO2	Evaluate role of the Local Governments in the planning. Comprehend the advantages of local level planning with peoples participation	K5
CO3	Create a spatial data base for local level planning. Describe how long-range transportation plans can be coordinated with local & regional land use goals	K3
CO4	Identify roles that MPOs and other regional. state agencies can take in creating coordinated regional transportation & land use plans	K2
CO5	Describe how to structure a process for creating a regional plan Identify effective tools to implement regional transportation & land use plans	K2

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEE414	CHOICE -IV	L	T	P	C
ELECTIVE – I		GEOGRAPHY OF SETTLEMENTS	5	-	-	4

Leaning Objectives:

1. The objective of the paper is to give to the students the basic ideas about the rural settlements, historical development during ancient, medieval and modern times, morphology of rural settlements, functions and rural settlement planning in India.
2. Todescribe the meaning ofsettlements
3. To identify various types of rural settlements
4. To describe various house types inIndia
5. To explain the functional classification of urban settlements.

UNIT I **General Introduction, Evolution & Distribution of Settlements** **12 hours**

Nature, Scope, Significance and Recent Trends in Settlement Geography. Evolution of Settlements in India: Emergence of Village Settlements, Origin and Growth of Towns; Basic and Non – Basic Concepts in Settlement formation. Distribution of Settlements, Spacing of Settlements – Application of Models of Christaller and Losch.

UNIT II **The Functional classification of Settlements** **12 hours**

Rural and Urban Settlements. Rural Settlements – Types of Rural Settlements, House Types, Morphology and Functions of Rural Settlements; Rural Service Centers and their Role in Urbanization Process. Indian Rural Settlements in Different Micro – Environmental Conditions: (a) Mountains (b) Desert Region (c) In the vicinity of Urban Centers.

UNIT III **Urban Settlements** **12 hours**

Classification of Urban Places – Non – Functional and Functional. Morphology of Indian Cities and Its Comparison with Western Cities; Functional Relations between Urban Settlements and their umlands.

UNIT IV **Theories in Settlement Geography** **12 hours**

CBD, Centrifugal and centripetal forces theory, Urban Fringe, Urban structures theories. Rank size relationship.

UNIT V **Settlement Geography of selected Indian Cities** **12 hours**

Mumbai, Kolkata, Bangalore, Delhi, Chennai, Hyderabad, Pune, Lucknow, Patna, Jaipur and Chandigarh.

TEXT BOOKS:

1. Hudson, F. S. Geography of Settlements, Macdonald, London, 1976.
2. Northam Ray, M. Urban Geography, John Wiley and Sons, New York, 1979.

3. Ambrose, Peter, Concepts in Geography, Vol.-I, Settlement Pattern, Longman, 1970.
4. Baskin, C., (Translator), Central Places in Southern Germany, Prentice-Hall Inc. Englewood Cliffs New Jersey, 1996.
5. Haggett, Peter, Andrew D. Cliff and Allen Frey (Ed.), Locational Models Arnold Heinemann, 1979.
6. King, Leslie, J., Central Place Theory, Saga Publications, New Delhi, 1986.

REFERENCE BOOKS:

1. Mayer, M. Harold and Clyde F. Kohn (Ed.) Readings in urban Geography, Central Book Depot, Allahabad, 1967.
2. Mitra, Asok, Mukherjee S and Bose, R.,: Indian Cities Abhinav Publications, New Delhi, 1980.
3. Nangia, Sudesh, Delhi Metrpolitan Region, K.B. Publications, New Delhi, 1976.
4. Prakasa, Rao, V. L. S., Urbanization in India: Spatial Dimensions, Concept Publishing Co., New Delhi, 1992.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Understand the significance and recent trends in settlements geography.	K2
CO2	Access the functional classification of the settlements.	K2
CO3	To establish the relationship between house types with relief, climate, and building materials	K3
CO4	Evaluate the urban settlements and imphological Indian cities.	K5
CO5	Analyse the theories of urban settlements and selected Indian cities.	K4

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	2	2	3	2	3	2	2	3	3	3	3
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	2	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEE421	CHOICE -I	L	T	P	C
ELECTIVE – II		GEOGRAPHY OF ECONOMIC ACTIVITIES	5	-	-	4

Learning Objectives:

1. Students will learn the Economic activities.
2. Students will learn the World industrial regions.
3. Students will learn the Communication technology.
4. Students Will learn the Measures and indices of connectivity and accessibility
5. Students will learn the World trade pattern.

UNIT I	**Economic Activities and Natural Resource** **12 hours** Economic Geography – Economic activities – Primary – secondary – tertiary and Quaternary activities – Natural resources – classification – World distribution and associated problems – resource management.
UNIT II	**Industrial Location Theories** **12 hours** Classification of industries – factors affecting location of industries – world industrial regions – tourism industry potentials and problems.
UNIT III	**Transport and Spatial Organization** **12 hours** World distribution and growth on information and communication technology – spatial interaction ideas of Edward Ullman, functional approach of M.E.Hurst, Models of transport and transport cost.
UNIT IV	**Notion of Accessibility and Network Models** **12 hours** Measures and indices of connectivity and accessibility, spatial flow models – gravity model and its variants – allocation models.
UNIT V	**Globalization and World Trade Pattern** **12 hours** World Trade Organizations, Globalization and liberation and world trade patterns – problems and prospects of inter and intra regional co – operation and trade.

TEXT BOOKS:

1. Gopal Singh – Geography of India, Atma Ram & Sons, New Delhi, 1995
2. Sharma T.C. and Countinho. O – Economic and Commercial Geography of India, Vikas publishing house Pvt. Ltd, New Delhi, 1998
3. Memoria, C.B, Economic and Commercial Geography of India, Sivalalagrawal and company, Agra 1995

REFERENCE BOOKS:

1. Tirtha, Geography of India, 1996
2. Dubey and Negi – economic and commercial geography 1999

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will gain factual knowledge about the primary, secondary, tertiary, and quaternary activities.	**K2**
CO2	Students will have an effective Understand the classification of industries, factors affecting location of industries and tourism industry potential and problems.	**K2**
CO3	Students will have the basic knowledge of the spatial interaction ideas of Edward Ullman, functional approach of M.E.Hurst, Models of transport and transport cost.	**K2**
CO4	Students will learn and understand the spatial flow models, gravity model and it's variation and allocation models.	**K2**
CO5	Students will understand the World Trade Organizations, Globalization and Liberation and prospects of inter and intra-regional co-operation and trade.	**K2**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEE422	CHOICE -II	L	T	P	C
ELETIVE –II (NME)		ENVIRONMENTAL GEOGRAPHY	5	-	-	4

Learning Objectives:

1. Understand the natural interactions within our environment.
2. Students will also learn the Ecosystem, Biomes and biodiversity.
3. The students will have a basic knowledge of Natural disruptions of the ecosystem.
4. Integrate this understanding with the uses that humans make of the natural world and their impacts.
5. Explaining the Environment related policies and programmes in India.

UNIT I **Introduction of Environment** **12 hours**

Elements and Types Man and environment relationships – determinism – possibilism, changing nature of concept – lithosphere – hydrosphere – biosphere – multi disciplinary approach

UNIT II **Concept of Ecosystem** **12 hours**

Ecosystem – structure – classification – Biomes – functioning of the ecosystem – food web – food pyramid – nutrient cycle – biodiversity – types.

UNIT III **Natural disruptions of the ecosystem** **12 hours**

Natural hazards – land slide, earth quake, volcano, floods, droughts, pollution, human interference on ecosystem – population growth and its impact – Man′s modifications of the biosphere – agriculture – Green Revolution – HYV and pesticides – mining, soils – coastal areas.

UNIT IV **Environmental Planning and Management** **12 hours**

Objectives and strategies, natural resource management and conservation (land, water and forest) – sustainable development concept, need, problems and strategies – EIA principles and procedures.

UNIT V **Environmental Programmes and Policies** **12 hours**

The Stockholm conference, the earth summits and round tables, climate change (causes and consequences), Kyoto Protocol, world climate data monitoring programme (WCD MP) Environment related policies and programmes in India pertaining to wild life, water, forest and environment; Environment Governances

TEXT BOOKS:

1. Anderson J.M. Ecology for Environmental Science: Biosphere, Ecosystems and Man, Arnold, London, 1981.
2. Balakrishnan, M., Environmental Problems and Prospects in India, in Das, R.C., et. al. Oxford & IBH Pub., New Delhi, 1998.

3. Canter Chary, L. W. Environmental Impact Assessment, 2nd edition, McGraw Hill, New York, 1996.
4. Chichester: Marsh, W.M. and Grossa, J.M., Environmental Geography: Science, Land use and Earth Systems, John Wiley & Sons, 1996.
5. Das, M.C., Fundamentals of Ecology, Tata Mc Graw Hill, New Delhi, 1993.
6. Farmer, A. Managing Environmental Pollution, Routledge, London, 1997.

REFERENCE BOOKS:

1. Gilpin, A. Dictionary of Environment and Sustainable Development, John Wiley and Sons Ltd., 1996.
2. Goudie, Andrew, The Nature of the Environment, Oxford Katerpring Co. Ltd. Huggett, R.J. 2002. Fundamentals of Biogeography, Routledge, London & New York, 1984.
3. Nobel and Wright, Environmental Science, Prentice Hall, New York, 1996.
4. Odum, E.P. Fundamental of Ecology, W.B. Sanders, Philadelphia, 1971.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be learning about the Man and environment relationships, biosphere and multi-disciplinary approach.	K2
CO2	Students will be able to Ecosystem, classification and functioning of the ecosystem.	K2
CO3	Students will be able to discuss the natural hazards and Man's modifications of the biosphere.	K4
CO4	Able to apply principles and procedures.	K3
CO5	Able to apply Environment Governances.	K5

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEE423	NATURAL DISASTER MANAGEMENT	L	T	P	C
ELETIVE –II (NME)			5	-	-	4

Learning Objectives:

1. Provide prevention and mitigation strategies for common natural disasters.
2. Identify the types of illnesses and injuries commonly seen in natural disasters
3. Discuss actions to take to protect health, safety, and securityof responders and affected populations in natural disasters
4. Describe clinical management guidance for injuries andillnesses seen in common natural disasters.
5. Students will be lean about political administrative aspects, social aspect, economic aspect, cultural aspect and environmental aspects.

UNIT I **Environment hazards & Disasters** **12 hours**

Meaning & approaches, Causes and consequences of disaster: Physical, economic and cultural, National and International organizations Into disaster management. Types of environmental hazards and disaster: Natural disaster-Earthquake, tsunamis, landslides, volcanic eruption, cyclones, tornados, floods, droughts, heat waves and cold waves. Man induced hazards-Soil erosion, release of toxic chemicals, nuclear explosion, population explosion and resultant environmental disasters.

UNIT II **Emerging approaches to Disaster management** **12 hours**

(1) Pre-disaster stage (Preparedness)- hazard zonation maps-predictability and forecasting warning, land use zoning, Information, Education & Communication (IEC) Disaster resistance house construction, Population reduction in vulnerable area and awareness. (2) Emergency Stage- Rescue training for search and operation at national and regional level, ground management plan preparation, immediate relief, Assessment surveys. (3) Post disaster stage rehabilitation

UNIT III **Social and Political Aspects** **12 hours**

Political administrative aspects, social aspect, economic aspect, cultural aspect and environmental aspects.

UNIT IV **Natural Disaster mitigation** **12 hours**

Relief measure, role of GIS in Relief measures, role of GPS in search and rescue, role of Remote sensing in prediction of hazards and disasters, measures of adjustment of natural hazards.

UNIT V **Disaster in Indian Context** **12 hours**

A regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster & Disaster in Hills, terror attacks, communal clashes, Remedial measures. National and international policies for disaster management.

TEXT BOOKS

1. R.B. Singh (Ed), Environmental Geography, Heritage Publishers New Delhi, 1990.
2. Savinder Singh, Environmental Geography, Prayag Pustak Bhawan, 1997.
3. Kates, B.I & White, G.F The Environment as Hazards, oxford, New York, 1978.
4. R.B. Singh (Ed), Disaster Management, Rawat Publication, New Delhi, 2000.
5. H.K. Gupta (Ed), Disaster Management, Universities Press, India, 2003.
6. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994.

REFERENCE BOOKS

1. Dr. Satender,, Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003.
2. A.S. Arya Action Plan For Earthquake, Disaster, Mitigation in V.K. Sharma (Ed) , Disaster Management IIPA Publication New Delhi, 1994.
3. M.C. Gupta, Manuals on Natural Disaster management in India, National Centre for Disaster Management, IIPA, New Delhi, 2001.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Identify major natural disaster	K2
CO2	Analyze the causes and consequence of disaster	K2
CO3	Execute different preventing methods	K3
CO4	Connect real world with methods	K4
CO5	Students will be acquiring knowledge about the National and international policies for disaster management.	K5

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	2	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	3	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEE424	GEOGRAPHY OF TOURISM	L	T	P	C
ELETIVE –II (NME)			5	-	-	4

Learning Objectives:

1. Understanding the different dimensions of tourism and their interrelationships.
2. Learn recent trends and dynamics of tourism in the context of globalization and sustainability.
3. Explain the location factors tourism activities.
4. Knowing the geographical, social, economic, political, cultural particularities of tourism resources and destinations.
5. Understand the interrelationships of tourism with environmental processes that interact at local, regional and global scale, with particular attention to the effects of climate change and biodiversity loss.

UNIT I **Geography of Tourism** **12 hours**

Definition, Nature, Scope and Extent. Concept of Tourism, Importance of Tourism. Relationship between Geography and Tourism, Tourism Promotion – Ecotourism, Agro – tourism, Heritage tourism and Adventure tourism. Factors affecting Tourism – Physical and Cultural factors. Tourism motivation, tourism as an industry.

UNIT II **The Classification of Tourism and Tourists** **12 hours**

Types of Tourism – Domestic and International Tourism – Adventure, Wildlife, Medical, Pilgrimage, Business, Leisure, Pleasure, Eco and Cultural Tourisms. Comparison between Mass and Alternative Tourism. Tourists types – Local, National and International. Impact of Tourism – Economic Impact, Physical and Environmental Impact, Socio-Cultural Impact.

UNIT III **Infrastructural Approach for the development of Tourism** **12 hours**

Mode of transportation, Agencies, Guides, License, Hotels, Resorts, Youth Hostels, Home stays, Govt. TB,. Role of Foreign Capital and Impact of Globalization on Tourism, Environmental Law and Tourism Government Policies for Planning and Promotion of Tourism in India. State level tourism planning in India with special reference to Karnataka.

UNIT IV **Case Studies** **12 hours**

Major Tourist Centers. Hill Station – Mount Abu, Shimla, Kudhuremukha. Beach Points – Mangalore, Vizag, Pangim, Marino Beach. Historical centers – Badami, Bijapur, Mysore, Ellora and Tajmahal.

UNIT V **Religious Centers** **12 hours**

Shiradi, Kanyakumari, Tirupathi and Dhamastala. Dams - T B Dam, Bhakranangal, DVP. National Parks – Dachigam National Park, Gir National Park, Nanda Devi National park, Periyar National park.

TEXT BOOKS:

1. Bhatia A.K, Tourism Development: Principles and Practices. Sterling Publishers, New Delhi, 1996.
2. Inskeep. E, Tourism Planning: An Integrated and Sustainable Development Approach Van, 1991.
3. Kaul R.K, Dynamics of Tourism and Recreation, Inter- India, New Delhi, 1985.
4. Kaur, J. Himalyan Pilgrimages and New Tourism, Himalyan Books, New Delhi, 1985.

REFERENCE BOOKS:

1. Lea, J. Tourism and development in the third world, 1988
2. Milton, D., Geography of World Tourism, Prentice Hall, New York, 1993
3. Peace, D. G, Tourism To-Day: A geographical Analysis, Harlwo, Longman, 1987.
4. Robinson, H. A. A geography of tourism, McDonald and Evans, London, 1996.
5. Sharma,J.K, Tourism, Planning & Development–A new perspective Kanishka, 2000.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Understand spatial distribution of resources in the evolution of tourism.	K2
CO2	Critique worldwide economic, cultural, political and technological exchanges and connections that tourism brings.	K2
CO3	Rate tourism as a key sustainable sector in country's economic growth	K4
CO4	Design sustainable tourism management plan using GST for tourism development.	K4
CO5	Evaluate socio-cultural, economic and environmental impacts of tourism.	K5

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	2	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEV11	THEMATIC CARTOGRAPHY	L	T	P	C
VALUE ADDED PROGRAM I			5	-	-	2

Learning Objectives:

1. Students have gained understanding of the purposes of cartography, recognize the elements of cartographic representation, and how maps work
2. Students gained understanding of the theory and principles of cartography and their relationship to practice
3. The main purpose of geography is to show different phenomena whether it cultural or physical on maps, therefore showing things on maps is main purpose of geographers.
4. This paper deals with conducting survey by different methods and preparation of maps.
5. Will become able to make graphical representation of world map.

UNIT I	**Map Compilation and Generalization** Map Generalization – Map Compilation – Scale Conversion	**6 hours**
UNIT II	**Representation of Relief** Methods of Depiction of Relief – Spot Height – Bench Mark – Triangulation Station – Hachuring – Hill shading – Layer Tinting	**6 hours**
UNIT III	**Statistical Data Analysis and Mapping** Representation of Statistical data into Thematic maps – Point symbol Maps – Line symbol Maps – Area symbol Maps – Volume symbols Maps	**6 hours**
UNIT IV	**Interpretation of SOI Map** Survey of India Topographical Sheet – Cartographic Appreciation of Survey of India – Detailed interpretation of Survey of India	**6 hours**
UNIT V	**Interpretation of British and US Maps** Interpretation of British and US maps – British Ordnance Survey - US Geological Survey maps	**6 hours**

TEXT BOOKS:

1. Monkhouse, F.J. and Wilkinson, H.R, Maps and Diagrams (3rd Edition). Methuen & Co., London, 1971.
2. Khan, M.Z.A. Text Book of Practical Geography. Concept Publishing Company, New Delhi, 1998.
3. Negi, B.S. Practical Geography. Kedarnath and Ramnath, Meerut, 1998.

REFERENCE BOOKS:

1. Singh, G. Map Work and Practical Geography (3rd Edition). Vikas Publishing House Pvt. Ltd., New Delhi, 1995.
2. Khullar, D.R. Essentials of Practical Geography. New Academic Publishing Co., Jalandhar, 2004.
3. Robinson, H. Elements of Cartography (6th Edition), John Wiley and Sons, New York, 1995.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	The main outcome of the paper lies in the fact that it gives clear idea regarding different types of maps and different map making processes	K2
CO2	Students will become able to draw the map generalization and compilation	K2
CO3	Will acquire practical knowledge for construction and interpretation of relief, spot height, bench mark, triangulation and layer tinting	K4
CO4	Will be able to study and interpret the thematic maps	K4
CO5	Will become able to develop world demarcation maps based on British and US map	K5

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	3	3	3	2	2	3	2
CO2	3	3	3	3	3	3	3	3	2	3	2
CO3	3	2	3	3	3	2	3	3	2	3	2
CO4	3	2	3	2	3	2	3	3	2	3	3
CO5	3	3	3	3	3	2	3	3	2	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

Course Code	P21GEV41	APPLICATION OF SPSS IN GEOGRAPHY	L	T	P	C
VALUEA ADDED II			5	-	-	2

Learning Objectives:

1. The main objective of the course is to impart adequate professional knowledge and computer skills so as to enable the students to take up career in the field of Geospatial Technology.
2. This paper deals with the analysis of statistical data.
3. Deals with the statistical data representation (median and mode; NN Analysis; Principal component analysis).
4. Student can apply this map making process in practical base research work and they can further prepare more accurate and précised map by applying different quantitative method
5. Skill of drawing of map, graph, diagrams and scale

UNIT I **Spatial analysis** **6 hours**

Centro graphic analysis – Mean center – Weighted mean center – Standard distance – Nearest Neighbor analysis.

UNIT II **Measures of Central Tendency** **6 hours**

Measures of central tendency – mean, median and mode – standard deviation– coefficient of variation.

UNIT III **Measures of Dispersion** **6 hours**

Measures of dispersion–Correlation – Linear regression analysis – Residual mapping – Factor analysis – ANOVA.

UNIT IV **Hypothesis Testing** **6 hours**

Hypothesis Testing – Parametric and Non–parametric test – Chi-Square testing, F–test and T–test.

UNIT V **GIS Data Analysis** **6 hours**

GIS – Georeferencing – Digitization – Queries – Buffering - Overlay Analysis – Interpolation – Map layout.

TEXT BOOKS:

1. Aslam Mahmood, and Moonis Raza, Statistical Methods in Geographical Studies, Rajesh Publications, New Delhi, 1986.
2. David Unwin - Introductory Spatial Analysis, Methuen, London, 1981.
3. Gregory S. - Statistical Methods and the Geographer, Longman, London, 1978

REFERENCE BOOKS:

1. Hammond R and P.S. McCullagh - Quantitative Techniques in Geography, An Introduction, Clarendan Press, Oxford, 1974.
2. John P. Cole and Cuchlaine A. M. King, Quantitative Geography, John Wiley, London, 1968.
3. Johnston R. J., Multivariate Statistical Analysis in Geography, Longman, London. 1973.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Modern science and technology have made tremendous progress in all possible fields. Geospatial technology has been emerged a new spatial information technology.	**K2**
CO2	Get knowledge about statistical methods.	**K3**
CO3	Another part helps students in developing their quantitative application in geographical study which gives more accuracy in any geographical enquiry which can further helps students in conducting research activities.	**K4**
CO4	Students will be able to create digital maps in formats reflecting the purpose, content and function of input data	**K4**
CO5	Students will be able to use GIS software to produce accurate, appropriate, convincing and creative maps and graphics	**K5**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**2**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

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MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL – 624102

SYLLABUS (2021-2022)

B.Sc GEOGRAPHY

(CHOICE BASED CREDIT SYSTEM)

(Full Time)

SYLLABUS, REGULATION AND SCHEME OF EVALUATION

Mother Teresa Women's University, Kodaikanal

Department of Geography

Choice Based Credit System (CBCS)

(2021-2022 onwards)

B.Sc. Geography

About the Programme

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core and elective courses. The courses are evaluated following the grading system, which provides uniformity in the evaluation and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations which enables the student to move across institutions of higher learning. The uniformity in evaluation system also enables the potential employers in assessing the performance of the candidates. BSc Geography or Bachelor in Science in Geography is an undergraduate degree with an emphasis on Geography for 3 years. It is the study of the Earth and its many properties, characteristics, people and phenomena, in addition to the map and geographical image-interpretation. There are a broad range of careers open to a geography graduate. If students pursue higher studies or gain some work experience, students can get jobs in MNCs and abroad. Graduates can also do certificate **courses** or gain higher education to increase their chances of getting a job abroad. There are many job opportunities available abroad for **B.Sc Geography** graduates. This syllabus will follow from academic year 2021-2022 onwards.

PROGRAMME OBJECTIVES:

- Students will be able to define geography and be able to describe in good detail the major subdivisions of the field of geography; explain what geographers do; and how geography relates to a variety of real-world jobs (all majors).
- Students will gain factual knowledge about the world and its regions focusing on the diversity of natural and cultural landscape features, and they will know some basic principles, definitions, and themes in the subject matter of geography (all majors).
- Students will attain increased global awareness and become more geographically informed people.

- Students will know the history and development of urbanization in recent times. Students will be familiar with the variety of issues and problems studied by urban and regional planners and how they apply their expertise to resolve these issues and problems in modern urban America (Environmental Studies and Sustainability).
- Students will be able to apply their understanding of land use and planning principles in a manner that will allow them to elicit and formulate an effective plan.
- Students will be able to effectively articulate their proposals both written and orally and be capable of advocating on behalf of their plan, as well as to negotiate with those who may oppose their plan (Environmental Studies and Sustainability).
- Students will have a basic knowledge of the theoretical and applied realms of geographic information science (GIS).

Eligibility:

For admission to the B.Sc degree in Geography course, students need to fulfill all the eligibility criteria. B.Sc Geography eligibility includes students must complete their 10+2 from a recognized board. The minimum age to apply for the course is 17 years. The admission for the course is given based on merit in the direct admission. Students can apply for admission by visiting either the college's website or the admission office.

General Guidelines for PG Programme:

Duration:

The duration of the course will be three consecutive academic years under semester system.

Medium of Instruction: English and Tamil

Evaluation:

Evaluation of the candidates shall be through internal and external assessment. The ratio of formative and summative assessment should be 25:75 for Core and elective papers.

1. Maximum marks for theory is 100 each
2. The Minimum passing mark for Internal Exam 13 out of 25 marks and for External Exam 38 out of 75 marks.
3. The University examination will be conducted at the each semester for the duration of three hours per paper.

Evaluation Pattern

	Theory		**Practical**	
	Min	**Max**	**Min**	**Max**
Internal	**10**	**25**	**10**	**25**
External	**30**	**75**	**30**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz (5) = 25**
- **External Theory: 75**

4. **Question paper in External examination for core and elective papers carrying 75 marks will be in the format below: (3 hours)**

Part	**Type**	**Number of questions to be answered**	**Marks**
A	Objective Type / Multiple Choice	10 questions, 2 questions from each unit, each carrying 1 mark	10 (10*1)
B	Paragraph (about 1-1 ½ pages)	5 questions, From each Unit Either or Choice, each carrying 5 marks	20 (5*4)
C	Essay type (about 3 pages)	Any 3 out of 5 questions, Open choice, One question from each unit, each question carrying 15 marks	45 (3*15)
Total			**75**

Minimum credits required to pass - 156.

Classification of Successful candidate:

% of Marks scored	Division
50 – 59	Second class
60 – 74	First class
75 and above	First class with Distinction

5. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination, Students who have earned 74% to 71% of attendance to be applied for condonation in the prescribed form with the prescribed fee. Students who have earned 70% to 65% of attendance to be applied for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Students who have attended below 65% are not eligible to appear for the examination and they shall re-do the semester(s) after completion of the course, with the prior permission of the Controller of the Examination, and The Registrar of the University.

6. Any Other Information:

In addition to the above regulations, any other common regulations pertaining to the UG Programmes are also applicable for this programme.

Maternity Leave – The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and The Registrar.

UG Geography Curriculum

Paper No.	Paper Code	Course Title	Credits	Hours L/P	Continuous Internal Assessment (CIA)	End Semester Exam (ESE)	Total
SEMESTER – I							
1	U21LTA11	Tamil – I	3	6/0	25	75	100
2	U21LEN11	English – I	3	6/0	25	75	100
3	U21GET11	Core – I – Geomorphology – 1	4	5/0	25	75	100
4	U21GEP11	Core – II – Practical – I – Fundamentals of Map Making and Relief Representation	4	0/6	25	75	100
5	U21PHA11/ U21BOA11	Allied – I – Physics / Botany Theory	4	5/0	25	75	100
6	U21EVS11	Environmental Studies	2	2/0	25	75	100
7	U21PEPS11	Professional English – I	4	6/0	25	75	100
		TOTAL	**24**	**36**	**-**	**-**	**700**
SEMESTER – II							
8	U21LTA22	Tamil – II	3	6/0	25	75	100
9	U21LEN22	English – II	3	6/0	25	75	100
10	U21GET21	Core – III – Geomorphology – II	4	5/0	25	75	100
11	U21GET22	Core – IV – Cartography	4	5/0	25	75	100
12	U21PHA22/ U21BOA22	Allied – II – Physics / Botany Practical – I	4	0/6	25	75	100
13	U21VAE21	Value Education	3	3/0	25	75	100
14	U21PEPS22	Professional English - II	4	6/0	25	75	100
		TOTAL	**25**	**37**	**-**	**-**	**700**
SEMESTER – III							
15	U21LTA33	Tamil – III	3	6/0	25	75	100
16	U21LEN33	English – III	3	6/0	25	75	100
17	U21GET31	Core – V – Climatology – I	4	5/0	25	75	100
18	U21STA33	Allied – III – Statistics Theory – II	4	5/0	25	75	100
19	U21GEE311/ U21GEE312/ U21GEE313	Elective – I – Basics of Remote Sensing and GIS / Regional Geography of Asia / Climatic change – Vulnerability and Adaptation	3	4/0	25	75	100
20	U21MSS31	SBE I-Managerial Skills	2	2/0			
21	U21GEN311/ U21GEN312	Non-Major Elective – I – Principles of Remote Sensing / Social and Cultural Geography	2	2/0	25	75	100
		TOTAL	**21**	**30**	**-**	**-**	**700**
SEMESTER – IV							
22	U21LTA44	Tamil – IV	3	6/0	25	75	100
23	U21LEN44	English – IV	3	6/0	25	75	100
24	U21GET41	Core – VI – Oceanography	4	4/0	25	75	100
25	U21GET42	Core – VII – Climatology – II	4	4/0	25	75	100

26	U21STA44	Allied – III – Statistics – Practical – II	4	0/6	25	75	100
27	U21GEE421/ U21GEE422/ U21GEE423	Elective – II – Geography of Tamil Nadu / Political Geography / Sustainable Development	3	0/4	25	75	100
28	U21CSS42	SBE II-Computer Skills for Office Management	2	3/0	25	75	100
29	U21GEN421 / U21GEN422	Non – Major Elective – II – Geographical Information System / Natural Regions of the World	2	2/0	25	75	100
		TOTAL	**25**	**35**	**-**	**-**	**800**
SEMESTER – V							
30	U21GEP52	Core – VIII – Practical – II – Climatic Diagrams and Weather Map	4	0/6	25	75	100
31	U21GET51	Core – IX – Geography of Resource – I	4	5/0	25	75	100
32	U21GET52	Core – X – World Regional Geography	4	5/0	25	75	100
33	U21GET53	Core – XI – Human Geography	4	5/0	25	75	100
34	U21GET54	Core – XII – Geography of India	4	5/0	25	75	100
35	U21GEE531/ U21GEE532/ U21GEE533	Elective – III – Biogeography / Industrial Geography / Disaster Studies.	3	3/0	25	75	100
36	U21GES53	SBE III – Practical – Applications of Statistical Methods in Geography	2	0/2	25	75	100
		TOTAL	**25**	**31**	**-**	**-**	**700**
SEMESTER – VI							
37	U21GET61	Core – XIII – Geography of Resource – II	4	5/0	25	75	100
38	U21GET62	Core – XIV – Geographical Thought	4	5/0	25	75	100
39	U21GEP63	Core – XV – Practical – Socio Economic data Analysis and Image Interpretation	4	0/6	25	75	100
40	U21GEP64	Core – XVI – Fundamentals of Map Projections	4	0/6	25	75	100
41	U21GEP64	Cure-XVII – Regional Geography of North America	4	5/0	25	75	100
42	U21GEE641/ U21GEE642/ U21GEE643	Elective – IV – Travel and Tourism / Ecology of the world / Regional Geography of Health	3	4/0	25	75	100
43	U21GES64	SBE –IV Practical – Principles of Surveying	2	0/2	25	75	100
44	U21EAS61	Extension Activities	3	0/2	25	75	100
		TOTAL	**28**	**35**	**-**	**-**	**800**
		Grand Total	**148**	**201**	**-**	**-**	**4400**

Non Major Elective

The candidates, who have joined the UG Programme, can also undergo Non Major Elective offered by other Departments.

Non Major Elective (NME) offered by ------:

Code	NME Paper
U21GEN311 / U21GEN312	NME-I - Principles of Remote Sensing / Social and Cultural Geography
U21GEN411/U21GEN412	NME-II - Geographical Information System / Natural Regions of the World

- **Professional English –Add on Course with extra 4 Credits – 5 Hours**
- **U21PHO31 - Online Course – III Semester**
- **U21PHI41 - Internship – IV Semester**
- **U21PHV51 - Value added course – V Semester: Field Work and Research Methodology**

Each carries 2 Credits to be included as additional credit courses.

PROGRAM OUTCOMES:

After completing B.Sc Programme in Geography, students will be able to

PO.1. Demonstrate knowledge of physical and cultural features of the earth and locate them on a map.

PO.2. Know about the basic disciplines of Geography and its sub branches.

PO.3. Know the basic concepts and terminologies used in Geography like interior of the earth, plate tectonic, sea floor spreading, population growth, disasters, composition and structure of atmosphere, hydrosphere, etc.

PO.4. Differentiate between minerals and rocks, weather and climate, interior of the earth, basic industries, farming etc.

PO.5. Get information about the causes and effects of local, national and international problems like global warming, acid rain, ozone depletion, soil degradation, deforestation etc.

PROGRAMME SPECIFIC OUTCOMES:

PSO.1. Students learn about formation of landforms and identify various landforms around them.

PSO.2. Students learn about various economic activities of man and their spatial temporal distribution.

PSO.3. Students acquire knowledge of basic surveying and map making.

PSO.4. Students know about disasters, their causes and managing disasters.

PSO.5. Students come to know about geographical, socio-economic and political background of India.

PSO.6. Students apply geographical knowledge in their day to day life like being alert about disasters, weather and climate data.

SEMESTER – I

SEMESTER – I

GEOMORPHOLOGY – I

Credit: 4 **Course Code: U21GET11** **Hours: 5**

Learning Objective:

- Students will understand the concept of place and how it is connected to people's sense of belonging to the physical environment, landscape and culture.
- The students will have a basic knowledge about the premises of origin of the solar system and the earth.
- Students can acquire an overall knowledge regarding the various processes and forms that operate in our physical environment, it may include river processes, mountain building processes, theories related to plate tectonics, mass balance, dynamics, hydrology, earthquakes, etc.
- Describing human-environment and nature-society interactions as well as global human and environmental issues.
- Identifying and explaining the planet's human and physical characteristics and processes, from global to local scales.

UNIT I **THEORIES AND PROCESSES:** Definition of geomorphology – Origin of the earth – Gaseous Hypothesis of Immanuel Kant – Nebular theory of Laplace – Tidal hypothesis of James Jeans and Modification by Jeffrey – Binary star theory of Russell – Structure of the earth's interior – Crust – mantle – core – Rocks – classification of rocks – igneous, sedimentary and metamorphic rocks.

UNIT II **EARTH MOVEMENTS:** Endogenetic forces – sudden forces and movements – diastrophic forces and movements – epeirogenetic movements – orogenetic movements – folds – faults – rift valleys – exogenetic forces.

UNIT III **ENDOGENIC PROCESS AND DRIFT THEORY:** Volcanoes – components of volcanoes – classification of volcanoes – volcanic materials – world distribution of volcanoes – hazardous effects of volcanism – earthquakes – causes of earthquakes – types and world distribution distribution– hazardous effects of earthquake – Wegner's Continental drift theory – Isostasy.

UNIT IV **MAJOR LANDFORMS:** Mountains – classification – plateaus – classification – plains – classification.

UNIT V **GEOMORPHIC PROCESSES:** Weathering – Meaning – controlling factors – types – physical – chemical and biological weathering – geomorphic importance of weathering – mass movement – concept – classification –

resultant features – Soil – formation of soil – characteristics, types and distribution – soil profile.

TEXT BOOKS:

1. *Dayal, P., A Text book Geomorphology, Shukla Book Depot, Patna, India, 1990*
2. *Thornbury, W. D. Principles of Geomorphology, John Wiley and Sons, New York, I960*
3. *Kale, V. S. and Gupta, A. Introduction to Geomorphology, Orient Longman, Calcutta, 2010*
4. *Singh, Savindra, Geomorphology, Prayag PustakBhawan, Allahabad, 2002.*

REFERENCE BOOKS:

1. *Balbir Singh Negi, Physical Geography, S.J Publications Meerut, 1993*
2. *Das Gupta, A., and Kapoor, A.N, Principles of Physical Geography, S.C. Chand & Company Ltd, 2001.*
3. *Lobeck. A.K., An Introduction to the study of Landscapes, McGraw –Hill Book company, 1939*
4. *Thorn Bury.D., - Principles of Geomorphology, Wiley Eastern Ltd, New Delhi, 1984*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson, the students will have acquired knowledge about the relationship of physical geography with other branches of earth science and divisions of physical geography.	K2
CO2	Students will understand an overview of the structure of the earth, origin, composition and interior of the earth.	K2
CO3	Students will have basic concepts about relief features of plateaus, hills, foothills, valleys, plains and flood plains.	K2
CO4	Students will understand the endogenic and exogenetic movements of the earth.	K2
CO5	Students will learn about the effects of hazardous	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – I

PRACTICAL – I – FUNDAMENTALS OF MAPMAKING AND RELIEF REPRESENTATION

Credit: 4 **Course Code: U21GEP11** **Hours: 6**

Learning Objectives:

- Explaining of scales, type, construction of plain scales and comparative and diagonal scales
- Calculating the basic map the refusing triangle method and enlarging and reduction with instrument.
- Identifying the map direction and hearing measurements of distance-using thread and rotometer.
- Describing the measurement of area by square, linear and plain meter methods.
- Explaining the Contours, contour interval and representation of relief features by contours.

UNIT I **SCALES:** Definition – types – conversion of scales – construction of Palin scales – comparative and diagonal scales – time scale.

UNIT II **ENLARGEMENT AND REDUCTION METHOD:** Enlargement and reduction by square – similar triangle method – Enlargement and reduction with instruments.

UNIT III **DIRECTIONS AND BEARINGS:** Map direction and bearing – Measurements of Distance – using Thread, Divider and Rotometer.

UNIT IV **MEASUREMENT OF AREA:** Measurement of area by square, linear and by planimeter methods.

UNIT V **RELIEF FEATURES:** Representation of relief features by hachures – hill shading – layer tinting – spot heights – and bench marks – Contours – contour interval – gradient – representation of relief features by contours.

TEXT BOOKS:

1. *Gopal Singh, Map Work and Practical Geography, (4th Edition), Vikas PublishingHouse, Ahmedabad, 1998*
2. *ZamirAlvi, A Text Book of Practical Geography, Vikas Publishing house*

Pvtltd, 1994

3. *Zulfequar Ahmad Khan. M.D., Text boom of Practical Geography, Concept Publishing Company, New Delhi, 1998.*
4. *Singh R.L & Rana P.B. Singh, Elements of Practical geography, Kalyani, Publishers, 2005.*
5. *Siya Ram Sharma, Practical Geography, Murali Lal & Sons Pvt.Ltd, 2008*

REFERENCE BOOKS:

1. *F.J. Monkhouse and H.R Wilkinson, Maps and Diagrams, B.I. Publications, Madras, 1952*
2. *V.P. Subrahmanyam and Subramaniam,A.R. Application of water balance concept for a climatic study of droughts in south India, 1964*
3. *M.D.Zulfequar Ahamad Khan, Text Book of Practical Geography, Concept Publishing Company, New Delhi, 1998.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this paper, basic knowledge of scales and measurements.	K2
CO2	Students will be understand and knowledge use of instruments.	K3
CO3	Students will learn practically explain the rotometer.	K3
CO4	Student shall know how to measurement of area by square and plain meters methods.	K4
CO5	Students will be acquiring knowledge about the base level of the features of the maps.	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**2**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – I

PROFESSIONAL ENGLISH - I

Credit: 4 **Course Code: U21PEPS11** **Hours: 5**

Learning Objectives:

- To develop the language skills of students by offering adequate practice in professional contexts.
- To enhance the lexical, grammatical and socio-linguistic and communicative competence of first year physical sciences students
- To focus on developing students' knowledge of domain specific registers and the required language skills.
- To develop strategic competence that will help in efficient communication
- To sharpen students' critical thinking skills and make students culturally aware of the target situation.

Learning Outcomes:

After the completion of the course, students will be able to

1. Recognise their own ability to improve their own competence in using the language
2. Use language for speaking with confidence in an intelligible and acceptable manner
3. Understand the importance of reading for life
4. Read independently unfamiliar texts with comprehension
5. Understand the importance of writing in academic life
6. Write simple sentences without committing error of spelling or grammar
7. (Outcomes based on guidelines in UGC LOCF – Generic Elective)

UNIT I **COMMUNICATION:** Listening – Listening to audio text and answering questions – Listening to Instructions – Speaking: Pair work and small group work – Reading: Comprehension passages – Differentiate between facts and opinion – Writing: Developing a story with pictures – Vocabulary: Register specific – Incorporated into the LSRW tasks

UNIT II **DESCRIPTION:** Listening: Listening to process description – Drawing a flow chart – Speaking: Role play (formal context) – Reading: Skimming / Scanning – Reading passages on products, equipment and gadgets – Writing: Process Description – Compare and Contrast – Paragraph – Sentence Definition and Extended definition – Free Writing – Vocabulary: Register

specific –Incorporated into the LSRW tasks.

UNIT III **NEGOTIATION STRATEGIES – LISTENING:** Listening to interviews of specialists / Inventors in fields (Subject specific) – Speaking: Brainstorming. (Mind mapping) – Small group discussions (Subject- Specific) – Reading: Longer Reading text – Writing: Essay Writing (250 words) – Vocabulary: Register specific – Incorporated into the LSRW tasks

UNIT IV **PRESENTATION SKILLS – LISTENING:** Listening to lectures – Speaking: Short talks – Reading: Reading Comprehension passages – Writing: Writing Recommendations, Interpreting Visuals inputs – Vocabulary: Register specific – Incorporated into the LSRW tasks

UNIT V **CRITICAL THINKING SKILLS – LISTENING:** Listening comprehension – Listening for information – Speaking: Making presentations (with PPT – practice) – Reading: Comprehension passages – Note making Comprehension: Motivational article on Professional Competence, Professional Ethics and Life Skills) – Writing: Problem and Solution essay – Creative writing –Summary writing – Vocabulary: Register specific – Incorporated into the LSRW tasks

SEMESTER – I

ALLIED – I

BOTANY THEORY

Credit: 4 **Course Code: U21BOA11** **Hours: 5**

Learning Objectives:

- To understand the taxonomy aspects of plants
- To learn the structure, reproduction & classification of lower plants
- To identify the plants as either monocotyledons or dicotyledons
- To gain knowledge for water absorption mechanism and photosynthesis

UNIT I **CHARACTERISTICS OF ALGAE AND FUNGI:** Classification of Algae, Structure and Reproduction of Algae- Oscillatoria, Sargassum. Economic importance of Algae. General characters of fungi, life cycle of Puccinia, Economic importance of Fungi ..

UNIT II **CRYPTOGAMS AND PHANEROGAMS:** Structure and life cycle of Bryophyte - Funaria Structure and life cycle of Pteridophyte -Lycopodium Structure and life cycle of Gymnosperm- Gnetum.

UNIT III **PLANT ANATOMY:** Types of tissues and Meristems. Primary structure, of Dicot and monocot stem, root. Structure of mature Anther and ovule, Fertilization and Dicot embryo..

UNIT IV General Outline of Benthem &Hooker's classification, Merits & Demerits. Floral Characters and Economic importance of Rubiaceae, Caesalpinaceae, Asclepidaceae and Poaceae.

UNIT V **PLANT PHYSIOLOGY:** Absorption of water and minerals, Transpiration-movement and loss of water in plants; Stomatal physiology, Photosynthesis; Photosynthetic pigments, light and Dark reaction (C3 cycle only). Photorespiration.

TEXT BOOKS:

1. *Pandey, P.B. College Botany - 1: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. Chand Publishing, New Delhi. 2014.*

2. *Bilgrami, K.S. A Textbook of Algae. CBS Publisher & Distributors, New Delhi, ISBN: 978-8123900490. 2010.*

REFERENCE BOOKS:

1. *Sharma, P. D. Microbiology, Rastogi& Co., Meerut. 2011.*
2. *Alexopoulos, C.J., C.M. Mims and M. BlackMell. Introductory Mycology. IV Edition. Miley India (P) Ltd., Daryaganj, New Delhi. 2007.*
3. *Vashishta, Sinha A.K, Adarsh Kumar.Bryophytes, S.Chand & Company ltd., New Delhi. 2011.*

E-REFERENCES

1. http://herba.msu.ru/shipunov/school/biol_154/textbook/intro_botany.pdf
2. http://www.survivorlibrary.com/library/strasburgers_text-book_of_botany_1921.pdf
3. https://biolympiads.com/wp-content/uploads/2018/09/1-Botany Basics.pdf

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Acquire knowledge of classification of algae and fungi and its economic importance.	K1
CO2	Know the lifecycle of bryophtes, pteridophytes and gymnossperm.	K2
CO3	Compare and differentiate the dicot and monocot plants.	K3
CO4	Identify the Rubiaceae, Caesalpinaceae, Asclepidaceae and Poaceae family by using floral characters.	K3
CO5	Understand the transpiration, water absorption and photosynthesis	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

CO	*PROGRAMME OUTCOMES (PO)*								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	1	2	3	4	5
CO1	*S*	*S*	*S*	*S*	*M*	*S*	*S*	*M*	S	M	M	M	S
CO2	*S*	*S*	*S*	*S*	*M*	*S*	*S*	*S*	S	M	S	S	S
CO3	*S*	*S*	*S*	*S*	*S*	*M*	*S*	*S*	S	S	S	M	S
CO4	*S*	*S*	*S*	*S*	*S*	*S*	*M*	*S*	M	S	S	M	S
CO5	*S*	*S*	*S*	*S*	*S*	*S*	*S*	*M*	S	S	S	S	M
CO5	*S*	*S*	*S*	*S*	*S*	*S*	*S*	*M*	S	S	S	S	M

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – II

SEMESTER – II

GEOMORPHOLOGY – II

Credit: 4 **Course Code: U21GET21** **Hours: 5**

Learning Objectives:

- The course will provide an understanding of the conceptual and dynamic aspects of landform development.
- Students will be able to read and interpret information on different types of physical feature maps.
- Showing an awareness and responsibility for the environment.
- Students will be evaluating the fundamental models of cycle of erosion and function of the river and its landforms development process.
- Students will be evaluating the importance of fundamental geomorphic principles and finding to the wider academic community.

UNIT I **PROCESSES OF RIVER:** Drainage systems – sequent – insequent – drainage patterns - Work of running water (river) – types of fluvial erosion – erosional landforms – transportational work of rivers – depositional landforms – river development stages – river capture – Normal cycle of erosion by Davis.

UNIT II **GLACIAL PROCESSES:** Types and movement of glacier – Erosional work of glacier – Depositional landforms of glacier.

UNIT III **WORK OF WIND:** Erosional work of wind and erosional landforms – transportational work – depositional landforms in arid regions.

UNIT IV **PROCESSES OF UNDERGROUND WATER:** Underground water and karst topography – Geomorphic work of groundwater – erosional landforms developed in limestone regions – depositional landforms of karst region.

UNIT V **WORK OF WAVES:** Agents of coastal erosion – erosional land forms – transportational work – depositional landforms in arid regions – coast – Johnson's classification of coast.

TEXT BOOKS:

1. *Dayal, P., A Text book Geomorphology, Shukla Book Depot, Patna, India, 1990*
2. *Pitty,A.F., The Nature of Geomorphology, Methuen and Co. Ltd., London, 1982*

3. *Thornbury, W. D. Principles of Geomorphology, John Wiley and Sons, New York, I960*
4. *Singh, Savindra, Geomorphology, Prayag Pustak Bhawan, Allahabad, 2002*

REFERENCE BOOKS:

1. *Balbir Singh Negi, Physical Geography, S.J Publications Meerut, 1993*
2. *Das Gupta, A., and Kapoor, A.N, Principles of Physical Geography, S.C. Chand & Company Ltd, 2001*
3. *Lobeck. A.K., An Introduction to the study of Landscapes, McGraw – Hill Book company, 1939.*
4. *Thorn Bury.D., - Principles of Geomorphology, Wiley Eastern Ltd, New Delhi, 1984*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Geomorphology produces an outcome, indicating that students should be able to work out a geomorphic process.	K2
CO2	Students will have acquired knowledge about the development of the earth's crust and methods of development of the major landforms.	K2
CO3	Students will be able to understand the processes by which transportation of earth material occurs through fluvial and gravitational processes.	K2
CO4	Students will be able to determine the physical, chemical and biological processes controlling the modern evolution of identified landforms.	K4
CO5	Students shall get to know about the formation of the earth's surface features, the role played by humans in changing the landscape and the significance of landforms in shaping the physical environment in an area.	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – II

CARTOGRAPHY

Credit: 4 **Course Code: U21GET22** **Hours: 5**

Learning Objectives:

- Students can able to understand the general classification of maps and their importance with relevant cartographic technique.
- Students will be able to think the position of earth and their dimensions using with geographic coordinate principles.
- Students can acquire knowledge of various map scales and the earth drawing projections.
- Students will be able to apply the map generalization layout principles with reference to SOI and NATMO.
- Understanding the techniques of constructing different types of cartographic symbols representing various geographical data

UNIT I **INTRODUCTION:** Nature, scope and content of cartography – maps – classification and uses – development of cartography – branches in cartography.

UNIT II **TOPOGRAPHICAL MAP:** Earth as a cartographic problem – shape, size and direction – dimension of the earth – plane, spherical and rectangular systems – latitudes, longitudes and time.

UNIT III **SCALES AND PROJECTIONS:** Map scale – types of scale – enlargement and reduction – map projection – basic principles of cylindrical, conical and zenithal projections.

UNIT IV **PROCESSES OF MAP MAKING:** Principles of map generalization – map design and layout – components of layout – map index with reference to SOI and NATMO maps.

UNIT V **MAP SYMBOLIZATION:** Point, line and area symbols – qualitative and quantitative symbols.

TEXT BOOKS:

1. *Robinson Arthur H et al, Elements of Cartography, 6th edition, Wiley India pvt. Ltd, 2010*
2. *Misra.R.P and A.Ramesh, Fundamentals of cartography, Concept Publishing*

Company, New Delhi, 2000.

3. *Erwin and Raisz, Principles of cartography, Mcgraw Hill book company 1962*

REFERENCE BOOKS:

1. *Robinson.H., Elements of Cartography, John Wiley and Son INC,1960*
2. Rampal K K, Mapping and Compilation, Concept Publishing Company, New Delhi, 1993
3. *Monhouse, Map and diagrams, Methuan, 1971*
4. *RL Singh, Elements of practical geography, Students to friends Allahabad 1968*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be aware the knowledge about the relationship of cartography with other branches of earth science and disciplines of geography.	K2
CO2	Students can identify the earth's dimensions relating the cartographic problems and their geographic coordinate system.	K2
CO3	Students can evaluate the techniques of scales and suitable projections of different maps.	K3
CO4	Students will understand the various map components with help of SOI and NATMO.	K4
CO5	After that they will get the capacity of map making with suitable cartographic symbols	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**3**
CO3	**3**	**2**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – II

VALUE EDUCATION

Credit: 3 **Course Code: U21VAE21** **Hours: 3**

Learning Objectives:

- Acquire the knowledge of nature, concepts of Values
- Explain the aims and objectives of value education.
- Develop skill to integrate value education in the present curriculum.
- Understand the various sources of Values.
- Describe the role of various agencies in fostering values.
- Discuss the need for Value Education at the tertiary Level.

UNIT I **NATURE AND CONCEPT OF VALUES:** Values: Meaning and Definitions- Nature and Concept of Values-Classification of Values- Instrumental Values: Personal values, Social values, Family values, Cultural values, Democratic values, Aesthetic Values, institutional values, spiritual values and Spirituality Spiritual Self-sufficiency- Terminal values: Happiness, Self-Contentment, Self-Actualisation, Peace, Wisdom.

UNIT II **SOURCES OF VALUES:** Socio-Cultural Tradition: Demographic values, Values of Society and Culture-Religion: Hinduism, Christianity, Muslim and Jainism and Constitutional Values: Preamble of Indian Constitution, Democratic values, Secularism, Unity in Diversity-Universal Values: International Understanding, Universal Brotherhood, Eternal Bliss, Truth and Peace.

UNIT III **INDIVIDUAL AND COLLECTIVE VALUES:** Individual Values: Self-respect, Self-motivation, Self Confidence, Self-Motivation, Honesty, Integrity, regularity, punctuality and Truthfulness- Psychological Values: Understanding Self: Innate Self and Acquired Self and Powers of Self, Purity in thoughts/words/deeds, Self-esteem, self-Recognition, Emotional Intelligence, Cognitive Ability- Collective values: Societal Values, Social Responsibilities of Individuals- -Healthy Responsibilities-Corporate Social Responsibility-Environmental Values- Eradication of Child Labour and bonded Labour and Child Marriage.

UNIT IV **VALUE EDUCATION:** Aims and Objectives of Value Education- Comments of the Various Committees on Value Education- Need for Value Education at the Tertiary Level (HEI): Anti ragging, Anti- drug, Harassment and Violence against Women -Value Education in 21st Century: Humanistic values for the 21st century, secular, democratic, and pluralistic, familial and global.

UNIT V **ROLE OF VARIOUS AGENGIES IN FOSTERING VALUES:** Role of Parents- Role of Teachers: Personal Values and Code of Conduct for teachers- Role of Society- Role of Peer Group- Role of Religion- Role of Mass Media- Role of Voluntary Organizations- Role of Government.

PRACTICUM:

- Values though Dramatization,
- Practicing democratic and secular values through skit and dramas.

SUGGESTED REFERENCES:

TEXT BOOK:

1. *Dr. Kiruba Charles., & V.Arul SelviValue Education, Neel Kamal Publications PVT. LTD. Educational Publishers, New Delhi, 2012.*

REFERENCE BOOKS:

1. *Government of India, National Policy on Education (1968), New Delhi, 1968.*
2. *Atkin, J., Values and Beliefs about Learning to Principles and Practice, Seminar Series no. 54. Incorporated Association of Registered Teachers of Victoria, Melbourne, 1996.*
3. *Bhardwaj, I., Value-oriented Education, Journal of Value Education, Volume 5, Page 9-24, 2005.*
4. *Prof.S.P.Rubela & Prof.Raj Kumar Nayak, Value Education and Human Rights Education, Neel Kamal Publications PVT. LTD, New Delhi, 2011.*
5. *Dr. Sarojini - Biographical Values, Arasi Publishing House, Dindigul*
6. *Ananda Valli Mahadevan and Rs. Jaya Kothaipillai (Editors) - Feminism, Mother Teresa Women's University, Kodaikanal, 2004.*
7. *Ramathal,K.M. and Others, Protection of Women from Domestic Violence Act, 2005.*
8. *Elamadhi Jannakiraman.K, and Others, Tamil and World Unity, Subramania Bharathiar Tamil Field, University of New Delhi, Pondicherry,2006.*
9. *Eraianbu. Et. Al - Seventh Knowledge (Part 2), Thirst Publication, Chennai, 2002.*
10. *Sinivasan.N.A.,Microeconomics(Part 2), Meenakshi Publishing, Madurai, 1998*
11. *Saroja Pandian, Non-violent Resources and Ways of Violence in the Fourteenth Century, Pandian Publishing, Madurai, 2002.*
12. *Paul's Firsts, Spirituality - Falsehood and Truth, Published by St. Mary's Church, Dindigul, 2001.*
13. *Prema.R - Feminism, Tamil Bookshop, Chennai, 2005.*

SEMESTER – II

PROFESSIONAL ENGLISH – II

Credit: 4 **Course Code: U21PEPS22** **Hours: 5**

Learning Objectives:

- The Professional Communication Skills Course is intended to help Learners in Arts and Science colleges
- Develop their competence in the use of English with particular reference to the workplace situation.
- Enhance the creativity of the students, which will enable them to think of innovative ways to solve issues in the workplace.
- Help students with a research bent of mind develop their skills in writing reports
- Develop their competence and competitiveness and thereby improve their employability skills and research proposals.

UNIT I **COMMUNICATIVE COMPETENCE:** Listening – Listening to two talks / lectures by specialists on selected subject specific topics – (TED Talks) and answering comprehension exercises (inferential questions) – Speaking: Small group discussions (the discussions could be based on the listening and reading passages- open ended questions – Reading: Two subject-based reading texts followed by comprehension activities/exercises – Writing: Summary writing based on the reading passages.

UNIT II **PERSUASIVE COMMUNICATION:** Listening: listening to a product launch-sensitizing learners to the nuances of persuasive communication – Speaking: debates – Just-A Minute Activities – Reading: reading texts on advertisements (on products relevant to the subject areas) and answering inferential questions – Writing: dialogue writing- writing an argumentative / persuasive essay.

UNIT III **DIGITAL COMPETENCE:** Listening to interviews (subject related) – Speaking: Interviews with subject specialists (usingvideo conferencing skills) – Creating Vlogs (How to become a vlogger and use vlogging tonurture interests – subject related) – Reading: Selected sample of Web

Page (subject area) – Writing: Creating Web Pages – Reading Comprehension: Essay on Digital Competence for Academic and Professional Life – The essay will address all aspects of digital competence in relation to MS Office and how they can be utilized in relation to work in the subject area

UNIT IV **CREATIVITY AND IMAGINATION:** Listening to short (2 to 5 minutes) academic videos (prepared by EMRC/ other MOOC videos on Indian academic sites – E.g. https://www.youtube.com/watch?v=tpvicScuDy0) – Speaking: Making oral presentations through short films – subject based - Reading: Essay on Creativity and Imagination (subject based) – Writing – Basic Script Writing for short films (subject based) – Creating blogs, flyers and brochures (subject based) - Poster making – writing slogans/captions(subject based)

UNIT V **WORKPLACE COMMUNICATION& BASICS OF ACADEMIC WRITING:** – Speaking: Short academic presentation using PowerPoint – Reading & Writing: Product Profiles, Circulars, Minutes of Meeting – Writing an introduction, paraphrasing – Punctuation (period, question mark, exclamation point, comma, semicolon, colon, dash, hyphen, parentheses, brackets, braces, apostrophe, quotation marks, and ellipsis) – Capitalization (use of upper case)

Grammar and vocabulary exercises / tasks to be designed based on the discourse patterns of the listening and reading texts in the book. This is applicable for all the units.

SEMESTER – II

ALLIED – II

BOTANY PRACTICAL

Credit: 4 **Course Code: U21BOA22** **Hours: 6**

Learning Objectives:

- To learn sectioning and mounting skills
- To observe the morphological feature for understanding the taxonomy
- To know the structure, reproduction & classification of lower plants
- To identify the plants as either monocotyledons or dicotyledons
- To gain knowledge on internal structure of plants by sectioning

UNIT I **Algae -** Oscillatoria (Harmogonia) Sargassum (Morphology) Fungi - Puccinia (T.S of Wheat leaf uredospore Teleutospore) Bryophytes - Funnaria (Habit) Pteridophyte – Lycopodium (Morphology,T.s of Stem, L.S. of cone) Gymnosperm - Gentum (morphology, T.S. of Stem showing secondary growth, Gentum , male cone, Female cone.

UNIT II **Taxonomy -** Identification and description of the families those are included in the theory 1. Rubiaceae, 2. Caesalpinaceae, 3. Asclepidaceae & 4. Poaceae

UNIT III **Anatomy:** Study of Apical meristem (shoot apex) Tissues - Parenchyma, Collenchymas, Sclerenchyma, T.S of Dicot stem.

UNIT IV **Embryology:** General Outline of Benthem &Hooker's classification, Merits & Demerits. Floral Characters and Economic importance of Rubiaceae, Caesalpinaceae, Asclepidaceae and Poaceae.

UNIT V **PLANT PHYSIOLOGY:** Experiments to demonstrate i. Osmosis - Thistle funnel experiment, ii. Evolution of oxygen during photosynthesis, iii.Ganongs's light screen experiment

TEXT BOOKS:

1. *Sivakumar, K. Algae- A Practical Approach. MJP Publishers, Chennai, India. 2016.*
2. *Gupta, V.K., Tuohy, M.G., Ayyachamy, M., Turner, K.M. and O'Donovan, A. Laboratory Protocols in Fungal Biology: Current Methods in Fungal Biology. Springer, London, UK. 2013.*

3. *Chmielewski, J. G. and Krayesky, D. General Botany laboratory Manual. AuthorHouse, Bloomington, USA. 2013.*
4. *Bendre, A. M. A Text Book Of Practical Botany – Rastogi Publications, Meerut, India. 2010.*

REFERENCE BOOKS:

1. *Sharma, P. D. Microbiology, Rastogi& Co., Meerut. 2011.*
2. *Alexopoulos, C.J., C.M. Mims and M. BlackMell. Introductory Mycology. IV Edition. Miley India (P) Ltd., Daryaganj, New Delhi. 2007.*
3. *Vashishta, Sinha A.K, Adarsh Kumar.Bryophytes, S.Chand & Company ltd., New Delhi. 2011.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	identify and differentiate algae, Fungi, Bryophytes and Pteridophytes	K3
CO2	Identify and classify the rubiaceae, caesalpinaceae , asclepidaceae & poaceae family plants	K3
CO3	Observe the various plant tissues and differentiate Monocot and Dicot plants through sectioning	K2
CO4	Understand the parts of plant embryo.	K2
CO5	Get practical knowledge on thistle funnel experiment and other physiological experiments	K1

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	2	3	4	5	6	7	8	1	2	3	4	5
CO1	S	S	S	M	M	S	S	M	S	S	S	M	S
CO2	S	S	S	S	M	S	S	S	S	M	S	S	M
CO3	S	S	S	S	S	M	S	M	S	S	S	M	S
CO4	S	S	S	S	S	S	M	S	M	S	S	M	S
CO5	S	S	S	S	S	S	S	M	S	S	S	S	M
CO5	S	M	M	S	S	S	S	M	S	M	S	S	M

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – III

SEMESTER – III

CLIMATOLOGY – I

Credit: 4 **Course Code: U21GET31** **Hours: 5**

Learning Objectives:

- The broad objective of the course is to introduce to the students the atmosphere and climates are critical parts of the earth system.
- Identifying and explaining the concept of distribution of temperature over earth surface.
- The students will be able to explain the position of the atmosphere and its components.
- Students will be evaluating the classification of climate, climate change and recent issues.
- The students will have a basic knowledge of the controlling factors and distributional aspects of the atmosphere.

UNIT I **STRUCTURE AND COMPOSITION OF ATMOSPHERE:** Climatology – meaning – elements of weather and climate composition of atmosphere – structure of the atmosphere.

UNIT II **INSOLATION AND HEAT BUDGET:** Insolation – meaning – distribution of insolation – factors affecting the distribution – heat budget of the earth and the atmosphere.

UNIT III **TEMPERATURE:** Transfer of heat energy – heating of the atmosphere by conduction – convection – radiation – absorption – reflection and scattering – controlling factors of temperature distribution – diurnal – seasonal – horizontal and vertical – distribution of temperature – normal lapse rate – inversion of temperature.

UNIT IV **PRESSURE:** Definition – Pressure gradient – pressure types – variations in atmospheric pressure –horizontal distribution of pressure and pressure belts.

UNIT V **ATMOSPHERIC PRESSURE BELT AND WIND SYSTEM:** Atmospheric motion-pressure gradient and air circulation – coriolis force – frictional force – geostrophic winds – gradient winds – General circulation – Planetary wind belt – seasonal winds – monsoon – concepts of origin of monsoon wind (thermal and dynamic) – local winds – periodic local winds and non–periodic local winds – ElNino – LaNino.

TEXT BOOKS:

1. *Lal. D.S., Climatology, Chatianya Publishing House, Allahabad, 1998*
2. *Howard J. Chritchfield, General Climatology, Prentice, Hall of India Pvt Ltd, 1987*
3. *Glen. T. Trewartha and LyesH.Horn, An Introduction to Climate, International student Edition, McGraw Hill International Book Company, 1980.*
4. *Critchfield, H. J. General Climatology, Prentice Hall, Englewood Cliffs, 1998*

REFERENCE BOOKS:

1. *Trewartha, G.T., An Introduction to Climate, McGraw Hill Book Co., New York, 1968.*
2. *Woolridge and Morgan, Physical basis of Geography, Palala Press Indian Edition, 2015.*
3. *Ayoade, J.O. Introduction to Climatology for the Tropics, John Wiley and Sons Ltd., New York, 1983.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will understand the composition and structure of the atmosphere.	K2
CO2	The students will be able to explain the position of weather phenomena, winds, humidity, precipitation and heat budget.	K2
CO3	They will be able to understand the elements and processes of climates, different climatic types and climate change.	K2
CO4	Students will be understood the mean global atmospheric circulations and disturbances, world climate systems, climatic variability and change.	K4
CO5	Students will be able to identify of climatic differentiation and the consequences of human activities.	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**3**
CO3	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – III

ELECTIVE – I – BASICS OF REMOTE SENSING AND GIS

Credit: 3 **Course Code: U21GEE311** **Hours: 4**

Learning Objectives:

- The aim of this course is to introduce students to the interface of Remote Sensing and GIS
- Also introduce about to various aspects of Aerial photographs.
- It will be teach about the important elements of the Geospatial technology.
- To develop new insights among students on the relevance of geospatial studies within the field of geography.
- It gives the technical knowledge of satellite system.

UNIT I **INTRODUCTION:** Principles of remote sensing – History

UNIT II **REMOTE SENSING:** EMR – Electromagnetic spectrum – energy interactions with atmosphere and earth surface features – platforms – types of remotely sensed data.

UNIT III **AERIAL PHOTOGRAPHS:** Types, elements and uses of aerial photographs – photogrammetry.

UNIT IV **SATELLITE REMOTE SENSING:** Satellite imagery – Sensors – Multi spectral – Landsat – Thematic Mapper – LISS – Comparison of maps with aerial photographs and satellite imageries.

UNIT V **INTRODUCTION OF GIS**: Definition – history – components – DBMS – Geographic Database – Hardware and Software – Use of GIS – raster and vector – GPS – history – segments.

TEXT BOOKS:

1. *Campbell J. B., Introduction to Remote Sensing, Guildford Press, 2007.*
2. *Jensen J. R., Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, 2004.*
3. *Joseph, G. Fundamentals of Remote Sensing, United Press India, 2005.*
4. *Nag P. and Kudra, M., Digital Remote Sensing, Concept, New Delhi, 1998.*
5. *Rees W. G., Physical Principles of Remote Sensing, Cambridge University Press, 2001.*

REFERENCE BOOKS:

1. *LanHeywod, Sarah Cornelines, An Introduction to Geographical Information System I Addison, Wesley, Longman Ltd, 2000*
2. *C.S.Agarwal & P.K.Grag, Text Book of Remote Sensing, Wheeler Publishing, 2000*
3. *Gampbell. James B.I Introduction to Remote Sensing, The Guild Press , New York, 2017*
4. *Curran, Fundamentals of Remote Sensing, Longman, London, 2006*
5. *Lillesend TM & Kiefer R.W, Remote Sensing & Image Interpretation, John Wiley & sons, New York, 2004.*
6. *Luedev D.R. Aerial Photographic Interpretation Mc. Graw Hill Company, New York, 2000.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will demonstrate knowledge of the foundations and theories of geographic information systems (GIS) and use the tools and methods of GIS.	K2
CO2	Students will demonstrate their knowledge of physical geography and the methods and techniques for observing, measuring, recording and reporting on geographic phenomena.	K2
CO3	Students will demonstrate their competence to work individually and as a team to develop and present a client-driven GIS solution.	K2
CO4	Student will be familiar with modern techniques in Geography.	K4
CO5	Students will be prepared to apply their skills in professional careers for UGC NET/SLET exams and other competitive exams including the civil services.	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**3**	**2**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – III

ELECTIVE – I – REGIONAL GEOGRAPHY OF ASIA

Credit: 3 **Course Code: U21GEE312** **Hours: 4**

Learning Objectives:

- Students should learn about the geographic diversity within South, Southeast and East Asia
- Students understand how human geographers study this region of the world
- Write a substantial term project relating to the geography of Asia, exhibiting critical thinking skills
- Students will be expected to gain an appreciation for the inter-relations of Asia's physical, cultural, political and economic realms.
- To evaluate the essential differences between the various countries, the various sub- regions, and between realms of Asia and the West.

UNIT I **PHYSICAL SETTING:** Geographic Location and Extent – Locational Significance – Physical Divisions; Climate: Seasonal Pattern of Monsoons – Climatic Regions.

UNIT II **DRAINAGE SYSTEM AND NATURAL VEGETATION:** Drainage System – Soil – Natural Vegetation – Types and distribution

UNIT III **AGRICULTURE:** Farming Types – Major crops: Rice, Wheat, Cotton, Jute, Tea, Coffee and Rubber – Recent developments in Agriculture; Fishing – Inland and Marine.

UNIT IV **MINERAL RESOURCES & INDUSTRIES:** Distribution and Production of Iron ore, Manganese, Copper, Tin, Gold, Gypsum and Mica; Industries: Locational Factors – Textiles – Sugar – Iron and Steel.

UNIT V **CONTROLLING FACTORS:** Growth – Distribution and Density, Transport: Roadways – Railways – Airways – Waterways.

TEXT BOOKS:

1. *Ranjit Tirtha, Geography of Asia, Rawat Publications, Jaipur, 2001.*
2. *Negai. B.S, the continent of Asia, S. Chand and co. (Pvt) Ltd, New Delhi, 1986.*

3. *Stamp, L.D. Asia: A Regional and Economic Geography. B.I. Publication Ltd., New Delhi, 1967.*
4. *Shafi, M. Geography of South Asia. MacMillan and Co., Kolkata, 2000.*

REFERENCE BOOKS:

1. *Richard and Chorley, Introduction to Physical Hydrology, Methuen & CoLtd, 2009.*
2. *Manning, J.C, Applied Principles of Hydrology, CBS Publishers. NewDelhi, 1989.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	They can know about their land formation, climate and natural vegetation.	K2
CO2	Understand climatic condition and seasons in Asia.	K2
CO3	Understand the irrigation and agricultural developments.	K2
CO4	They understand the economic resources of Asia	K2
CO5	Evaluating the impacts of human activities on natural environments special reference to Asia	K4

K1 – Remember, **K2 – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**
CO4	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**3**	**2**	**2**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**

****Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0***

SEMESTER – III

ELECTIVE – I

CLIMATE CHANGE: VULNERABILITY AND ADAPTATION

Credit: 3 **Course Code: U21GEE313** **Hours: 4**

Learning Objectives:

- To understand the foundational concepts of climate change and its impacts.
- To assess the human and environmental vulnerability to climate change.
- To learn the various adaptation and mitigation for reducing the impacts of climate change and national action plan.
- Students will be learn about climate change to impact on human health
- Explain the National Action Plan on Climate Change

UNIT I **SCIENCE OF CLIMATE CHANGE:** Understanding Climate Change; Green House Gases and Global Warming; Global Climatic Assessment – IPCC

UNIT II **CLIMATE CHANGE AND VULNERABILITY:** Physical Vulnerability; Economic Vulnerability; Social Vulnerability

UNIT III **IMPACT OF CLIMATE CHANGE:** Agriculture and Water; Flora and Fauna; Human Health

UNIT IV **ADAPTATION AND MITIGATION:** Global Initiatives with Particular Reference to South Asia.

UNIT V **ACTION PLAN ON CLIMATE CHANGE:** National Action Plan on Climate Change; Local Institutions (Urban Local Bodies, Panchayats)

TEXT BOOKS:

1. *Singh, M., Singh, R.B. and Hassan, M.I. (Eds.) Climate change and biodiversity: Proceedings of IGU Rohtak Conference, Volume 1. Advances in Geographical and Environmental Studies, Springer, 2014.*
2. *Sen Roy, S. and Singh, R.B. Climate Variability, Extreme Events and Agricultural Productivity in Mountain Regions, Oxford & IBH Pub., New Delhi, 2002.*
3. *OECD. Climate Change Mitigation: What Do we Do? Organisation and Economic Co-Operation and Development, 2008.*
4. *UNEP. Global Environment Outlook: GEO4: Environment for Development, United*

NationsEnvironment Programme, 2007.

REFERENCE BOOKS:

1. *IPCC. Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007.*
2. *IPCC Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 2014.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Understanding the foundational concepts of climate change and its impacts	K2
CO2	Assessing the human and environmental vulnerability to climate change	K3
CO3	Learning the various adaptation and mitigation for reducing the impacts of climate change and national action plan.	K2
CO4	Students will also have knowledge about climate change to impact on agriculture and water, flora and fauna and human health	K2
CO5	Students will be able to identify of climatic change differentiation and the consequences of human activities	K4

K1 – Remember, **K2 – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**3**
CO4	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**

****Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0***

SEMESTER – III

JOB ORIENTED COURSE – I

PRACTICAL – COMPUTER APPLICATION IN GEOGRAPHY

Credit: 2 **Course Code: U21MSS31** **Hours: 2**

Learning Objectives:

- Understand the fundamentals of computer
- Explaining the Representation of population data.
- Understand the Analysis of Agricultural data.
- Explaining the Representation of industrial data.
- Explaining the Representation of transport data.

UNIT I **INTRODUCTION TO COMPUTERS:** Hardware and Software – Operating Systems - Working with Microsoft Windows – File Management – Creation of Files and Folders – Moving, Cutting, Copying, Pasting and Deleting of Files and Folders.

UNIT II **INTRODUCTION TO MICROSOFT OFFICE PACKAGE:** Word, Excel, Power Point – Outlook and Access Working with Microsoft Word – Creation of New Files, Documents, Templates – Save, Edit, Format, Insert Table, Pictures, Pages – Adding Headers and Footers – Out–put Generation.

UNIT III **WORKING WITH MICROSOFT EXCEL:** Creation of New worksheet – Formatting of Cells – Statistical Analysis of Data – Creation of Charts – Formatting Charts – Output Generation.

UNIT IV **DATA ANALYSIS:** Analysis of agricultural data – distribution of crops – dot – choropleth –piechart.

UNIT V **REPRESENTATION OF INDUSTRIAL AND TRANSPORT DATA:** Triangular graph – traffic flow – connectivity measures and binary matrix.

TEXT BOOKS:

1. *Monkhouse F.J. and Wilkinson H.R. – Maps and Diagrams – Dirton Co., Newyork, 1999.*
2. *R.P.Mishra and A.Ramesh – Fundamentals of Cartography – Concept*

publishing Company,New Delhi, 1996.

3. *Robinson A.H. and R.D.Sale-Elements of Cartography-Hjohn Wiley and Sons, NewYork, 2011.*

REFERENCE BOOKS:

1. *Singh R.L. and P.K.Dutt-Elements of Practical Geography,1969.*
2. *M.D.Zulfequar ahamad Khan – Text Book of Practical Geography,Concept Publishing Company, NewDelhi, 2001.*

Learning Outcomes

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will have a basic knowledge of the components of computer	K2
CO2	Students will learn and understand the line graphs, poly graphs and compound line graphs.	K2
CO3	Students will have an effectively Understand the dot, choropleth, pie chart.	K2
CO4	Students will have the knowledge of the triangular graph.	K3
CO5	Students will have an effectively Understand the traffic flow, connectivity measures and binary matrix.	K4

K1 – Remember, **K2 – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2**

**Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0*

SEMESTER – III

Non – Major Elective – I

PRICIPLES OF REMOTE SENSING

Credit: 2 **Course Code: 21GEN311** **Hours: 2**

Learning Objectives:

- The aim of this course is to introduce students to the interface of Remote Sensing and GIS
- Also introduce about to various aspects of Aerial photographs.
- It will be teach about the important elements of the Geospatial technology.
- To develop new insights among students on the relevance of geospatial studies within the field of geography.
- It gives the technical knowledge of satellite system.

UNIT I **INTRODUCTION -** Principles of remote sensing – History

UNIT II **EMR** – Electromagnetic spectrum – Energy interactions with atmosphere and earth surface features

UNIT III **SATELLITE REMOTE SENSING** - Platforms – Sensors

UNIT IV **AERIAL PHOTOGRAPHS** – types – elements of interpretation and uses of aerial photographs

UNIT V **SATELLITE IMAGERY** – types – visual image interpretation – uses of satellite imageries.

TEXT BOOKS:

1. *Campbell J. B., Introduction to Remote Sensing, Guildford Press, 2007.*
2. *Jensen J. R., Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, 2004.*
3. *Joseph, G. Fundamentals of Remote Sensing, United Press India, 2005.*
4. *Nag P. and Kudra, M., Digital Remote Sensing, Concept, New Delhi, 1998.*
5. *Rees W. G., Physical Principles of Remote Sensing, Cambridge University Press, 2001.*

REFERENCE BOOKS:

1. *LanHeywod, Sarah Cornelines, An Introduction to Geographical Information System I Addison, Wesley, Longman Ltd, 2000*
2. *C.S.Agarwal & P.K.Grag, Text Book of Remote Sensing, Wheeler Publishing, 2000*
3. *Gampbell. James B.I Introduction to Remote Sensing, The Guild Press , New York, 2017*

4. *Curran, Fundamentals of Remote Sensing, Longman, London, 2006*
5. *Lillesend TM & Kiefer R.W, Remote Sensing & Image Interpretation, John Wiley & sons, New York, 2004.*
6. *Luedev D.R. Aerial Photographic Interpretation Mc. Graw Hill Company, New York, 2000.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will demonstrate knowledge of the foundations and theories of geographic information systems (GIS) and use the tools and methods of GIS.	K2
CO2	Students will demonstrate their knowledge of physical geography and the methods and techniques for observing, measuring, recording and reporting on geographic phenomena.	K2
CO3	Students will demonstrate their competence to work individually and as a team to develop and present a client-driven GIS solution.	K2
CO4	Student will be familiar with modern techniques in Geography.	K4
CO5	Students will be prepared to apply their skills in professional careers for UGC NET/SLET exams and other competitive exams including the civil services.	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**3**	**2**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – III

Non – Major Elective – I

SOCIAL AND CULTURAL GEOGRAPHY

Credit: 2 **Course Code: U21GEN312** **Hours: 2**

Learning Objectives:

- Understanding the concept of space and place, religions and language groups.
- Explaining the Human health and Health care planning.
- Explaining the concept of culture, cultural regions and cultural imperialism.
- Recognize the difference between boundary and land boundary.
- Understanding the connection between Hartland theory and Rimland theory and contemporary politics.

UNIT I **Introduction -** Social Geography – Nature and scope – social structure and processes – concept of space and place –social wellbeing – quality of life – social exclusion, derivation and discrimination issues relating to under privileged groups–spatial distribution of social groups in India, tribes, castes, religions and language groups.

UNIT II **Concept of Culture And Cultural Regions in World -** Concept of culture, culture complex, culture areas and cultural regions, cultural heritage, cultural interactions, cultural diffusion and cultural ecology – cultural imperialism.

UNIT III **Health Factors -** Health – factors affecting human health – nutritional status, diseases – etiological condition, classification and distribution patterns, – Health care planning and policies in India, prospects of medical tourism in India.

UNIT IV **Development of Political Geography -** Concept of boundaries and frontiers, heart land and rim land theories – conflicts – resource, regional and ethnic human rights and conflicts resolution – recent trends and development in Political Geography.

UNIT V **Geo-Politics of World** - Geopolitics of climatic change, geopolitics of World Resources – regional organizations of cooperation (SAARC, ASEAN, OPEC, EU)

TEXT BOOKS:

1. Majid Husain – Human Geography – Rawat Publications 1994.
2. GillianC.Morgan –Human and Economic Geography, Oxford University Publications 1999.

REFERENCE BOOKS:

1. AimeVincentPerpillou-Human Geography, Longman Group limited London 1977.
2. C.Daryll Forde-Habitat, Economy and Society, Methuen Publishers 1977.
3. Chandna – Population Geography, Kalyani Publishers, 2015.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson, the students will have acquired Knowledge about the spatial distribution of social groups, religions and language groups.	K2
CO2	Students will understand an overview of the culture complex, cultural heritage and cultural imperialism.	K2
CO3	Students will understand the factors affecting human health, disease and Planning.	K3
CO4	Students will have basic concepts about boundaries and frontiers.	K2
CO5	Students will learn about the political geography.	K2

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	2	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

SEMESTER – III

ALLIED – III

STATISTICS THEORY - I

Credit: 4 **Course Code: U21STA33** **Hours: 5**

Learning Objectives:

- To make the students aware of different type of data sets and their graphical representations introducing of descriptive statistical measures, including those for two variables.
- To study the introduction of frequency distribution, graphs, histograms, frequency curve, ogives and problems of frequency
- Distinguish among different scales of measurement and their implications;
- Interpret data displayed in tables and graphically; Apply concepts of sample space and probability;
- Calculate measures of central tendency and variation for a given data set;

UNIT I **INTRODUCTION -** Meaning, Scope and Limitations of Statistics – Primary and Secondary Data – Methods of Collecting Primary Data – Sources of Secondary Data – Classification and Tabulation of Data.

UNIT II **FREQUENCY DISTRIBUTION -** Formation of Frequency Distribution – Presentation of Data – Diagrams: Bar Diagrams and Pie Diagram - Graphs: Histogram, Frequency Polygon, Frequency Curve and Ogives - Simple problems.

UNIT III **MEASURES OF CENTRAL TENDENCY -** Mean, Median, Mode, Geometric Mean and Harmonic Mean –Merits and Demerits – Properties of a Good Measure –Simple problems.

UNIT IV **MEASURES OF DISPERSION -** Range, Quartile Deviation, Mean Deviation, Standard Deviation and Co- efficient of Variation - Skewness: Meaning – Measures of Skewness – Karl Pearson's Co-efficient of Skewness and Bowley's Co-efficient of Skewness - Simple problems.

UNIT V **CONCEPT OF PROBABILITY** – Basic Concepts – Events – Equally Likely and Mutually Exclusive Events – Mathematical, Statistical Definitions of Probability – Addition and Multiplication Theorems (Without Proof) – Simple Problems.

TEXT BOOKS:

1. Rohatgi V. K. and Saleh A. K. Md. E., An Introduction to probability and Statistics. John Wiley & Sons (Asia).
2. Mukhopadhyay, P., Mathematical Statistics, new Central Book Agency Pvt. Ltd.,

Calcutta.
3. Hoel P. G., Introduction to Mathematical Statistics, Asia Publishing House.
4. Meyer P. L., Introductory Probability and Statistical Applications, Addision Wesley.
5. J.N. Kapur and H.C. Saxena, "Mathematical Statistics", S. Chand and Co.

REFERENCE BOOKS:

1. Gupta, C.B.(1978): An introduction to Statistical Methods, Vikas Pub.House, New Delhi.
2. Elhance, D.N. (1972): Fundamentals of Statistics, Kitab Mahal, Allahabad.
3. Burt, J.E., Barber, G.M., and Rigby, D.L. (2009): Elementary Statistics for Geographers (3rd Ed.), The Guilford Press.
4. A.M. Gun, M.K. Gupta and B. Dasgupta : Fundamentals of Statistics (Vol. 1) World Press Publication
5. S.C.Gupta, V.K.Kapoor : Fundamentals of Mathematical Statistics Pustakkosh Publication.
6. Hogg and Craig: Introduction to Mathematical Statistics,Pearson Publication.
7. B. L. Agrawal, "Basic Statistics", New Age Publication.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Demonstrate the background of statistics and its scopes, applications and limitations	**K2**
CO2	Identify the relevant population, sample, study units (subjects), variables, data.	**K2**
CO3	Produce and interpret graphical summaries of data and its proper application.	**K3**
CO4	Describe basic characteristics of the data distribution, including shape, center, spread, and outliers.	**K2**
CO5	Calculate and interpret numerical summary statistics as well as to have knowledge of important properties of different measurements.	**K2**

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**
CO4	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**3**

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

SEMESTER – IV

SEMESTER – IV

OCEANOGRAPHY

Credit: 4 **Course Code: U21GET41** **Hours: 4**

Learning Objectives:

- The main objective of the course is to introduce students to basic concepts of oceanography and stimulate students interest and curiosity in the many and varied sciences used in the study of the oceans
- To introduce students to the basic principles underlying physical processes in the ocean.
- Explain the distribution of sea surface temperature, pressure and salinity
- Explain the main factors that determine surface and deep ocean currents
- Students will able to the significance of marine resources and conservations.

UNIT I **INTRODUCTION OF OCEAN & TOPOGRAPHY:** Oceanography – meaning – scope and branches of oceanography – Distribution of continents and ocean – Bottom topography of Indian, Atlantic and Pacific Ocean.

UNIT II **OCEAN TEMPERATURE & SALINITY:** Temperature – Process of Heating and Cooling – distribution of temperature – horizontal and vertical – Salinity – Sources – Controlling factors – distribution of salinity – horizontal and vertical.

UNIT III **OCEAN CURRENTS:** Surface Currents – origin - Factors controlling currents – types of currents – Currents of Indian, Atlantic and Pacific Oceans – Waves and Tides.

UNIT IV **MARINE RESOURCES:** Classification – coral reef – conditions of growth types and distribution of coral reefs.

UNIT V **MARINE DEPOSITS:** Sources and types – Classification – Marine Sediments – Distribution of Sediments.

TEXT BOOKS:

1. *Sharma, R.C. and Vatal, M., Oceanography for Geographers, Chaitanya Publishing House, Allahabad, 1970.*
2. *Thurman, H.V. and Trujillo, A. P. Introductory Oceanography, Prentice Hall, New Jersey, 1997.*
3. *Pinet, P.R. Invitation to Oceanography, Jones and Bartlett Publishers, Boston, 2009.*

4. *Joseph, W.S. and Parish, H.I. Introductory Oceanography, McGraw Hill, Tokyo, 1974.*
5. *Gross, G.M. Oceanography, Macmillan Publication, New York, 1990.*

REFERENCE BOOKS:

1. *Christopherson, R. W. and Birkeland, G. H. Geosystems: An Introduction to Physical, Geography (8thEdition), Pearson Education, New Jersey, 2012.*
2. *Strahler, A.H. and Strahler, A.N. Modern Physical Geography (4/E), John Wiley and Sons, Inc., New York, 2001.*
3. *4. Khullar, D.R. Physical Geography, Kalyani Publishers, New Delhi, 2012.*
4. *Das Gupta, A.andKapoor, A.N. Principles of Physical Geography, S.C. Chand and Company Ltd. New Delhi, 2001.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson the students will become able to acquaint themselves with nature and scope of oceanography and distribution pattern of land, sea and oceans.	K2
CO2	Students will have knowledge about specific concepts of oceanography into a multidisciplinary analysis of the Earth	K2
CO3	Students will also have knowledge about ocean resources, their types and distribution and their influences upon mankind.	K2
CO4	Students will be learning about the principles involved in the generation of waves and tides and evaluate their effects on coastal processes and marine ecosystems.	K4
CO5	Students will be learning about how the oceans are connected to and drive major earth processes, such as atmospheric and oceanic circulation, climate and weather, plate tectonics, marine resources and sustainability of humans.	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**2**
CO2	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**
CO3	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**
CO4	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**3**
CO5	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – IV

CLIMATOLOGY – II

Credit: 4 **Course Code: U21GET42** **Hours: 4**

Learning Objectives:

- To understand the dynamics of the atmosphere, the ocean and the overall climatologically system.
- Students can acquire an overall knowledge about elements and factors influencing climate.
- Students will be able to understand the process of weather and climate, Climate Change & global warming.
- Students shall get to know about the different climatic systems found in the world.
- Examine the significance of air masses and associate their relationships and also human influence on climate.

UNIT I **HUMIDITY:** Water vapor – evaporation – latent heat - types of humidity – measurement of humidity – Evaporation – evapotranspiration – Condensation – forms of condensation - fog- classification of fogs.

UNIT II **CLOUDS:** Classification and characteristic features of clouds – Precipitations – forms – types and distribution of precipitation.

UNIT III **ATMOSPHERIC CIRCULATION:** Air mass – characteristics – source region – classification of air masses – fronts – concepts – classification – cyclones – origin and distribution of tropical and temperate cyclones – anti cyclones – thunderstorms- tornado – Jet streams.

UNIT IV **CLIMATIC CLASSIFICATION:** Koppen's and Thronthwaite's classifications.

UNIT V **WEATHER FORECASTING:** Meaning and importance – procedures for forecasting – tools in weather forecasting – types of weather forecasting – benefits of weather forecasting.

TEXT BOOKS:

1. *Lal. D.S., Climatology, Chatianya Publishing House, Allahabad, 1998*
2. *Howard J. Chritchfield, General Climatology, Prentice, Hall of India Pvt Ltd, 1987*
3. *Glen. T. Trewartha and LyesH.Horn, An Introduction to Climate, International student*

Edition, McGraw Hill International Book Company, 1980.

4. *Critchfield, H. J. General Climatology, Prentice Hall, Englewood Cliffs, 1998*
5. *Smith, K., Principles of Applied Climatology, McGraw Hill Book Co., London, 1975.*

REFERENCE BOOKS:

1. *Trewartha, G.T., An Introduction to Climate, McGraw Hill Book Co., New York, 1968.*
2. *Woolridge and Morgan, Physical basis of Geography, Palala Press Indian Edition, 2015.*
3. *Ayoade, J.O. Introduction to Climatology for the Tropics, John Wiley and Sons Ltd., New York, 1983.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be able to basic concepts about the structure and composition of the atmosphere and the elements of the hydrological cycle.	K2
CO2	They will learn how atmosphere and climate are a critical part of the earth system and climatic variability and change are central to the issue of current and future global environmental change.	K2
CO3	Understand the physical basis of the natural greenhouse effect, including the meaning of the term radioactive forcing.	K2
CO4	The students will be able to apply the knowledge about the process of weather and climate, Climate Change & global warming through human activities.	K4
CO5	Students will be able to develop a scientific understanding of climates and their characteristics.	K2

K1 – Remember, **K2 – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**
CO3	**3**	**2**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**3**

****Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0***

SEMESTER – IV

ELECTIVE – II – GEOGRAPHY OF TAMILNADU

Credit: 3 **Course Code: U21GEE421** **Hours: 4**

Learning Objectives:

- To understanding the general idea of location and physical aspects of Tamil Nadu State
- To learn the status of water and their irrigation types with their usage
- Students will be able to identify the different crop types and cultivating regions
- Students can acquire knowledge of different types of minerals with their relationship of industries
- Students will have a general understanding of human population patterns and various influencing factors.

UNIT I **PHYSICAL SETTINGS:** Location – relief – Drainage – Climate – soil and Natural Vegetation.

UNIT II **IRRIGATION AND RIVER VALLEY PROJECTS:** Irrigation types – multipurpose projects

UNIT III **AGRICULTURE:** Rice – Cotton – Sugarcane – Coffee Tea – Agricultural regions.

UNIT IV **RESOURCES & MAJOR INDUSTRIES:** Minerals – Iron – Coal – Bauxite; Industries – textile Industries – sugar Industry – cement Industry – Industrial regions.

UNIT V **POPULATION:** Growth, distribution, density and problems; Transport and Trade.

TEXT BOOKS:

1. *R.L. Singh, India Regional Geography – VBS publishers and Distributors Ltd.,NewDelhi, 1995.*
2. *Dr. A. Ramesh and P.S. Tiwari, Basic Resource Atlas Tamil Nadu, University of Madras, 1983*
3. *Poduval R.N, Foodgrain Economy of Tamil Nadu Problems and Prospects, Emerald Publishers, Chennai, 1987.*

4. *Spate, O.H.K. and Learmonth, A.T.A. India and Pakistan: A General and Regional Geography, Methuen Publications, London, 1967.*

REFERENCE BOOKS:

1. *Velappan D, Economic Development of TamilNadu, Emeral Publishers, Chennai, 1986.*
2. *Ranjet Tirtha & Gopala Krishnan, Geography of India, Rawat Publications, Jaipur, 1996.*
3. *Prithvish Nag & Smitha Sengupta, Geography of India, Concept publishing company, NewDelhi, 1999.*
4. *SHBoTN. Statistical Hand Book of Tamil Nadu, Department of Economics and Statistics, Government of Tamil Nadu, Chennai, 2004.*
5. *TNEA. Tamil Nadu, An Economic Appraisal 2011-12 to 2013- 14. Department of Evaluation and Applied Research, Chennai, 2014.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students can understand about the various physical features, climate and natural vegetation.	K2
CO2	To identify the nature of irrigation types and various multipurpose projects with help of agricultural activity	K4
CO3	Students will be identifying the different types of crops and their cultivated regions.	K2
CO4	Students will be able to understanding the location of industries and their availability of mineral resources.	K4
CO5	Students will have a fair knowledge about various population characteristics in relation to transport and trade	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – IV

ELECTIVE – II – POLITICAL GEOGRAPHY

Credit: 3 **Course Code: U21GEE422** **Hours: 4**

Learning Objectives:

- To understand the development of group identities such as nations and examine the linkages between these identities and the political organization of territory.
- To examine states emergence with an emphasis on how internal and external forces work centripetally and centripetally on the integrity of state territories.
- To develop an appreciation for the effects of boundaries on economic, political, and social processes.
- To study in relevant details theoretical concepts and challenges underpinning the study of geography and politics.
- To identity the political, economic, and environmental forces that are undermining the modern nation-state system.

UNIT I **POLITICAL GEOGRAPHY:** Definition, scope, content and development – Geopolitics – State: Powers and functions of the state – Categories of the state – Nations and Nationalism.

UNIT II **CORE AREAS:** Types, Capitals – Types, Morphological classification, Factors of development, Federal capitals – New and neutral capitals – Capitals in post – 1945 federations.

UNIT III **BOUNDARIES AND FRONTIERS:** Definition, boundary classification, Genetic and functional, Morphological classification (Buffer zone – Land locked countries) – Border disputes.

UNIT IV **ELECTORAL GEOGRAPHY:** Geography of elections – Geography of campaigning, Voting pattern, Voters participation – Opinion poll – Gerry Mandering – Election Commission.

UNIT V **POLITICAL GEOGRAPHY OF INDIA:** Integration of Indian states – Integration of Sikkim – India's bilateral relationship with China, Pakistan and Sri Lanka – SAARC countries - India's foreign policy.

TEXT BOOKS:

1. *Adhikari, Sudeepta, Political Geography of India, Sharda Pustak Bhawan, Allahabad, 2008.*

2. *Bose, Sugata and Ayesha Jalal (eds.), Nationalism, Democracy and Development, Oxford University Press. New Delhi, 1998.*
3. *Brass, Paul, Politics of India since Independence, Cambridge University Press. Cambridge, 1992.*
4. *Cohen Sayl, B., Geography and Politics in a divided world, OUP, New York, 1973.*
5. *De Blij Harm, J., Systematic Political Geography, John Wiley and sons, New York, 1980.*

REFERENCE BOOKS:

1. *Dikshit, R.D., Political Geography of Federalism: An Inquiry into Origins and Stability, Macmillan publication. New Delhi, 1975.*
2. *Dikshit, R.D. Political Geography: A contemporary perspective, McGraw Hill Publishing co., New Delhi, 1982.*
3. *Muir, R., Modern Political Geography, Macmillan, London, 1981.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be able to trace the connection between historical process of state formation and modern developments	K2
CO2	To be able to analyse and interpret the key stages in the formation of the modern nation-state	K2
CO3	To understand the origins of political systems and be able to draw on the examples of different regions to explain the diversity of world orders today	K2
CO4	To be able to apply geopolitical theory to analysing the phenomenon of failed states and its implications for the international politics	K3
CO5	To understand the politics of integration and be able to articulate potential challenges to the conventional understanding of sovereignty	K2

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO3	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**

****Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0***

SEMESTER – IV

ELECTIVE – II – SUSTAINABLE DEVELOPMENT

Credit: 3 **Course Code: U21GEE423** **Hours: 4**

Learning Objectives:

- Students will be able to define sustainability and identify major sustainability challenges.
- Students will have an understanding of the carrying capacity of ecosystems as related to providing for human needs.
- Students will be able to apply concepts of sustainable development to address sustainability challenges in a global context.
- Students will identify, act on, and evaluate their professional and personal actions with the knowledge and appreciation
- Interconnections among economic, environmental, and social perspectives

UNIT I **SUSTAINABLE DEVELOPMENT:** Definition, Components, Limitations and Historical Background.

UNIT II **THE MILLENNIUM DEVELOPMENT GOALS:** National Strategies and International Experiences

UNIT III **SUSTAINABLE REGIONAL DEVELOPMENT:** Need and examples from different Ecosystems.

UNIT IV **INCLUSIVE DEVELOPMENT:** Education, Health; Climate Change: The role of higher education in sustainable development; The human right to health; Poverty and disease; The Challenges of Universal Health Coverage; Policies and Global Cooperation for Climate Change

UNIT V **SUSTAINABLE DEVELOPMENT POLICIES AND PROGRAMMES:** The proposal for SDGs at Rio+20; Illustrative SDGs; Goal-Based Development; Financing for Sustainable Development; Principles of Good Governance; National Environmental Policy, CDM.

TEXT BOOKS:

1. *Osorio, Leonardo et al, "Debates on sustainable development: towards a holistic view of reality".Environment, Development and Sustainability 7: 501-518, 2005.*
2. *Robbins, Paul, Political Ecology: A Critical Introduction. Blackwell Publishing, 2004.*

3. *Ayers, Jessica and David Dodman, "Climate change adaptation and development I: the state of thedebate". Progress in Development Studies 10 (2): 161-168, 2010.*
4. *Baker, Susan, Sustainable Development. Milton Park, Abingdon, Oxon; New York, N.Y.: Routledge. (Chapter 2, "The concept of sustainable development"), 2006.*

REFERENCE BOOKS:

1. *Agyeman, Julian, Robert D. Bullard and Bob Evans (Eds.), Just Sustainabilities: Development in anUnequal World. London: Earthscan, 2003.*
2. *Brosius, Peter, "Endangered forest, endangered people: Environmentalist representations ofindigenous knowledge", Human Ecology 25: 47-69, 1997.*
3. *Lohman, Larry, "Re-imagining the population debate". Corner House Briefing 28, 2003.*
4. *Martínez-Alier, Joan et al, "Sustainable de-growth: Mapping the context, criticisms and future prospects of an emergent paradigm" Ecological Economics 69: 1741-1747, 2010.*
5. *Merchant, Carolyn (Ed.) Ecology. Atlantic Highlands, N.J: Humanities Press. (Introduction, pp 1-25.), 1994.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will have acquired Knowledge about the sustainable development of components, limitations and historical background.	K2
CO2	Students will understand an overview of the millennium development goals of the national strategies and international experiences	K2
CO3	Students will understand the different ecosystems.	K2
CO4	Students will have basic concepts about challenges of universal health coverage, policies and global cooperation for climate change	K4
CO5	Students will learn about the good governance.	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**2**
CO2	**3**	**2**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**
CO4	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – IV

SBE – II – COMPUTER SKILLS FOR OFFICE MANAGEMENT

Credit: 2 **Course Code: U21CSS42** **Hours: 3**

Learning Objectives:

- Learn to basic information about desktop/laptop.
- Learn to create, edit, file management using MS-Word and MS-Excel.
- Working knowledge in MS-Powerpoint.
- Will get knowledge in Introduction to access and Power point.
- To equip Internet and advanced Communication.

Learning Outcomes:

After the completion of the course, students will be able to

1. Understand to create document and prepare formatted reports with precision and accuracy.
2. Apply the knowledge of mathematical formulae and make the calculation easier for enormous data
3. To study about in Introduction to access and Power point and prepare Power point for their relevant topic
4. Understand Internet and advanced Communication
5. Apply, analysis and evaluate to handle desktop/taptop, MS-Word, MS-Excel, MS-Powerpoint, access internet and communication

UNIT I **DEFINITION OF OPERATING SYSTEM:** Functions of OS - Types of OS: Single user, Multi-User, multi-task, RTOS, Single-user, Multi-tasking – Windows Desk top

UNIT II **INTRODUCTION TO OFFICE - OPEN OFFICE – WRITER:** Word - Working with Documents--Open Office writer-formatting documents-Creating Tables- Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula, Insertion of Objects: Equation Editor, Organizational Chart, Drawing - Inserting ClipArts, Pictures/Files etc., Tools – Word Completion, Spell Checks, Mail merge, Templates, Creating contents for books, Creating Letter/Faxes, Creating Web pages, Using Wizards, Tracking Changes, Security, Digital Signature. Printing Documents – Shortcut keys

UNIT III **INTRODUCTION TO EXCEL:** Spread Sheet & its Applications, Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets- Formatting Spreadsheets-OpenOffice-Calc - Introduction – Introduction to Spreadsheets, Overview of a Worksheet, Creating Worksheet & Workbooks, Organizing files, Managing files & workbooks, Functions & Formulas, Working with Multiple sheets, Creating Charts & Printing Charts – Operating with Excel documents, which are already created and saved in Excel

UNIT IV **INTRODUCTION TO ACCESS AND POWER POINT:** Access: Introduction, Planning a Database, Starting Access, Access Screen, Creating a New Database, Creating Tables, Working with Forms, Creating queries, Finding Information in Databases, Creating Reports, Types of Reports- Power point: Introduction to presentation – Opening new presentation, Different presentation templates, Setting backgrounds, Selecting presentation layouts. Creating a presentation - Setting Presentation style, Adding text to the Presentation.

UNIT V **INTERNET AND ADVANCED COMMUNICATION:** Internet and Web Browsers-internet browsing, searching - Search Engines - Portals - Social Networking sites- Blogs - viewing a webpage, downloading and uploading the website; Creating an email-ID, e-mail reading, saving, printing, forwarding and deleting the mails, checking the mails, viewing and running file attachments, addressing with cc and bcc-Introduction to various devices & Applications: Other than the computers, (electronic gadgets), which are widely using by executives in the Offices – Tablet, Smart Phone – concept of mobile phone and Tablet and their uses – Various applications using by Tablets and Smart Phones such as UC browser, WhatsApp, Maps, Skype, e payments.

TEXT BOOKS:

1. *Sathish Jain, M.Geetha, Karthika, "MS-Office 2010 – Training Guide", BPB Publications, 2010.*
2. *Bittu Kumar, "Mastering MS-Office: Computer Skill Development: be Future Ready", BPB Publications, 2017.*

SEMESTER – IV

NME – II – GEOGRAPHICAL INFORMATION SYSTEM

Credit: 2 **Course Code: U21GEN411** **Hours: 2**

Learning Objectives:

- They can know about concept and components of Geographical Information System.
- Know about GIS data structures.
- Students will able to an idea about GIS Data Analysis.
- They understand the satellite remote sensing
- Students understand the Global Positioning System.

UNIT I **INTRODUCTION:** GIS – Definition – history – components – hardware – software – data – people

UNIT II **GIS DATA TYPES:** Geographic data – point, line and area – spatial data and non spatial data

UNIT III **GIS DATA STRUCTURES:** Data model – raster and vector – data conversation – digitization – errors

UNIT IV **GIS DATA ANALYSIS:** Database Management System (DBMS) – use of GIS

UNIT V **INTRODUCTION Of GPS:** GPS - Definition – history – segments – uses

TEXT BOOKS:

1. *Campbell J. B., Introduction to Remote Sensing, Guildford Press, 2007.*
2. *Jensen J. R., Introductory Digital Image Processing: A Remote Sensing Perspective, Prentice Hall, 2004.*
3. *Joseph, G. Fundamentals of Remote Sensing, United Press India, 2005.*
4. *Nag P. and Kudra, M., Digital Remote Sensing, Concept, New Delhi, 1998.*
5. *Rees W. G., Physical Principles of Remote Sensing, Cambridge University Press, 2001.*

REFERENCE BOOKS:

1. *C.S.Agarwal & P.K.Grag, Text Book of Remote Sensing, Wheeler Publishing, 2000*
2. *Gampbell. James B.I Introduction to Remote Sensing, The Guild Press , New York, 2017*
3. *Curran, Fundamentals of Remote Sensing, Longman, London, 2006*

4. *Lillesend TM & Kiefer R.W, Remote Sensing & Image Interpretation, John Wiley & sons, New York, 2004.*
5. *Luedev D.R. Aerial Photographic Interpretation Mc. Graw Hill Company, New York, 2000*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will acquire knowledge regarding the use of modern tools and technology like GPS, GIS in geographical studies and can apply this knowledge in any field of study.	K3
CO2	They can know about concepts, components, development, and types of GIS	K2
CO3	Students can acquire a broad knowledge regarding GIS and can developed idea about aerial photographs, satellite imagery etc.	K4
CO4	They understand about Aerial photography and Satellite Remote Sensing.	K2
CO5	Develop an idea about interpretation and application of GIS	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	3	3	3	2	2	3	2
CO2	3	3	2	3	2	3	3	3	3	2	3
CO3	3	2	2	2	2	3	3	2	2	3	2
CO4	3	2	3	3	3	3	3	3	3	2	3
CO5	3	3	3	3	2	3	3	2	2	2	2

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – IV

NME – II – NATURAL REGIONS OF THE WOLRD

Credit: 2 **Course Code: U21GEN412** **Hours: 2**

Learning Objectives:

- They can know about concept and components of Geographical Information System.
- Know about Natural Regions of the World.
- Students will able to an idea Tropical Monsoon Region.
- They understand the World Deserts
- Students understand the Climate, Natural Vegetation, Animal life, Human life and Economic Development.

UNIT I **INTRODUCTION:** Definition – Natural Regions of the World – Equatorial Region: Situation and extent, Climate, Natural Vegetation, Animal life, Human life and Economic Development.

UNIT II **TROPICAL REGION:** Tropical Monsoon Region – Tropical Savanna – Climate – Soil – Vegetation – Life in Tropics – Economic Activity.

UNIT III **ARID REGION:** World Deserts – Hot Deserts – Cold Deserts – Climate – Soil – Vegetation – Life in Deserts – Economic Activity.

UNIT IV **TEMPERATE REGION:** World Grasslands – (Prairies – Pampas – Downs – Valdes – Canterbury) Climate – Soils – Life in Temperate Regions – Economic activity.

UNIT V **TUNDRA REGION:** Arctic Region – Climate – Vegetation – Life in Tundra Region - Economic Activity.

TEXT BOOKS:

1. *Heintzelman, O.H. and Highsmith R.M. World Regional Geography, Prentice Hall Ltd., New Delhi, 1973.*
2. *Hussain, M. World Geography. Rawat Publication, New Delhi, 2004.*
3. *Robinson, H. Monsoon Asia. McDonald and Evans Ltd., Plymouth, 1977.*

REFERENCE BOOKS:

1. *Stamp, L.D. Asia: A Regional and Economic Geography. B.I. Publication Ltd., New Delhi, 1967.*

2. *Tirtha, R. Geography of Asia. Rawat Publication, New Delhi, 2005.*
3. *Wheeler, J., Kostabade, R. and Thoman, R.S. Regional Geography of the World. Holt Rinehart and Winston, New York, 1969.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will acquire knowledge regarding the Equatorial Region	K2
CO2	They can know about Tropical Monsoon Region, Tropical Savanna, Climate, Soil, Vegetation, Life in Tropics and Economic Activity	K2
CO3	Students can acquire a broad knowledge regarding World Grasslands	K2
CO4	They understand about Arid Region.	K2
CO5	To help Students learn more about their local area and describe how places make them feel.	K3

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**
CO3	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**3**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – IV

ALLIED – IV

STATISTICS THEORY - II

Credit: 4 **Course Code: U21STA44** **Hours: 5**

Learning Objectives:

- To study the concept of random sample from a distribution, sampling distribution of a statistic, standard errors of important estimates such as mean and proportions.
- To study about important inferential aspects such as point estimation, test of hypotheses and associated concepts,
- To study about inferences from Binomial, Poisson and Normal distributions as illustrations,
- To study about order statistics and associated distributions,
- To study the concept about non-parametric method and some important non-parametric tests.

UNIT I **INTRODUCTION -** Correlation – Scatter Diagram - Karl Pearson's Co-efficient of Correlation - Spearman's Rank Correlation – Regression – Construction of regression equations - Difference between Correlation and Regression – Simple Problems

UNIT II **SAMPLING METHODS** – Advantages and Limitations – Sampling and Non-Sampling Errors – Random sampling methods - Simple Random, Systematic and Stratified Sampling Methods – Non-Radom sampling methods (No Derivations, Only Concepts).

UNIT III **SAMPLING DISTRIBUTION** – Standard Error – Tests of Significance – Null and Alternative Hypotheses – Type I and Type II Errors – Large Sample Tests – Test for Single Mean, Difference of Means, Single Proportion and Difference of Proportions – Simple Problems.

UNIT IV **SMALL SAMPLE TESTS** - Student's' test – Test for Single Mean and Difference of Means(independent and paired samples) – Chi-Square Test –Test for Independence of Attributes and Goodness of Fit – F- test for Equality of Two Variances.

UNIT V **ANALYSIS OF VARIANCE** – Assumptions – One way and Two way Classifications (No Derivations) – Simple Problems.

TEXT BOOKS:

1. Rohatgi V. K. and Saleh A. K. Md. E., An Introduction to probability and Statistics. John Wiley & Sons (Asia).
2. Mukhopadhyay, P., Mathematical Statistics, new Central Book Agency Pvt. Ltd., Calcutta.

3. Hoel P. G., Introduction to Mathematical Statistics, Asia Publishing House.
4. Meyer P. L., Introductory Probability and Statistical Applications, Addision Wesley.
5. J.N. Kapur and H.C. Saxena, "Mathematical Statistics", S. Chand and Co.

REFERENCE BOOKS:

1. Gupta, C.B.(1978): An introduction to Statistical Methods, Vikas Pub.House, New Delhi.
2. Elhance, D.N. (1972): Fundamentals of Statistics, Kitab Mahal, Allahabad.
3. Burt, J.E., Barber, G.M., and Rigby, D.L. (2009): Elementary Statistics for Geographers (3rd Ed.), The Guilford Press.
4. A.M. Gun, M.K. Gupta and B. Dasgupta : Fundamentals of Statistics (Vol. 1) World Press Publication
5. S.C.Gupta, V.K.Kapoor : Fundamentals of Mathematical Statistics Pustakkosh Publication.
6. Hogg and Craig: Introduction to Mathematical Statistics,Pearson Publication.
7. B. L. Agrawal, "Basic Statistics", New Age Publication.

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson, the students will have acquired Knowledge about the concept of random sample from a distribution, sampling distribution of a statistic, standard error of important estimates such as mean and proportions	K2
CO2	Students knowledge about important inferential aspects such as point estimation, test of hypotheses and associated concepts.	K2
CO3	Students will understand about inferences from Binomial, Poisson and Normal distributions as illustrations.	K3
CO4	Students will have basic knowledge about order statistics and associated distributions.	K2
CO5	Concept about non-parametric method and some important non-parametric tests.	K2

***K1**– Remember, **K2**– Understand, **K3**– Apply, **K4** – Analyze, **K5**– Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3	3	3	2	3	2
CO2	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	3	2	3	3	2	3	3	3	2
CO4	3	3	3	3	3	3	3	3	2	3	3
CO5	2	3	2	2	3	2	3	3	3	3	3

***Strongly Correlating – 3** **Moderately Correlating – 2**
Weekly Correlating – 1 **No Correlation – 0**

SEMESTER – V

SEMESTER – V

PRACTICAL – II – CLIMATIC DIAGRAM AND WEATHER MAP INTERPRETATION

Credit: 4 **Course Code: U21GEP52** **Hours: 6**

Learning Objectives:

- Diagrammatic data presentation makes it easier for a student to understand the data
- To draw graphs, using suitable axes and scales draw, interpret and compare line graph, Dispersion Diagram, frequency diagrams and climate graph.
- To identify and explain differing weather symbols and the uses and purposes of weather symbols.
- Explain the list of the some instruments that meteorologists use to collect weather data.
- To identify and describe the main human and physical features of your local area.

UNIT I **CLIMATIC DATA ANALYSIS:** Diagrammatic representation of Climatic data – Hyther graph – Climograph – Wind Rose diagram and Ergo graph.

UNIT II **REPRESENTATION OF CLIMATIC DATA:** Temperature and rainfall – Line graphs – Dispersion diagram – Isopleth maps – uses, merits and demerits – Isotherm, Isobars and Isohyets

UNIT III **INDIAN WEATHER MAP INTERPRETATION:** Weather symbols, station model – Weather map interpretation.

UNIT IV **METEOROLOGICAL INSTRUMENTS:** Maximum and minimum Thermometer, Dry and Wet Bulb Thermometer, Fortin's Barometer, Aneroid Barometer, Rain Gauge, Wind Vane, Anemometer.

UNIT V **FIELD WORK OR LOCAL GEOGRAPHY:** Field work and local geography.

TEXT BOOKS:

1. *M. Ishtiaq- Practical Geography-published by Jawahar publishers and Distributors-1994.*

2. *F.J. Monkhouse and H.R. Wilkinson – Maps and Diagrams - B.I Publications - 1952.*
3. *MD.Zulfequar Ahmad Khan-Text Book of Practical Geography - Concept Publishing Company, New Delhi-1998.*
4. *Gopalsingh - Map work and practical geography - Vikas publishing House pvt.Ltd-1996.*
5. *R.L Singh – Elements of Practical Geography, Kalyani publishers,1979*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Diagrammatic representation can be used for both the educated section and uneducated section of the society.	K2
CO2	Students will able to the graph like Hyther Graph, Climograph, and Ergo graph and difference between the Temperature and Rainfall data analysis.	K4
CO3	Describe how these instruments are used to collect weather data from many geographic locations and many altitudes.	K4
CO4	The role of satellites and computers in modern weather forecasting and meteorologists develop accurate weather forecasts	K3
CO5	To help Students learn more about their local area and describe how places make them feel.	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**3**	**2**
CO4	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**2**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – V

GEOGRAPHY OF RESOURCES – I

Credit: 4 **Course Code: U21GET51** **Hours: 5**

Learning Objectives:

- The course will provide knowledge about the concepts of different types of resources.
- It's also give knowledge about natural resource processes.
- Conservation and management of resources for sustainable development.
- Students will be able to read and interpret information on different types of physical features maps.
- Students shall get to know about the Grass land types and livestock distribution

UNIT I **INTRODUCTION:** Resource – Meaning – Concept of resources – functional – dynamic concepts – Classification of resources – renewable – nonrenewable resources.

UNIT II **LAND RESOURCES:** Land as a resource – land use types and conservation; soil as a resource – erosion and conservation; man as a resource.

UNIT III **WATER RESOURCES:** Water as a resource – uses – irrigation – transport – problems – conservation – fisheries – major fishing grounds of the world – problems.

UNIT IV **NATURAL VEGETATION:** Forest – types – products and conservation.

UNIT V **GRASSLANDS OF WORLD:** Grassland types – livestock distribution.

TEXT BOOKS:

1. *Leong G C, Morgan G C, 'Human and Economic Geography', Oxford University Press, the U.K, 2009.*
2. *Roy Prithwish, 'Economic Geography: A Study of Resources', New Central, Book Agency Pvt. Ltd, 2001.*
3. *Alka Goutham, Geography of Resources, Exploration, Conservation and Management, Sharada Pusthak Bhavan, New Delhi, 2013.*
4. *Khanna K. K. and Gupta, V. K., Economic & Commercial Geography, Sultan Chand & Sons, 1996.*

REFERENCE BOOKS:

1. *Prithvish Roy & Somnathmukerjee – Economic geography an appraisal of resources, new central book agency, culcutta, 2009.*
2. *V.K. Gupta – Economic and Commercial Geography, Sultan Chand and Sons, 1977.*
3. *S.K. Sadhukhan – Economic Geography an Appraisal of resources, S.Chandand company Ltd. – 1982.*
4. *A.Das Gupta – Economic and Commercial Geography, Mukhrjee and Co. Pvt.Ltd. 1978.*
5. *M.C.Agarwal – Commercial Geography, Himalaya Publishing House, 1981.*
6. *B.S.Negi – Economic and Commercial Geography of the World, S.Chand andCo.Ltd. 1980.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will become sensitized the classification of resources.	K2
CO2	Students will be learning conservation methods and techniques.	K2
CO3	Understanding the basic concept of resource and its various types and their utilities	K2
CO4	Acquiring basic information about potentials and management of resources like land, water, forest and power in global context.	K4
CO5	Understanding the prevailing natural resource potential and problems of management.	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**2**	**3**
CO2	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**
CO3	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – V

WORLD REGIONAL GEOGRAPHY

Credit: 4 **Course Code: U21GET52** **Hours: 5**

Learning Objectives:

- Describe what Geography and world Regional Geography are.
- Locate and define the Natural Region of the World.
- Understand the Warm temperate regions and temperate desert region.
- Explain the Cold temperate regions.
- Briefly Explain Cold regions.

UNIT I **INTRODUCTION:** Region – Definition – evolution of regional concept – characteristics of region – Types of region – Generic regions – Major generic regions – Formal – Functional – specific region.

UNIT II **NATURAL REGION OF THE WORLD:** Meaning – Criteria of delimitation of natural regions – Tropical Regions – Equatorial region – savanna region or Sudan type – tropical monsoon region – tropical deserts or Sahara type region.

UNIT III **WARM TEMPERATE REGIONS:** Mediterranean region – temperate desert region – China type region.

UNIT IV **COLD TEMPERATE REGION:** prairie type region – west European region – St.Lawrence type region

UNIT V **COLD REGIONS:** Taiga type – Tundra type – high mountain regions.

TEXT BOOKS:

1. *Heintzelman and Highsmith – World Regional Geography Prentice – Hall, India – 1965.*
2. *Don R.Hoy – Geography and Development a World Regional Approach, Collier Mac Millan Publisher – 1978.*

REFERENCE BOOKS:

1. *Goh – Cheng leong – Certificate Human and Economic Geography – Oxford University Publications – 1995.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this Lesson, the students will have acquired knowledge about the characteristics of region, Types of region, Formal, Functional and Specific region.	K2
CO2	Students will have Knowledge of the Tropical Regions, Equatorial region, Savanna region, tropical monsoon region and tropical deserts.	K2
CO3	Students will gain a better understanding of Mediterranean region, temperate desert region and chinna type region.	K3
CO4	Students will have an effective understand the Prairie type region and West European region.	K2
CO5	Students will gain Knowledge about the Taiga type, Tundra type and high mountain regions.	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**3**	**2**	**2**	**2**	**3**	**2**	**3**	**3**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – V

HUMAN GEOGRAPHY

Credit: 4 **Course Code: U21GET53** **Hours: 5**

Learning Objectives:

- This paper gives an overall idea about human environment relationship in different environmental condition
- To develop an idea about the world population distribution and the factors that lead to uneven distribution of the population.
- It also focuses on the problem that is likely to arise due to an increase in the world population.
- Students will be able to locate on a map major physical features, cultural regions, and individual states and urban centers.
- Students will understand global and regional patterns of cultural, political and economic institutions, and their effects on the preservation.

UNIT I **NATURE AND PRINCIPLES:** Scope and content, definition – different viewpoints – concept of determinism, Possibilism and Probabilism – Recent trends in human geography – branches in human geography.

UNIT II **SPACE AND SOCIETY:** World cultural regions – Food gatherers – Semang and Sakai; Hunters – Bushmen – Cultivators – People of the Malabar coast – Nomads- Masai and levels of culture in twentieth century.

UNIT III **HUMAN RACE IN WORLD:** Human Races – Classification – Distribution – Religion – Major types and distribution.

UNIT IV **POPULATION:** Spatial pattern of distribution – growth – problems of over population and under population – population Theory – Malthus and optimum theory – Migration – Causes – consequences and problems.

UNIT V **SETTLEMENTS:** Rural and Urban settlement – factors – types – growth – Urban morphology and functional classification of towns – Urbanization – Trend, level, – World , India.

TEXT BOOKS:

1. *Majid Husain, Human Geography, Rawat Publications, 1994.*
2. *Gillian C.Morgan, Human and Economics Geography, Oxford University Publications 1999.*

3. *Aime Vincent Perpillou, Human Geography, Longman Group limited London 1977.*
4. *C.Daryll Forde, Habitat, Economy and Society, Methuen Publishers 1977.*
5. *Ray M.Northam, Urban Geography, John Wiley and sons Publications, 1979.*

REFERENCE BOOKS:

1. *S.K.Shelar, Human geography, Chandralok Prakashan, 2012.*
2. *Amal Datta, Human Migration a social phenomenon, Mittal publication, 2003.*
3. *K.Chakraworthy, Population Geography, Mohit Publication, 2006.*
4. *R.Jagannathan, Human Geography, Dominant Publishers and Distributers, 2012*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	The students will be aware of the scope and contents of human geography.	K2
CO2	Students will acquire an understanding regarding the relationship between prevailing geographic environment and cultural practices of human being.	K2
CO3	This paper tries to build an idea among students regarding the role that geography play in community engagement.	K2
CO4	Students will have a general understanding of global human population patterns, and human impacts on the physical environment.	K3
CO5	Students will have a general understanding of how the physical environment, human societies, and local and global economic systems are integral to the principles of sustainable development.	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO3	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – V

GOEGRAPHY OF INDIA

Credit: 4 **Course Code: U21GET54** **Hours: 5**

Learning Objectives:

- This course provides an insight into different aspects of physiography, climate, regional variability and culture in India.
- Describing the Importance of the value of Regional and Regionalization of Indian.
- Students can acquire an overall knowledge of agriculture, region, industry, transport and trade of India.
- Students will understand the social distribution of population and transportation network of their country.
- They understand the economic resources of India.

UNIT I **PHYSICAL:** Location – Continent of unity in diversity – Relief – drainage – climate – soil – types and distribution – Natural vegetation – types and distribution.

UNIT II **IRRIGATION:** Need for Irrigation – Types – canal – tank – well – Multipurpose projects.

UNIT III **AGRICULTURE:** Types – Major crops – rice, wheat, millets, cotton, oilseeds, tea, coffee and jute – Agricultural regions – problems – Animal husbandry.

UNIT IV **RESOURCES & INDUSTRIES:** Minerals – coal, oil, iron ore, manganese, bauxite, copper – Power resources – Hydel, thermal and atomic – Industries – Iron and Steel, Cement, Textile, Sugar, Paper, Shipbuilding – Small scale and Cottage Industries.

UNIT V **POPULATION:** Population Growth – distribution – density and problems – Transport and trade.

TEXT BOOKS:

1. *Gopal Singh, Geography of India, Atma Ram, India, 1976.*
2. *Nag, P. and Roy, P., Geography of India, Concept Publications, New Delhi, 1998.*
3. *Tirtha, R., Geography of India, Rawat Publications, Jaipur, 1996.*

4. *Majid Hussain, Geography of India, McGraw, 2009.*
5. *Hill India Rajaram K, Geography Of India, Spectrum Books (P) Ltd, 2015.*

REFERENCE BOOKS:

1. *Ranjit Tirtha and Gopal Krishnan, Geography of India Rawat publications, Jaipur, New Delhi, 1996.*
2. *Prithvish Nag and Smita Sengupta, Geography of India, Concept Publishing Company, New Delhi, 1999.*
3. *C.B. Mamoria, Geography of India, Shivalal Agarwala & Company, Agra, 1975.*
4. *R.L. Singh, India A Regional Geography, National Geographical Society of India, 1971.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	The student will get familiarized with the geographic dimensions of India in terms of its political and administrative characteristics; aspects of its regional vitality; and formation of regions.	K2
CO2	The student will understand climatic condition and seasons in India.	K3
CO3	They understand globalization and Indian economy and also understand the regional distribution of resource.	K2
CO4	They understand the population problems in India. Access the population policies and reaction the countries.	K3
CO5	Applying the knowledge of global issues to a unique scientific problem.	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**3**
CO2	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – V

ELECTIVE – III – BIO GEOGRAPHY

Credit: 3 **Course Code: U21GEE531** **Hours: 3**

Learning Objectives:

- The broad objective of the course is to introduce to the students the concept of biogeography.
- Students will also learn the components, interpretation and application of biogeography.
- Interaction between living organisms and non-living organisms.
- The students will have a basic knowledge of Living organisms with climate and physical environment.
- Students will be evaluating the biogeochemical cycle and biodiversity conservation measures in India.

UNIT I **BASIC CONCEPTS:** Definition, scope and significance of biogeography – basic ecological concepts and principles – ecosystem – types of ecosystems – components of ecosystem – functioning of ecosystem – concepts of biome – types, ecotone and community – bio diversity.

UNIT II **EVOLUTION OF LIFE ON EARTH THROUGH GEOLOGICAL TIME:** Origin of fauna and flora – plant and animal evolution through geological times – distribution of plant life on earth and its relation to soil types – climates and human practices.

UNIT III **EXTINCTION OF FLORA AND FAUNA:** Problem of extinction of plant and animal life – habitat decay and their conservation – process of desertification – its consequences and its management principles.

UNIT IV **INDUSTRIES EFFLUENTS SPECIAL REFERENCE OF RIVERS IN INDIA:** Industrial effluent and its effect on fresh water biology – management practices (special reference to India)

UNIT V **STUDY OF ECOLOGICAL REGIONS IN INDIA:** Study of ecological regions of Himalayas and Western Ghats in relations to their plant and animal life, their Interrelations, problems – conservation and management measures.

TEXT BOOKS:

1. *MacDonald, G., Biogeography: Introduction to space, time and life. Wiley, 2001.*
2. *Eugene Pleasants Odum, Basic Ecology. Saunders College Pub; and digital edition, 2011, The University of Michigan, 1983.*
3. *G. Tyler Miller and Scott Spoolma. Essentials of Ecology. Cengage Learning, 2014.*
4. *Swarnim K, Climate, Forest, Biodiversity and Desert, Surendra Publications, New Delhi, 2012.*
5. *Gerald G Marten., Human Ecology: Basic Concepts for Sustainable Development. Taylor and Francis. USA, 2008.*

REFERENCE BOOKS:

1. *Robinson, Biogeography, ELBS Mc Donald and Evans London, 1982*
2. *L.G. Simons, Biogeographically process, Allen and Unwell, London.*
3. *C Barry, Cox, Black Well, Biographical An Ecological Evolutionary Approach, Oxford 1977.*
4. *B. Seddon, Biogeography, Duck worth, London, 1971.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be learning about the concept and relevance of biogeography, ecosystem and ecology responsible for the global trend.	K2
CO2	Students will be able to biodiversity, types of biodiversity, the role of humans in ecological disturbances and conservation issues and identify ecological aspects of the environment.	K3
CO3	Able to Geography converging and forming our biosphere.	K2
CO4	Students will be able to discuss the basics of ecosystem services and the consequences of ecosystems.	K4
CO5	Able to apply interaction of biotic and abiotic resources.	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**2**
CO2	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**2**	**2**	**2**
CO3	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**3**
CO5	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – V

ELECTIVE – III – INDUSTRIAL GEOGRAPHY

Credit: 3 **Course Code: U21GEE532** **Hours: 3**

Learning Objectives:

- They can know about their nature and scope of industrial geography.
- They understand the industrial location
- Students understanding the general idea of coal and iron based industries
- Students can acquire knowledge of different types of minerals with their relationship of industries
- Students will have a general understanding of industrial patterns and various influencing factors.

UNIT I **INTRODUCTION:** Nature and Scope of Industrial Geography

UNIT II **INDUSTRIES:** Types, Geographical Characteristics and Location of Industries (Weber's Theory): Small and Medium Industries, Heavy Industries: Coal and Iron based industries, Rural based Industries, Footloose Industry

UNIT III **MEGA INDUSTRIAL COMPLEXES:** National Capital Region, Mumbai – Pune Industrial Region, Bengaluru-Chennai Industrial Region and Chota Nagpur Industrial Region

UNIT IV **IMPACT OF INDUSTRIALIZATION IN INDIA:** Environmental; Social and Economic

UNIT V **INDUSTRIAL POLICY:** Industrial Policy of India

TEXT BOOKS:

1. *Alexander J.W. Economic Geography, Printice Hall of India Pvt. Ltd., New Delhi, 1979.*
2. *Goh Cheng Leong. "Human and economic geography", Oxford University Press, New York, 1997.*
3. *Thoman, R.S., Conkling E.C. and Yeates, M.H. Geography of Economic Activity, McGrawHill Book Company, 1968, 1968.*

4. *Miller, E. Geography of Manufacturing Printice Hall - Englewood Cliff, New Jersey, 1962.*
5. *Tiwari, R.C. Geography of India. Prayag Pustak Bhawan, Allahabad, 2007.*

REFERENCE BOOKS:

1. *Gunnar Alexandersson "Geography of Manufacturing, Prentice Hall, New Jersey Truman, 1967.*
2. *A. Harishorn, John W. Alexander " Economic Geography", Prentice Hall of India Ltd., New Delhi, 2000.*
3. *Singh, Jagdish India - A Comprehensive & Systematic Geography, Gyanodaya Prakashan,Gorakhpur, 2003.*
4. *Pathak, C. R. Spatial Structure and Processes of Development in India. Regional ScienceAssoc., Kolkata, 2003.*
5. *Sharma, T.C. Economic Geography of India. Rawat Publication, 2013.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will be able to identify the different industrial regions in India	K2
CO2	Students will gain knowledge about the Weber's Theory	K3
CO3	Students will be learning the significance of various industries.	K2
CO4	Evaluating the impacts of industrialization growth on natural environments, social and economic special reference to India	K4
CO5	After complete the lesson students got the appropriate awareness about Industrial Policy of India	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**
CO2	**3**	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	**3**	**2**
CO3	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**2**
CO4	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**
CO5	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – V

ELECTIVE – III – DISASTER STUDIES

Credit: 3 **Course Code: U21GEE533** **Hours: 3**

Learning Objectives:

- To understand basic concepts in Disaster Management
- To Understand Definitions and Terminologies used in Disaster management
- To Understand Types and Categories of Disasters
- To Understand the Challenges posed by Disasters
- To understand Impacts of Disasters

UNIT I **DISASTER:** Meaning and classification – Concepts of disaster – Hazard – Catastrophe – Risk and vulnerability – Disaster zones of India.

UNIT II **GEOLOGICAL HAZARDS:** Earthquakes - Scale of measurement - Intensity and magnitude - Earthquake prone zones - Volcanic hazards - Landslides and Tsunami.

UNIT III **CLIMATIC DISASTERS:** Cyclones – Flood – Drought – Avalanche and Frost - Forest fire.

UNIT IV **HUMAN INDUCED:** Thermal, Nuclear and chemical disaster – Health hazard, Global warming – Ground water depletion and deforestation.

UNIT V **DISASTER MANAGEMENT ORGANIZATIONS:** International – National – State and Local level - NGO - Disaster Cycle – Preparatory phase – Emergency phase, Rehabilitation and Reconstruction process – Mitigation and management. NROM – NIDM – SDMC.

TEXT BOOKS:

1. *Abbott, P.L. Natural Disasters, Wm. C. Brown Publishing Co., New York, 1996.*
2. *Agarwal Gurcharan Singh S.K., and Inderjeet Sethi, The Degrading Environment(cause of Concern) Commonwealth Publication, New Delhi, 1993.*
3. *Agarwal, S.K. Global Warming and Climate Change, A.P.H. Publications, New Delhi, 2004.*
4. *Ghosh G.K. Disaster Management, A.P.H. Publishing Corporation, New Delhi, 2008.*

5. *Goel, S. L. Disaster Management. Deep & Deep Publication Pvt.Ltd, New Delhi, 2008.*

REFERENCE BOOKS:

1. *Kumaraswamy. K, GIS for Natural Resources and Disaster Management, Union offsetprinters, Tiruchirappalli, 2009.*
2. *Narayan, B. Disaster Management. A.P.H. Publishing Corporation, New Delhi, 2009.*
3. *Nicholas, K. Geohazards, Natural and human, Prentice hall of India, Delhi, 1995.*
4. *Saxena, H.M. Natural Disasters, Wm. C. Brown Publishing Co., New York, 1996.*
5. *Singh, R. B. Disaster Management, Rawat Publications. New Delhi, 2008.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Describe Definitions and Terminologies used in Disaster Management, Types and Categories of Disasters	K2
CO2	Students will be able to challenges posed by Disasters and Impacts of Disasters	K2
CO3	Describe various disasters that India is vulnerable to, and the hazard maps that enable them to visualize their vulnerabilities	K3
CO4	To understand about the Natural Disasters its Causes and Consequences	K4
CO5	To learn about Disaster Management and Mitigation.	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**
CO3	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**3**
CO5	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – V

SBE - PRACTICAL – III

APPLICATION OF STATISTICAL METHODS IN GEOGRAPHY

Credit: 2 **Course Code: U21GES53** **Hours: 2**

Learning Objectives:

- Understanding for the student on statistical concepts to include measurements of location and dispersion, sampling, estimation, hypothesis testing, regression, and correlation analysis, multiple regression analysis.
- Students will be understood the statistical methods are applied in geography in order to make precise statements.
- Keeping the nature of data and purpose of study, students would be able to make a rational choice amongst listed various statistical methods.
- Perform Test of Hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.
- Compute and interpret the results of Multivariate Regression and Correlation Analysis, for forecasting.

UNIT I **BASIC CONCEPTS:** Data – Data sources and types of data raw data – variables – class – class limits – class boundaries – class width – class – class mark – class frequencies.

UNIT II **FREQUENCY DISTRIBUTION AND GRAPHS:** Frequency distribution – cumulative frequency – graphical representation of frequency distribution.

UNIT III **MEASURES OF FREQUENCY DISTRIBUTION:** Histogram – frequency curve – frequency polygon – cumulative frequency polygon – cumulative frequency curve.

UNIT IV **MEASURES OF CENTRAL TENDENCY:** Mean – median – mode – Skewness and Kurtosis – Selection of class intervals for mapping.

UNIT V **MEASURES OF DISPERSION:** Mean Deviation, Standard Deviation, Quartile Deviation and Coefficient Variation, Quartiles, Deciles and Percentiles

TEXT BOOKS:

1. *Ebdon D., Statistics in Geography: A Practical Approach, 1977.*
2. *Hammond P. and McCullagh P. S., Quantitative Techniques in Geography: An Introduction, Oxford University Press, 1978.*
3. *King L. S., Statistical Analysis in Geography, Prentice-Hall, 1969.*
4. *Mahmood A., Statistical Methods in Geographical Studies, Concept Pub. Co, 1977.*
5. *Pal S. K., Statistics for Geoscientists, Tata McGraw Hill, New Delhi, 1998.*

REFERENCE BOOKS:

1. *V.P. Subrahmanyam and Subramaniam, A.R. Application of water balance concept for a climatic study of droughts in south India, 1964*
2. *Sarkar, A. Quantitative geography: techniques and presentations. Orient, 2013.*
3. *Silk J., Statistical Concepts in Geography, Allen and Unwin, London, 1979.*
4. *Yeats M., An Introduction to Quantitative Analysis in Human Geography, McGraw Hill, New York, 1974.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Keeping in view the nature of data and purpose of study, students would be able to make a rational choice amongst listed various statistical methods.	K2
CO2	Demonstrate understanding of basic concepts of probability and statistics embedded in their courses.	K3
CO3	Students will be able to how to apply discrete and continuous probability distribution to various business problems.	K3
CO4	Show proficiency in basic statistical skills embedded in their courses.	K4
CO5	Students shall know how to organize, manage, and present data.	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	2	3	2	3	2	2
CO2	3	3	3	2	3	2	3	3	2	3	2
CO3	3	2	3	3	2	3	3	3	2	3	2
CO4	3	2	2	2	2	2	3	3	3	2	3
CO5	3	3	3	3	3	2	3	3	2	3	3

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – V

VALUE ADDED COURSE

FIELD WORK AND RESEARCH METHODOLOGY (PRACTICAL)

Credit: 2

Learning Objectives:

- This paper is a field based paper where students developed their field based knowledge
- Examine the introduction of Research, motivation in research, types of research, significance of research, research process and criteria of good research.
- Students able to tackle or face any problem while conducting a research project.
- To understand meed, features, development of research and sampling design and its basis types.
- Understand interpretation and report-writing techniques, mechanics of writing of Report.

UNIT I **FIELD WORK IN GEOGRAPHICAL STUDIES:** Role, Value, Data and Ethics of Field-Work

UNIT II **A CASE STUDY:** Defining the Field and Identifying the Case Study – Rural / Urban / Physical / Human / Environmental.

UNIT III **METHOD OF COLLECTION OF DATA:** Field Techniques – Merits, Demerits and Selection of the Appropriate Technique; Observation (Participant / Non Participant), Questionnaires (Open/ Closed / Structured / Non-Structured); Interview with Special Focus on Focused Group Discussions; Space Survey (Transects and Quadrants, Constructing a Sketch)

UNIT IV **QUANTITATIVE TECHNIQUE IN GEOGRAPHY:** Use of Field Tools – Collection of Material for Physical and Socio-Economic Surveys.

UNIT V **RESEARCH DESIGN:** Designing the Field Report – Aims and Objectives, Methodology, Analysis, Interpretation and Writing the Report.

PRACTICAL RECORD

1. Each student will prepare an individual report based on primary and secondary data collected duringfield work.

2. The duration of the field work should not exceed 10 days.
3. The word count of the report should be about **8000 to 12,000** excluding figures, tables, photographs,maps, references and appendices.
4. One copy of the report on A 4 size paper should be submitted in soft binding.

TEXT BOOKS:

1. *Creswell J., Research Design: Qualitative and Quantitative Approaches Sage Publications, 1994.*
2. *Dikshit, R. D. The Art and Science of Geography: Integrated Readings. Prentice-Hall of India,New Delhi, 2003.*
3. *Evans M., "Participant Observation: The Researcher as Research Tool" in Qualitative Methodsin Human Geography, eds. J. Eyles and D. Smith, Polity, 1988.*
4. *Mukherjee, Neela. Participatory Rural Appraisal: Methodology and Application. Concept Publs.Co., New Delhi, 1993.*

REFERENCE BOOKS:

1. *Mukherjee, Neela. Participatory Learning and Action: with 100 Field Methods. Concept Publs.Co., New Delhi, 2002.*
2. *Special Issue on "Doing Fieldwork" The Geographical Review 91:1-2, 2001.*
3. *Stoddard R. H., Field Techniques and Research Methods in Geography, Kendall/Hunt, 1982.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students should understand the link between quantitative research questions and data collection	K2
CO2	Learn the significance of field work in geographical studies.	K2
CO3	Understand the meaning of field and identifying the case study.	K2
CO4	Know about different types of field techniques.	K4
CO5	Develop an idea about research problems.	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**3**
CO2	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**3**	**2**	**2**
CO3	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**2**	**3**
CO5	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – VI

SEMESTER – VI

GEOGRAPHY OF RESOURCES – II

Credit: 4 **Course Code: U21GET61** **Hours: 5**

Learning Objectives:

- It is an introductory course of resource geography which is aimed at providing knowledge about the concept of resource and its classification, and the distribution, utilization and management of land, water, forest and energy resources.
- It also focuses on the natural resource and its problems of conservation and management.
- Besides, it also provides basic idea about sustainable development of resources.
- They understand the concept of different types of resources
- They learn about use and misuse of resources.

UNIT I **AGRICULTURE:** Types – intensive, extensive, wet and dry, mixed farming, subsistence farming, commercial farming and plantation agriculture.

UNIT II **RESOURCE:** Energy as a resource – coal, oil, water and a nuclear power, – non conventional – solar and wind.

UNIT III **MINERALS:** Ferrous, non – ferrous – iron ore, manganese, mica, copper and bauxite.

UNIT IV **MAJOR INDUSTRIES:** Location factors, iron and steel, automobile, shipbuilding and textile industries.

UNIT V **TRANSPORT:** Land, water and air – trade – internal and international.

TEXT BOOKS:

1. *Leong G C, Morgan G C, 'Human and Economic Geography', Oxford University Press, the U.K, 2009.*
2. *Roy Prithwish, 'Economic Geography: A Study of Resources', New Central, Book Agency Pvt. Ltd, 2001.*
3. *Alka Goutham, Geography of Resources, Exploration, Conservation and Management, Sharada Pusthak Bhavan, New Delhi, 2013.*

4. *Khanna K. K. and Gupta, V. K., Economic & Commercial Geography, Sultan Chand & Sons, 1996.*

REFERENCE BOOKS:

1. *Prithvish Roy & Somnath mukerjee, Economic geography an appraisal of resources, new central book agency, Culcutta, 2009.*
2. *V.K. Gupta, Economic and Commercial Geography, Sultan Chand and Sons, 1977.*
3. *S.K. Sadhukhan, Economic Geography an Appraisal of resources, S.Chandand company Ltd. – 1982.*
4. *A.Das Gupta, Economic and Commercial Geography, Mukhrjee and Co. Pvt.Ltd. 1978.*
5. *M.C.Agarwal, Commercial Geography, Himalaya Publishing House, 1981.*
6. *B.S.Negi, Economic and Commercial Geography of the World, S.Chand and Co.Ltd. 1980.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will become sensitized to concept and classification of resources, use or misuse and will learn conservation methods and techniques.	K2
CO2	Develop an idea about resource.	K3
CO3	Understand the agricultural recourses	K2
CO4	Acquire knowledge about different types of Mineral and power resources.	K2
CO5	Showing an awareness and responsibility for the environment.	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**
CO3	**3**	**2**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – VI

GEOGRAPHICAL THOUGHT

Credit: 4 **Course Code: U21GET62** **Hours: 5**

Learning Objectives:

- This paper is a core paper that intends to introduce students to philosophical and methodological issues in the development of the discipline of geography.
- To assess the nature and trend of ancient, modern and post-modern trends in the field of geography
- Explain the pre-history of geographical ideas in different dimension form Greek, Roman and impact of explorations and discoveries.
- Students will be evaluating the fundamental concepts in geography these are general geography was regional geography, determinism/possibilism.
- Student will be learn about the trend of Indian Geography in Colonial and postcolonial period.

UNIT I **PREHISTORY OF GEOGRAPHICAL IDEAS:** Greek, Roman, Arab – impact of exploration and discoveries.

UNIT II **MODERN GEOGRAPHICAL THOUGHT:** American, British, German, French – development of geography of India.

UNIT III **PERSPECTIVES IN GEOGRAPHY:** Dualism and dichotomy in Geography – physical Vs human, determinism Vs possibilism, qualitative Vs quantitative,

UNIT IV **RECENT TRENDS IN GEOGRAPHY:** Tradition in geography – quantitative revolutions – regional concepts.

UNIT V **NEW SYNTHESIS IN GEOGRAPHY:** Multi disciplinary approach – role of remote sensing – GPS and GIS.

TEXT BOOKS:

1. *Dikshit R. D., Geographical Thought: A Contextual History of Ideas, Prentice–Hall India, 1997.*
2. *Hartshone R., Perspectives of Nature of Geography, Rand MacNally and Co, 1959.*
3. *Holt-Jensen A., Geography: History and Its Concepts: A Students Guide, SAGE, 2011.*

4. *Johnston R. J., Geography and Geographers, Anglo-American Human Geography since 1945, Arnold, London, 1997.*
5. *Kapur A., Indian Geography: Voice of Concern, Concept Publications.*

REFERENCE BOOKS:

1. *Negi B.S. Geographical thought – Karinath Ramnathmeerat 1994.*
2. *Freeman. R. Hundred Years of geography – Hutchinson London 1970*
3. *Martin Geoffrey J., 2005: All Possible Worlds: A History of Geographical Ideas, Oxford, 2001.*
4. *Soja, Edward, Post-Modern Geographies, Verso, London. Rawat Publ., Jaipur and New Delhi, 1997.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	The paper will be useful for students in understanding perspectives on the development and contemporary trends in geography and its systematic study.	K2
CO2	Students will demonstrate an advanced understanding of the historical development of geographical thought.	K2
CO3	Develop an idea about evolution of geographical thinking and disciplinary trends in Germany, France, Britain, and United States of America.	K2
CO4	Build an idea about between environmental determinism and possibillism, systematic and regional.	K2
CO5	Know about the modern geographical thoughts and contribution of geography.	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**	**3**
CO3	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**2**
CO5	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – VI

PRACTICAL – SOCIO ECONOMIC DATA ANALYSIS AND IMAGE INTERPRETATION

Credit: 4 **Course Code: U21GEP63** **Hours: 6**

Learning Objectives:

- Understanding Population data.
- Explaining Transport analysis.
- Understand Agricultural data analysis
- Briefly Explain Index of industrial Diversification.
- Understand Nelson's and Rafiullah's methods.

UNIT I **DIAGRAMMATIC REPRESENTATION OF DATA:** Line, Bar, Isopleths

UNIT II **REPRESENTATION OF AREA DATA:** Dots and spheres, proportional circles and Choropleth

UNIT III **CONVENTIONAL SIGN AND SYMBOLS:** Conventional signs and symbols in topographical maps – NATMO maps and ordinance survey maps

UNIT IV **INTERPRETATION OF TOPOGRAPHICAL MAP:** Interpretation of SOI Topographic sheets – Relief features, land use, settlement and transportation and vegetation type

UNIT V **INTERPRETATION OF ORDNANCE SURVEY MAP:** Interpretation of Ordinance survey maps – Interpretation of aerial photographs and satellite images.

TEXT BOOKS:

1. *Dr.M. Kudrat – Digital Remote Sensing concept publishing company, NewDelhi – 1998.*
2. *K.K. Rampal – Handbook of Aerial Photography and Interpretation – concept publishing company, NewDelhi-1999.*
3. *R.K.BanerjeeBireswar Banerjee – Remote Sensing Techniques for Regional Development – Ashok Kumar Mittal Concept publishing Company – 2000.*
4. *F.J.Monkhouse and H.R Wilkinson, Maps and Diagrams, B.I. Publications, Madras, 2003.*

REFERENCE BOOKS:

1. *R.P.Misra, A. Ramesh – Fundamentals of cartography – concept publishing company – 2000.*
2. *R.L.Singh Elements of Practical Geography, Kalyani Publishres, NewDelhi, 2003.*
3. *Gopal Singh, Map work and Practical Geography, Vikas publishing house Ltd, 1986.*
4. *M.D.ZulfequarahamadKhan, Text Book of Practical Geography, Concept Publishing Company, NewDelhi, 1991.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students will learn about the Simple line graph, Semi log - log log graph, Age and Sex Pyramid, Triangular graph and Population potential map.	K3
CO2	Students will learn and understand the Connectivity measures, Alpha, Beta and Gamma indices and Accessibility measures Binary matrix.	K3
CO3	Students will know the Index of Industrial Diversification.	K3
CO4	Students will have the knowledge of the Crop Combination analysis, Weaver's, Doiand Rafiullah's methods, Crop diversification Bhatia's method.	K4
CO5	Students will gain knowledge about the Nelson's and Rafiullah's method.	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**3**
CO2	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO3	**3**	**2**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**
CO4	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – VI

PRACTICAL – FUNDAMENTALS OF MAP PROJECTIONS

Credit: 4 **Course Code: U21GEP64** **Hours: 6**

Learning Objectives:

- To understanding the general idea of maps and projections.
- To learn the graphical and polar case projection types with their usage
- Students will be able to identify the different forms of projection
- Students can acquire knowledge of how the three dimension earth drawn into two dimensional representations in a paper or sheet.
- At the end of the lesson students can get a clear idea about cartographic techniques and GIS based software's.

UNIT I **INTRODUCTION:** Properties of the maps and globe; Map Projection: General principles and classification of Projections: Construction, Properties, limitations and uses of projections.

UNIT II **ZENITHAL PROJECTIONS:** Gnomonic, Stereographic and Orthographic (Polar cases) – characteristics and their uses.

UNIT III **CONICAL PROJECTIONS:** One standard parallel, Two standard parallels, Bonne's and Polyconic projection – characteristics and their uses.

UNIT IV **CYLINDRICAL PROJECTIONS:** Simple cylindrical, Equal area cylindrical – characteristics and uses.

UNIT V **SINUSOIDAL AND MOLLWEIDE'S PROJECTIONS:** Sinusoidal and Mollweide's projections – choice of projections.

TEXT BOOKS:

1. *Zulfequar Ahmad Khan M.D, Text book of Practical Geography, concept*
2. *Pubishing Company, 1998.*
3. *Siya Ram Sharma, Practical Geography, Murali Lal & Sons Pvt.Ltd, 2008.*
4. *Singh L.R, Fundamentals of Practical Geography, Sharda Pustak Bhavan, 2009.*
5. *Gopal Singh, Map Work and Practical Geography (4th Edition), Vikas Publishing House, Ahmedabad, 1998.*

REFERENCE BOOKS:

1. *M. Ishtiaq- Practical Geography-published by Jawahar publishers and Distributors-1994.*
2. *F.J. Monkhouse and H.R. Wilkinson-Maps and Diagrams – B.I.Publications-1952.*
3. *MD.Zulfequar Ahmad Khan-Text Book of Practical Geography – Concept Publishing Company, New Delhi-1998.*
4. *R.L Singh – Elements of Practical Geography, Kalyani publishers, 1979*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students can be trained the basic principles of geographic coordinate systems in relation to the earth shape.	K2
CO2	Students will be able to identify how to drawn our earth surface in a suitable projection in our place	K3
CO3	Students will be able to identifying the different forms of projections in relation to the surface of the earth transformed into a flat surface drawn by plain paper.	K3
CO4	Students will develop a solid understanding of the distortion of various map projection on the earth surface	K2
CO5	After complete the lesson students got the appropriate awareness of coordinate system of projection in various countries of the world.	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**3**	**3**	**3**
CO2	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**2**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**2**
CO5	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – VI

REGIONAL GEOGRAPHY OF NORTH AMERICA

Credit: 4 **Course Code: U21GET63** **Hours: 5**

Learning Objectives:

- Students understanding the general idea of location and physical aspects of North America
- Understand climatic condition and seasons in North America
- Students will be able to identify the different crop types and cultivating regions
- Students can acquire knowledge of different types of minerals with their relationship of industries
- Students will have a general understanding of human population patterns and various influencing factors.

UNIT I **PHYSICAL SETTINGS**: Relief – The Canadian shield – Western mountains – interior plains – Appalachian mountains – coastal plains – drainage – The Artic – Pacific – Atlantic and Inland drainage systems – climate – Winter – Summer – climatic regions – soil – Major types – natural vegetation – major natural vegetation zones of North America.

UNIT II **AGRICULTURE:** Main crops – wheat – rice corn – cotton – tobacco – sugarcane- sugar beet – Agricultural regions of North America.

UNIT III **MINERAL AND POWER RESOURCES:** Iron ore, – copper – zinc – lead – gold – coal – petroleum – natural gas – hydroelectricity – Industries – iron and steel – cotton textile – woollen – automobile – ship building – air craft – chemical industries.

UNIT IV **POPULATION:** Distribution – density – problems – urbanization

UNIT V **TRANSPORT:** Land, water and air – Trade.

TEXT BOOKS:

1. *Jone S and Briyan – North America – Methuen. – 1963*
2. *Paterson – North America – Oxford University Press – 1984*
3. *White C – Regional Geography of Anglo America, Methuen -1979*

REFERENCE BOOKS:

1. *B.S. Negi – Economic and Commercial Geography of the World, S. Chand and Company Ltd., - 1982.*
2. *S.K. Sadhukhan – Economic Geography and appraisal of resources Chand S and company Ltd., - 1982.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	They can know about their land formation, climate and natural vegetation in North America	K2
CO2	They understand the economic resources of region.	K2
CO3	Students will be identifying the different types of crops and their cultivated regions.	K2
CO4	Students will be able to understanding the location of industries and their availability of mineral resources.	K2
CO5	Students will have a fair knowledge about various population characteristics in relation to transport and trade	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**2**	**2**
CO2	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**2**	**2**
CO3	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**2**	**2**	**2**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**3**
CO5	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – VI

ELECTIVE – IV – TRAVEL AND TOURISM

Credit: 3 **Course Code: U21GEE641** **Hours: 4**

Learning Objectives:

- Understanding the concept of tourism, leisure, history of tourism and type of tourism.
- Explaining determinants and motivation tourism.
- Describing elements of tourism, socio economic impact on tourism development.
- Students will be able to travel formalities, travel, facilities visa, passport, etc.
- Students will understand tourism planning and problem to Tamil Nadu.

UNIT I **BASIC CONCEPTS AND TYPES OF TOURISM:** Concepts of tourism and leisure – principles and purpose of geography of tourism – history of tourism – ancient – medieval – modern – Types of tourism.

UNIT II **DETERMINANTS OF TOURISM:** Determinants and motivation of tourism – measurement of tourism

UNIT III **ELEMENTS OF TOURISM:** Attraction, accommodation and accessibility Socio economic impact on tourism development

UNIT IV **TRAVEL FORMALITIES:** Tour Itinerary – Travel Agencies – International Concessions – Travel abroad- facilities- Visa, Passport, Bank restrictions – Traveler's Cheques.

UNIT V **TOURISM AND ENVIRONMENT:** Tourism and planning and development in India with Special reference to Tamil Nadu – Tourist potential – problems – planning – medical tourism

TEXT BOOKS:

1. *Robinson, H. A Geography of Tourism. Mcdonald and Evans, London, 1976.*
2. *Seth, P.N. and Bhat, S.S. An Introduction to Travel and Tourism. Sterling Publishers Private Ltd., New Delhi, 2012.*
3. *Ghosh, B. Tourism and Travel Management (2nd Edition). Vikas Publishing House Pvt. Limited. New Delhi, 2009.*

4. *Singh, A.P. Himalayan Environment and Tourism. Chugh Publications, Allahabad, 1989.*
5. *Kaul, R.N. Dynamics if Tourism: A Trilogy. Sterling Publishers Pvt. Limited, New Delhi, 1985.*
6. *Bhatia, A.K. Tourism Development: Principles and Practices. Sterling Publishers Pvt. Limited, New Delhi, 2002.*

REFERENCE BOOKS:

1. *Singh, S.N. Geography of Tourism and Recreation with Special Reference to Varanasi. Inter India Publication, New Delhi, 1985.*
2. *Das, M. India, a Tourist Paradise: Introducing a Wonderful Land and a Wonderful People. Sterling Publishers Pvt. Limited, New Delhi, 1983.*
3. *Kaul R.N., Dynamics of Tourism, NewDelhi, Sterling Publishers, 1985.*
4. *Francois Vellas and Lionel B'echerel, Greate Britain, Antony Raw Ltd., 1995.*
5. *Bhatia A.K. – Tourism Development Bangalore sterling Publishers (p) Ltd. 1999.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson students will have acquired about tourism and history of tourism.	K2
CO2	Students will have understood the tourism development.	K2
CO3	Student under the element of tourism and socio economic tourism.	K3
CO4	Acquire knowledge about the tourism potential and different tourism organizations in India.	K3
CO5	Students will be able to apply the principles of tourism to a local, regional or national community to develop a tourism policy and plan based on tourism parameters	K3

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**	**3**
CO2	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**3**	**3**
CO3	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**3**	**2**	**3**	**3**
CO4	**3**	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**
CO5	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – VI

ELECTIVE – IV – ECOLOGY OF THE WORLD

Credit: 3 **Course Code: U21GEE642** **Hours: 4**

Learning Objectives:

- Define the basic rules and concepts of the ecology science.
- Define the ecology of individual, population, community and ecosystem.
- Define the concepts that are the ambient, environment, biome, biosphere, ecosphere, ecological relationship and factors, and homeostasis.
- To understand about regional studies of the world.
- To learn about Equatorial, Tropical, Temperate and Polar Regions.

UNIT I **EQUATORIAL REGIONS:** Amazon type and Equator type: Situation, Extent, Climate, Natural vegetation, Flora and fauna, Natural resources, Human life and economic development.

UNIT II **TROPICAL REGIONS:** Monsoon, Sudan, Sahara and Caribbean – Situation, Extent, Climate, Natural vegetation Flora and fauna, Natural resources, Human life and Economic development.

UNIT III **WARM TEMPERATE REGIONS:** Mediterranean, China and Steppe - Situation, Extent, Climate, Natural vegetation, Flora and fauna, Natural resources, Human life and Economic development.

UNIT IV **COOL TEMPERATE REGIONS:** West European, Lawrence, Prairie – Situation, Extent, Climate, Natural vegetation, Flora and fauna, Natural resources, Human life and Economic development.

UNIT V **COOL TEMPERATE POLAR REGIONS:** Taiga and Tundra – Situation, Extent, Climate, Natural vegetation, Flora and fauna, Natural resources, Human life and Economic development.

TEXT BOOKS:

1. *Cole, J. A Geography of the World's Major Regions, Routledge, London, 1996.*
2. *Darshan singh manku, A Regional Geography of the world, kalyani publishers, New Delhi, 1998.*
3. *Deblij, H.J. Geography: Regions and Concepts, John Wiley, New York, 1994.*

4. *Dudley Stamp, Asia – A regional and economic Geography, Orient B.I. publisher's Pvt Limited, New Delhi, 1979.*
5. *Dudley Stamp, The World Regional Geography, Orient Longman Limited, New Delhi, 1979.*

REFERENCE BOOKS:

1. *Goh Cheng Leong, Human & Economic Geography, Oxford University Press, New York, 1982.*
2. *Khanna, K.K. and Gupta, V.K., Economic and Commercial geography, Sultan Chand and Sons, New Delhi, 1988.*
3. *Singh, R.L., India: A Regional Geography, NGSI, Varanasi, 1971.*
4. *Dudley Stamp, The World Regional Geography, Orient Longman Limited, New Delhi, 1979.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	After this lesson the students will become able to demonstrate a history of social and environmental processes that have influenced forming of the world's major cultural regions.	K2
CO2	Will become able to compare evolutionary processes of human societies under different historical, cultural and environmental perspectives.	K2
CO3	Will acquire knowledge of major regions of the world with cultural and physical features.	K2
CO4	Know about different types of region in the world	K2
CO5	Students can acquire knowledge regarding developed, underdeveloped and developing regions of the world.	K4

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**2**	**3**	**2**	**2**
CO2	**3**	**3**	**2**	**3**	**2**	**2**	**2**	**3**	**2**	**2**	**2**
CO3	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**2**	**2**	**2**	**3**	**2**	**3**	**3**
CO5	**3**	**3**	**2**	**3**	**3**	**2**	**3**	**3**	**2**	**2**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – VI

ELECTIVE – IV – GEOGRAPHY OF HEALTH

Credit: 3 **Course Code: U21GEE643** **Hours: 4**

Learning Objectives:

- Students understanding the general idea of nature, scope, significance and development of geography of health
- Understand climatic condition and seasonal diseases
- Students will be able to identify the climatic change in human health
- Students can acquire knowledge of different types of health risks
- Students will have a general understanding of human health and various influencing factors.

UNIT I **GEOGRAPHY OF HEALTH**: Nature, Scope, Significance and development.

UNIT II **GEOGRAPHICAL FACTORS AFFECTING HUMAN HEALTH:** Physical – Social and environmental Factors

UNIT III **EXPOSURE AND HEALTH RISKS:** Air pollution; household wastes; water; housing; workplace.

UNIT IV **REGIONAL PATTERN OF HEALTH AND DISEASE:** Health and Disease Pattern in Environmental Context with special reference to India, Types of Diseases and their regional pattern – Geographical perspectives of Communicable and Non communicable diseases.

UNIT V **CLIMATE CHANGE AND HUMAN HEALTH:** Changes in climate system – heat and cold; Biological disease agents; food production and nutrition.

TEXT BOOKS:

1. *Akhtar Rais (Ed.), Environment and Health Themes in Medical Geography, Ashish, Publishing House, New Delhi, 1990.*
2. *Avon Joan L. and Jonathan A Patzed. Ecosystem Changes and Public Health,Baltimin, John Hopling Unit Press(ed), 2001.*
3. *Bradley,D., Water, Wastes and Health in Hot Climates, John Wiley Chichesten, 1977.*

4. *Christaler George and Hristopoles Dionissios, Spatio Temporal Environment Health Modelling , Boston Kluwer Academic Press, 1998.*
5. *Cliff, A.D. and Peter,H., Atlas of Disease Distributions, Blackwell Publishers, Oxford, 1988.*

REFERENCE BOOKS:

1. *Murray C. and A. Lopez, The Global Burden of Disease, Harvard University Press, 1996.*
2. *Moeller Dade wed., Environmental Health, Cambridge, Harward Univ. Press, 1993.*
3. *Phillips, D.and Verhasselt, Y., Health and Development, Routledge, London, 1994.*
4. *Tromp, S., Biometeorology: The Impact of Weather and Climate on Humans and their Environment, Heydon and Son, 1980.*
5. *Gatrell, A.,and Loytonen, GIS and Health, Taylor and Francis Ltd, London, 1998.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	They can know about their Geographical factors affecting in human health	K2
CO2	They understand the health risks of region.	K2
CO3	Students will be identifying the different types of diseases.	K3
CO4	Students will be able to understanding the Climate Change and Human Health.	K4
CO5	Students will have a fair knowledge about various communicable and non – communicable diseases in relation to Geographical perspectives	K2

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**2**
CO2	**3**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**3**	**2**	**3**
CO3	**3**	**3**	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**2**
CO4	**3**	**2**	**3**	**2**	**3**	**2**	**2**	**3**	**3**	**2**	**3**
CO5	**3**	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**2**	**3**	**3**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

SEMESTER – VI

SBE – PRACTICAL – PRINCIPLES OF SURVEYING

Credit: 2 **Course Code: U21GES64** **Hours: 2**

Learning Objectives:

- Anyone have a basic, practical understanding of the survey techniques and survey related instruments are necessary in the present context
- To learn the basic survey methods like chain survey in the field study
- Students will be able to get the knowledge about simple graphical survey methods using some traditional survey method
- Students can acquire knowledge of traditional Indian survey methods
- At the end of the lesson students can get a clear idea about cartographic techniques and GIS based software's.

UNIT I **BASIC CONCEPTS OF SURVEYING AND SURVEY EQUIPMENT:** Chain

UNIT II **BASIC CONCEPTS OF SURVEYING AND SURVEY EQUIPMENT:** Prismatic Campas

UNIT III **BASIC CONCEPTS OF SURVEYING AND SURVEY EQUIPMENT:** Plane Table

UNIT IV **BASIC CONCEPTS OF SURVEYING AND SURVEY EQUIPMENT:** Dumby Level

UNIT V **BASIC CONCEPTS OF SURVEYING AND SURVEY EQUIPMENT:** Indian Clinometer

TEXT BOOKS:

1. *R.L. Singh _ Elements of Practical Geography, Kalyani Publishres, New Delhi, 1999*
2. *F.J. Monkhouse and H.R Wilkinson, Maps and Diagrams, B.I. Publications, Madras, 2005.*
3. *Gopal Singh – Map work and Practical Geography, Vikas publishing house Ltd, 1992.*

REFERENCE BOOKS:

1. *V.P. Subrahmanyam and Subramaniam,A.R. Application of water balance concept for a climatic study of droughts in south India, 1964*

2. *M.D.Zulfequar ahamad Khan –Text Book of Practical Geography, Concept Publishing Company, NewDelhi, 1996.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
CO1	Students can learn the basic principles of survey in relation to their survey instruments.	K2
CO2	They got the capability of handling the survey instruments with direct field knowledge	K3
CO3	Students can be able to do the field work using various instruments like graphical survey methods	K4
CO4	Students will be able to demonstrate an understanding to the direction related measuring survey equipment's	K4
CO5	After complete the lesson they got the appropriate knowledge of handling different survey methods	K5

***K1** – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyze, **K5** – Evaluate*

Outcome Mapping:

PO/CO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	**3**	**2**	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**
CO2	**3**	**3**	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**3**	**3**
CO3	**3**	**3**	**2**	**3**	**3**	**3**	**2**	**2**	**3**	**3**	**3**
CO4	**3**	**2**	**3**	**2**	**3**	**3**	**2**	**3**	**2**	**3**	**2**
CO5	**3**	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**3**	**2**

Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0

Department of Computer Science

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

B.Sc. COMPUTER SCIENCE

UNDER CBCS
(2021-2022 ONWARDS)

DEPARTMENT OF COMPUTER SCIENCE

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL
DEPARTMENT OF COMPUTER SCIENCE
Choice Based Credit System (CBCS)
(2021-2022 onwards)
B.SC COMPUTER SCIENCE

1. About the Programme

BSc Computer Science is a 3-year undergraduate program that deals with the subjects and topics related to Computer Science, Computer Application, and its services. The main aim of this program is to create quality professionals and research fellows who can work in every sector of the world by implementing the technology of Computer Systems and Software.

This degree can lead them to profiles like computer scientist or an information systems manager or a networking specialist. It ensures efficient management of the available computer facilities, handle smooth functioning of the local area and wide area networking, implement cyber security systems, maintain software and hardware system upgradation, and manage system designing and technical analysis for the organisation.

It has been specifically designed for aspirants looking for a career in computers. The course covers all aspects of computers right from the basic fundamentals of computers to database systems & advanced courses like Cloud Computing, Artificial Intelligence, Internet of Things etc.

2. Program Educational Objectives [PEOs]

PEO1: To enrich knowledge in the core areas of computer science

PEO2: To provide opportunities for acquiring in depth knowledge on tools and techniques of advanced computing systems

PEO3: To enable career and entrepreneurial opportunities in IT sector among graduates

PEO4: To inculcate team spirit for handling complex problems in data analysis and research work

PEO5: To realize the impact of computing systems in societal development

3. Eligibility

The procedure for B.Sc. Computer Science admission is mostly done on the basis of merit. The basic B.Sc. Computer Science eligibility is a minimum aggregate of 50% in Class 12 with Mathematics compulsory subject.

4. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.
ii. **Medium of Instruction:** English
iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	**10**	**25**	**10**	**25**
External	**30**	**75**	**30**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions(MCQs): 2 questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	**45**
Total Marks			**75**

*** Minimum credits required to pass: 156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/ Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average

40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance lesser than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

Programme Outcomes

On successful completion of the Programme, the student will be able to

PO1: Understand the basic and advanced concepts involved in real world computing systems

PO2: Apply the algorithmic principles and computer fundamentals for computer based systems

PO3: Analyze, formulate and solve the problems in different domains using computing techniques

PO4: Understand the impact of computing systems for societal development

PO5: Collaborate with team members in developing projects and to accomplish a common objective

Programme Specific Outcomes

The students at the time of graduation will be able to

PSO1: Impart the fundamental principles and methods of Computer Science in a wide range of applications

PSO2: Apply domain knowledge and problem solving skills to solve real time problems

PSO3: Ensure career opportunities and empower good employability skills in IT sector

PSO4: Identify and utilize the tools and techniques in the design and development of Software products

PSO5: Ability to work and communicate effectively in interdisciplinary environment

B.Sc. COMPUTER SCIENCE

Course Code	Title of the Course	Credits	Hours		CIS	EIS	Total
			L	P			
FIRST SEMESTER							
U21LTA11	TAMIL I	3	6	-	25	75	100
U21LEN11	ENGLISH I	3	6	-	25	75	100
U21CST11	**Core-1**: Programming in C	4	5	-	25	75	100
U21CSP11	**Core-2**: Programming in C Lab	4	-	6	25	75	100
U21CSA11	**Allied – 1**: Discrete Mathematics	4	5	-	25	75	100
U21EVS11	Environmental Studies	2	2	-	25	75	100
U21PEPS11	Professional English for Physical Sciences – I	4	6	-	25	75	100
	Total	**24**	**36**		**-**	**-**	**700**
SECOND SEMESTER							
U21LTA22	TAMIL II	3	6	-	25	75	100
U21LEN22	ENGLISH II	3	6	-	25	75	100
U21CST21	**Core-3**: Fundamentals of Data Structures	4	5	-	25	75	100
U21CSP22	**Core-4**: Data Structures using C Lab	4	-	5	25	75	100
U21CSA22	**Allied-2**: Digital Principles & Computer Organization	4	5	-	25	75	100
U21VAE21	Value Education	3	3	-	25	75	100
U21PEPS22	Professional English for Physical Sciences – II	4	6	-	25	75	100
	Total	**25**	**36**		**-**	**-**	**700**
THIRD SEMESTER							
U21LTA33	TAMIL III	3	6	-	25	75	100
U21LEN33	ENGLISH III	3	6	-	25	75	100
U21CST31	**Core-5**: Object Oriented Programming with Java	4	5	-	25	75	100
U21CSA33	**Allied-3**: Statistical Methods	4	5	-	25	75	100
U21CSE311/ U21CSE312	**Elective I**: Object Oriented Programming using Java Lab / Graphics using C++ Lab	3	-	4	25	75	100
U21MSS31	**SBE-1**: Managerial Skills	2	2	-	25	75	100
	NME – I:	2	2	-	25	75	100
	Total	**21**	**30**		**-**	**-**	**700**
FOURTH SEMESTER							
U21LTA44	TAMIL IV	3	6	-	25	75	100
U21LEN44	ENGLISH IV	3	6	-	25	75	100

U21CST41	**Core-6**: Web Technology	4	4	-	25	75	100
U21CSP43	**Core-7**: Web Technology Lab	4	-	4	25	75	100
U21CSA44	**Allied-4:** Fundamentals of Computer Algorithms	4	4	-	25	75	100
U21CSE421 / U21CSE422	**Elective II** **1.** System Software **2.** PHP with MySQL	3	3	-	25	75	100
U21CSS42	**SBE II –** Computer Skills for Office Management	2	-	2	25	75	100
	NME – II:	2	2	-	25	75	100
	Total	**25**	**31**		**-**	**-**	**800**
FIFTH SEMESTER							
U21CST51	**Core-8**: Relational Database Management System	4	5	-	25	75	100
U21CST52	**Core-9**: Operating System Concepts	4	5	-	25	75	100
U21CST53	**Core-10**: Computer Networks	4	5	-	25	75	100
U21CST54	**Core-11:** Computer Graphics	4	5	-	25	75	100
U21CSP54	**Core-12**: Relational Database Base Management Systems Lab	4	-	5	25	75	100
U21CSE531 U21CSE532	**Elective III** 1.Multimedia & Applications 2. Cloud Computing	3	3	-	25	75	100
U21CSS53	**SBE III -**Operating System Lab	2	-	2	25	75	100
	Total	**25**	**30**		**-**	**-**	**700**
SIXTH SEMESTER							
U21CST61	**Core-13**: Software Engineering	4	5	-	25	75	100
U21CST62	**Core-14**: Mobile Application Development	4	5	-	25	75	100
U21CST63	**Core-15**: Artificial Intelligence	4	5	-	25	75	100
U21CSP65	**Core-16**: Mobile Application Development Lab	4	-	5	25	75	100
U21CSR61	**Core-17**: Project	4	-	5	25	75	100
U21CSE641 / U21CSE642	**Elective IV** 1.Internet of Things 2.R Programming	3	3	-	25	75	100
U21CSS64	**SBE IV** – Image Processing Lab	2	2	-	25	75	100
U21EAS61	Extension Activities	3	-	-	100	-	100
	Total	**28**	**30**		**-**	**-**	**800**
	Grand Total	**148**	**193**				**4200**

Non-Major Elective (NME)

The candidates, who have joined the UG Programme, can also undergo Non Major Elective offered by other Departments.

Non-Major Electives (NME) offered by Computer Science Department

Course Code	Title of the Course
U21CSN31	NME I: Web Designing using HTML
U21CSN42	NME II: Photo Designing Tools

ADDITIONAL CREDIT COURSES

COURSE CODE	COURSE	SEMESTER	CREDITS
U21CSO31	Online Course	III	2
U21CSI41	Internship	IV	2
U21CSV51	Quantitative Aptitude - Value Added Course	V	2

SEMESTER I

CODE	U21CST11	PROGRAMMING IN C	L	T	P	C
CORE - I			5	-	-	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					

OBJECTIVES:

1. To understand and develop well-structured programs using C language.
2. To learn the implementation of data structures through C language.
3. To deal with efficient memory allocation & input/output methods.
4. To improve the Problem-solving skills through computer programming.

UNIT I - INTRODUCTION

Overview of C: Introduction - character set - C tokens - keyword & identifiers –constants – variables - data types – Declarations of variables – Arithmetic, Relational, Logical, Assignment, conditional, Bit wise, special, increment and decrement operators - Arithmetic expressions - Evaluation of expression - Operator Precedence & Associativity -Mathematical functions - Reading & writing a character - Formatted input and output.

UNIT II – DECISION MAKING

Decision Statements: If, if else, switch, break, continue –the ?Operator - The GOTO statement – Loop Control Statements: Introduction – for, nested for loops – while, do-while statements – Arrays: One-dimensional - Two dimensional - Multidimensional arrays.

UNIT III – STRING HANDLING

Character string handling - Declaring and initializing string variables – Reading strings from terminal - Writing strings to screen - String handling functions - User-defined functions: Need for user defined functions – Types of functions - calling a function category of functions - no arguments and no return values – Arguments but no return values-Arguments with return values– Recursion - functions with arrays - functions with arrays -The scope and lifetime of variables in functions

UNIT IV - STRUCTURES

Structure: Definition- Structure initialization - Comparison of structure variables -Arrays of structures - Arrays within structures - Structures within structures – unions. Pointers: understanding pointers - accessing the address of a variable - declaring and initializing pointers - accessing a variable through its pointers - pointer expressions – pointers and arrays - pointers and character strings - pointers and functions - pointers and structures.

UNIT V – FILE MANAGEMENT

File Management in C: defining and opening a file - closing file - I/O operations on files - error handling during I/O operations - Random access to files - command line arguments. Dynamic memory allocation: Introduction- dynamic memory allocation –MALLOC – CALLOC – REALLOC- The pre-processor

TEXT BOOK

1. E.Balagurusamy- Programming in ANSI C - Tata McGraw Hill 7th Edition, 2017.

REFERENCE BOOKS

1. Byron Gottfried - Programming with C - Tata McGraw Hill, 3rd Edition, 2013.
2. V.Rajaraman - Computer Programming in C - Prentice Hall of India Pvt. Ltd,1st Edition, 2004.
3. SmarajitGhosh - Programming in C - Prentice Hall of India Pvt. Ltd.,1st Edition, 2004
4. YashwvantKanetkar - Let us C - BPB Publications, 13th Edition, 2014.

Webliography

1.www.tutorialspoint.com
2.www.fresh2fresh.com
3.www.cprogramming.com
4. www.spoken-tutorial.org

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Apply the syntax and semantics of C language – K3
CO2: Utilize the concept of functions and arrays in solving real world problems – K3
CO3: Demonstrate structures, union and pre-processing techniques in C - K1
CO4: Designreal world problems using pointers and file concept - K3
CO5: Develop problem solving skills using C language – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S	M	S	S	M	M
CO2	S	W	M	S	M	S	W	M	S	S
CO3	S	S	W	M	M	S	S	M	S	M
CO4	S	S	S	M	M	S	S	M	S	M
CO5	M	S	S	M	M	S	S	M	M	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

CODE	U21CSP11	PROGRAMMING IN C LAB	L	T	P	C
CORE - II			-	-	6	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. Imbibe the in-depth practical experience in 'C' programming.
2. To impart knowledge on basic concepts in C
3. To make them familiar with Structure and Files in C
4. To develop C programs for real world problems

LIST OF PROGRAMS

1. Finding the Largest and Smallest of three numbers using if, if-else.
2. Checking for an Armstrong number using if, if-else
3. Solving Quadratic equations using switch statement
4. Finding the area of different shapes using switch statement.
5. Ascending and descending order of numbers using arrays.(Largest and smallest numbers)
6. Sorting of names in alphabetical order.
7. Program to search the given element by using linear search.
8. Matrix operations i) Addition ii) Subtraction iii) Multiplication iv) Transpose
9. Finding factorial of a number Using Recursive function
10. Generating Fibonacci series Using Recursive function
11. String manipulations using string functions
i) String length ii) String comparison iii) String copy
12. String manipulations without using string functions
i) String length ii) String comparison iii) String copy
13. Palindrome checking Using function
14. Counting characters, words and lines Using function
15. Generate salary slip of employees using structures.
16. Program to generate student mark list using array of structures
17. Programs for file handling (Sequential, Random)

COURSE OUTCOMES

On the successful completion of the course, students will be able to
CO1: Develop and execute programs using Operators and control Structures – K2
CO2: Develop programs in C to solve any kind of real world problem - K2
CO3: Apply the programming concepts of C in the standalone applications. - K3
CO4: Have a depth understanding in C program features – K2
CO5: Develop programming skills in C language – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	M	M	M	M	M
CO2	W	S	S	S	S	S	S	S	S	S
CO3	S	M	M	S	S	S	W	M	S	S
CO4	S	S	W	M	M	M	S	S	M	M
CO5	S	S	M	M	S	S	M	M	S	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

CODE	U21CSA11	DISCRETE MATHEMATICS	L	T	P	C
ALLIED - I			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand the problem solving method.
2. To Understand the concept of logical implications and equivalences
3. To learn about the importance of groups and its properties
4. To evaluate Boolean functions and simplify expressions using the properties of Boolean algebra.

UNIT I - SET

Review of theory of sets – Relations – Equivalence Relations – partial Order – Function – Binary Operations.

UNIT II – LOGIC CONNECTIVES

Logic – Introduction – connectives – Truth Table – Tautology – Implications – Equivalences.

UNIT III - GROUPS

Groups – Definitions & Examples – Elementary – Properties –Equivalent definitions of a group- Sub Groups – Cosets and Lagrange's Theorem.

UNIT IV - MATRIX

Matrices – Special type of Matrices – operations – Inverse of a Matrices – Elementary Transformation – Rank of Matrix – Simultaneous Linear Equation – Eigen values and Eigen vectors – Cayley Hamilton theorem.

UNIT V – POSETS AND LATTICES

Partial Ordering – Posets – Representation of finite posets by diagrams (Hasse Diagram) - Lattices – Properties – Sub Lattices -Distributive Lattices–Modular Lattices- Boolean Algebra.

TEXT BOOKS

S.Arumugam&ThangapandiIssac - Modern Algebra - Scitech Publications (India) PvtLtd ., 2015.

REFERENCE BOOKS:

1. Oscar Levin, Discrete Mathematics – An Open Introduction, 3rd Edition 2015
2. Arumugam S, Satya S.K. Jayanty - Modern Algebra - Scitech Publications (India) Pvt .Ltd, 2003

COURSE OUTCOMES:

After successful completion of the course, student shall be able to:

CO1: Understand the complexity of computational problems – K2

CO2: Think about the design of formal language which would be able to address any real time problem – K1

CO3: Improve the working flow of computational models – K2.

CO4: Evaluate Boolean functions using the properties of Boolean algebra – K2

CO5: Simplify Boolean expressions using Boolean algebra – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO 4	PSO5
CO1	S	S	M	M	M	M	M	W	M	M
CO2	S	S	S	M	M	W	M	M	S	M
CO3	S	S	S	M	M	S	M	M	S	M
CO4	S	S	S	S	M	M	M	M	S	M
CO5	S	S	W	M	M	S	M	M	S	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

sEMESTER – II

Course Code	U21CST21	FUNDAMENTALS OF DATA STRUCTURES	L	T	P	C
CORE III			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand about the operations of Stack & Queue.
2. To understand about Tree & its traversal techniques.
3. To Understand about Graphs and its components.
4. The student can get the In-depth Knowledge in dealing with Data and its Structures.

UNIT I - ARRAYS

ARRAY: Axiomatization – Ordered Lists – Sparse Matrices – Representation of Arrays.

UNIT II – STACKS AND QUEUES

STACKS AND QUEUES: Fundamentals – Amazing Problem – Evaluation of expressions – Multiple Stack and Queues.

UNIT III – LINKED LIST

LINKED LIST: Singly Linked List, Linked Stacks and Queues – The Storage Pool - Polynomial Addition – Doubly Linked list and Dynamic Storage Management – Garbage Collection and Compaction.

UNIT IV - TREES

TREES: Basic Terminology – Binary Trees – Binary Tree Representations – Binary Trees Traversal – More on Binary Trees – Threaded Binary trees –Binary Trees Representation of Trees

UNIT V - GRAPHS

GRAPHS: Terminology and Representations: Introduction – Definitions and Terminology – Graph representations – Traversal, connected components and Spanning Trees.

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TEXT BOOK

1. Ellis Horowitz SartajSahni - Fundamentals of Data Structure - Galgotia Publications, 1998.
2. Seymour Lipschutz-, Data Structures with C -Schaum's Outline Series, 2017

REFERENCE BOOKS

1. SartajSahni - Data Structures, Algorithms and Applications in C++ - McGraw Hill 1998.
2. A.Chitra, P.T.Rajan - Data Structures - Vijay Nicol Imprints Pvt Ltd, Mc,Graw Hill Education of India Pvt. Ltd., 2006.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Describe the basics of Ordered Lists and Representation of Arrays – K1
CO2: Apply the knowledge of Linked list for solving problem in the real world. – K3
CO3: Demonstrate the usage of Binary trees and Representation of Trees – K2
CO4: Illustrate the performance of Graphs representation and spanning Trees – K4

CO5: Understand the procedures for tree traversal techniques – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	M	S	M	S	M	M
CO2	S	S	S	S	M	S	S	W	S	S
CO3	S	S	S	W	M	S	S	S	S	S
CO4	S	M	M	S	M	M	M	M	M	M
CO5	S	S	W	S	M	S	S	S	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSP22	DATA STRUCTURES USING C LAB	L	T	P	C
CORE - IV			-	-	5	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To impart knowledge on Data Structures
2. To implement and differentiate single and double linked list
3. To illustrate stack to convert infix to postfix.
4. To develop programs for De queue and Dictionary

LAB EXERCISES

1. Program using array based stack push (), pop (), stack_Full() and stack_Empty() functions.
2. Program to evaluate the given postfix expression using the stack
3. Program that uses stack operations to convert a given infix expression into its postfix equivalent
4. Program to add two polynomials using linked list.
5. Program to find Union of two single Linked Lists.
6. Program to Create a singly linked list of integers.
7. Program to Delete a given integer from the above linked list.
8. Program to Display the contents of the above list after deletion.
9. Program to eliminate duplicates from Linked List
10. Program to implement all the functions of a dictionary (ADT) using hashing
11. Program to implement a double ended queue ADT an array, using a doubly linked list.
12. Program that uses functions to perform the following:
13. Program to Create a doubly linked list of elements.
14. Program to Delete a given element from the above doubly linked list.
15. Program to Display the contents of the above list after deletion.

COURSE OUTCOMES:
Upon successful completion of the course the students will be able to
CO1: Apply the concepts to solve problems using C programming language - K3
CO2: Implement the basic data structures using C – K1
CO3: Solve real world problems using C programming language – K3
CO4: Recognize the importance of Data Structure features – K4
CO5: Create linked list using stack operations – K5

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	M	M	S	S	S	W	S	S	S
CO3	S	S	W	S	S	S	S	S	W	S
CO4	S	M	M	S	M	M	S	M	M	M
CO5	S	M	M	S	S	S	S	S	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSA22	DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION	L	T	P	C
ALLIED II			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand the fundamentals of computer and its role in problem solving.
2. To acquire the concept of flow of control and program structures.
3. To learn the operation of latches, flip-flops, counters, registers and register transfers in the Computer organization.
4. To design two-level logic functions with AND, OR, NAND, NOR and XOR gates with minimum number of gate delays or literals

UNIT I: NUMBER SYSTEM

Number Representation - Number System: Binary, Hexadecimal - Octal Codes - BCD - Excess-3 - Gray Code - ASCII - EBCDIC - Binary Arithmetic - 1's Complement - 2's Complement Representation - Error Detecting Codes - Hamming Codes. Introduction - Boolean Algebra - Demorgan's Theorem - Sum Of Product method - Product of Sum method - Karnaugh Map.

UNIT II: GATES

Introduction - Logic Gates – Universal Gates – Decoder – Encoder – Multiplexer – De-multiplexer - Half Adder - Full Adder - Half Subtractor - Full Subtractor. Flip-Flops - S-R Flip-flop - J-K Flip Flops.

UNIT III: INSTRUCTIONS

Introduction: Machine Language - Assembly language – Assembler - Programming Arithmetic & Logic Operations – Input - Output Programming. Basic Computer Organization and Design Instruction Codes - Computer Registers - Computer Instruction - Timing & Control Instruction Cycles-Memory Reference Instruction.

UNIT IV:

I/O Organization - Peripheral Devices - I/O Interface - Mode of Transfers – DMA- RAM- ROM- Memory Decoding – Error detection and correction – Programmable Logic Array – Programmable Array Logic

UNIT V:

Memory Organization - Memory Hierarchy - Main Memory - Auxiliary Memory -Associative Memory - Cache Memory - Virtual Memory – Dynamic Storage management – Data Management Concepts – Programmable Logic devices

TEXT BOOKS:

1. Albert Paul Malvino& Donald P.Leach - Digital Principles and Applications - IV Edition, Tata McGraw Hill Company Limited, 2006.
2. Morris Mano - Computer System Architecture - Pearson Publication, Third Edition,1981.

REFERENCE BOOKS:

1. P. K. Sinha&PritiSinha - Computer Fundamentals - BPB Publications, 2007.
2. Dr. Anita Goel - Computer Fundamentals- Pearson Education, 2010.
3. Alexis Leon - Fundamentals of Information Technology - Vikas Publication, 2009
4. P.S.Manoharan - Digital Principles & System Design –-Revised Edition-Charulatha Publication, 2017.

COURSE OUTCOMES:

Upon successful completion of the course the students will be able to

CO1: Understand the hardware and software types and components of the computer – K2
CO2: Recognize the problem-solving fundamental key points. – K1
CO3: Sketch out the representation of numbers and codes in the computer – K1.
CO4: Know the digital computers internal components and the execution of the instructions – K2
CO5: Understand the hierarchy of memory management and usage – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	M	M	W	M	S
CO2	S	M	M	S	M	M	M	M	M	M
CO3	S	M	M	W	M	M	M	M	M	M
CO4	S	S	S	S	M	S	M	M	S	S
CO5	S	M	M	S	M	M	M	M	M	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

SEMESTER: III

COURSE CODE	U21CST31	OBJECT ORIENTED PROGRAMMING WITH JAVA	L	T	P	C
CORE - V			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:
1. To understand the object-oriented paradigm in the Java programming language.
2. To know about the Package and Interfaces.
3. To Understand about Applets.
4. To write Java application programs using proper program structure

UNIT I - Introduction
Fundamentals of Object Oriented Programming - Basic Concepts of Object-Oriented Programming – Benefits of OOP –Applications of OOP. Java Evolution – overview of Java Language

UNIT II - Basics
Constants, Variables and Data types. Operators and Expressions – Decision Making and Branching

UNIT III - Looping
Decision Making and Looping - Classes, Objects and Methods – Arrays, Strings and Vectors. Interfaces: Multiple Inheritance

UNIT IV - Packages
Packages: Putting classes together – Multithreaded Programming – Managing errors and Exception.

UNIT V - Applets
Applet Programming – Graphics Programming – Introduction to AWT packages – Introduction to Swings - Managing Input Output in Files in Java.

TEXT BOOK
E.Balagurusamy - Programming with Java, Sixth Edition – McGraw Hill Education Private Limited. 2019

REFERENCE BOOKS
1. Patrick Naughton, Herbert Schildt - The Complete Reference Java 2 - India: McGraw Hill, 5th Edition. (2006).
2. Dr.K.Somasundaram - Introduction to Java Programming -India: Jaico Publishing House. (2013).

COURSE OUTCOMES:
Upon successful completion of the course the students will be able to

CO1: Know the basics of OOP and the syntax of Java language – K1
CO2: Empower the knowledge of Input/Output functions with file manipulations using I/O – K2
CO3: Analyze GUI programming applications using AWT packages – K4
CO4: Develop Java based Applications using GUI and database Connectivity - K4

CO5: Create knowledge about the file concept in Java – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	M	M	W	M	M
CO2	S	W	M	S	M	S	M	S	S	S
CO3	S	S	S	S	S	S	S	W	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	M	M	S	M	M	M	M	M	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSA33	STATISTICAL METHODS	L	T	P	C
ALLIED -III			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To have a broad background in Statistics fundamentals and techniques.
2. To recognize the importance and value of mathematical and statistical thinking, training, and approach to problem solving, on a diverse variety of disciplines.
3. To become familiar with a variety of examples where mathematics or statistics helps accurately explain abstract or physical phenomena.
4. Creating confidence to have the versatility to work effectively in a broad range of analytic, scientific, government, financial, health, technical and other positions.

UNIT I:Organizing data:

RawData-Frequency distribution-percentage- bar graph- pie graph-histogram-cumulative frequency distributions- Arithmetic Mean – Median – Mode – Geometric Mean – Harmonic Mean.

UNIT II: Regression

Regression – Principles of Least Square – Correlation – Rank Correlation.

UNIT III:Assignment Problem

Experiments, sample space – compound events- probability- marginal and continuous probability- mutually exclusive events- Baye's Theorem – permutation and combination.

UNIT IV: Simplex Method

Binomial Distribution – Poisson Distribution – Normal Distribution (Problems only) – Some more continuous distribution.

UNIT V: Transportation Problem

χ^2 – Distribution - χ^2 Test - χ^2 test to test the goodness of fit – Test for independence of attributes.

TEXT BOOK:

1. S.ArumugamIssac - Statistics - New Gamma Publishing House, Palayamkottai, 2014.
2. Larry.J.Stephens - Beginning statistics - Schaum's Outline Series, McGraw-Hill Education; 2nd edition, January 2006

REFERENCE BOOKS:

1. S.C.Gupta, V.K.Kapoor - Element of Mathematical Statistics - Sultan Chand &Sons, 2014.
2. Dr.S.P.Gupta - Statistical Methods - Sultan Chand & Sons, 2012.

COURSE OUTCOMES:

After successful completion of the course, student shall be able to:

CO1: Acquire the knowledge of Statistics fundamentals and techniques – K1

CO2: Solve the Regression and Correlation problems – K3

CO3: Describe the solution methods using Bayes theorem – K1

CO4: Evaluate problems using various distributions – K4
CO5: Understand the importance of mathematical and statistical thinking – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	W	M	S	S	S	M	S
CO2	S	M	S	S	M	M	M	W	M	M
CO3	S	S	S	M	M	M	M	M	M	M
CO4	S	M	S	S	M	M	M	S	M	M
CO5	S	M	M	S	M	M	M	M	M	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSE311	CHOICE I	L	T	P	C
ELECTIVE -I		OBJECT ORIENTED PROGRAMMING USING JAVA – LAB	-	-	4	3
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.
2. To understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.
3. To Understand the principles of inheritance, packages and interfaces
4. The Student can develop software in the Java programming language.

Exercise:

1. Arrays and flow control statements.
2. Run time exception And I/O exception.
3. Multi- Threading.
4. Layout Management.
5. GUI Components (Labels, Check box, Menus, Text, etc.)
6. Event Handling (Focus Events, Key Events, Paint Events, Text Events, Mouse Events, Window Events, Etc.)
7. Animation and Images.
8. Java Applet.
9. Java files management methods.
10. Java Streams.
11. JDBC (Java Database Connectivity).
12. Arithmetic Operation Using Java Script
13. Prime Number Using Java Script
14. Find Largest Number in Array Using Java Script
15. Palindrome Using Java Script

TEXT BOOK

E. Balagurusamy - Programming with Java, Sixth Edition – McGraw Hill Education Private Limited. 2019

REFERENCE BOOKS

1. Patrick Naughton, Herbert Schildt - The Complete Reference Java 2 - India: McGraw Hill, 5th Edition. (2006).
2. Dr.KSomasundaram - Introduction to Java Programming -India: Jaico Publishing House. (2013).

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1: Solve problems using OOPs concept in Java – K2

CO2: Implement simple software using JAVA – K3

CO3: Implement the Input/Output functions with file manipulations using I/O Streams – K3

CO4: Implement the GUI programming applications using AWT packages – K3

CO5: Solve problems using java script operations – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	M	M	M	M	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	S	S	S	S	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSE312	CHOICE II	L	T	P	C
ELECTIVE -I		GRAPHICS USING C++ - LAB	-	-	4	3

Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze

Objectives:

1. To apply the fundamentals of Graphics primitives using C++
2. To create a program using 2D & 3D Transformations
3. To understand the features of line, circle and ellipse algorithms
4. To emphasize the properties of composite transformations in Graphics

Program List

1. Draw a Line using DDA Algorithm
2. Draw a Line using Bresenham's Line Drawing Algorithm
3. Draw a Circle using Mid Point Circle Algorithm
4. Draw an Ellipse using Mid Point Ellipse Algorithm
5. Implement various attributes of Output primitives
6. Implement 2D Transformation
7. Implement 2D Composite Transformation
8. Clip a Line using Cohen Sutherland Clipping Algorithm
9. Implement 3D Transformation
10. Implement 3D Composite Transformation

COURSE OUTCOMES:

Upon successful completion of the course the students will be able to

CO1: Apply the concepts to solve graphical primitives using C++ programming language – K3

CO2: Implement the 2D & 3D transformations using C++ - K2

CO3: Solve the real world problems using the features of clipping algorithm – K2

CO4: Recognize the importance of Composite transformations & its features – K1

CO5: Realize the importance of composite transformations and its properties – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	W	S	S	S
CO2	S	M	M	S	S	W	S	S	S	S
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	M	M	S	M	M	S	M	M	M
CO5	S	M	M	S	S	S	S	S	S	S

S – Strongly Correlating - 3 Marks

M – Moderately Correlating - 2 Marks

W-Weakly Correlating - 1 Mark

SEMESTER IV

COURSE CODE	U21CST41	WEB TECHNOLOGY	L	T	P	C
CORE VI			4	-	-	4

OBJECTIVES:

1. To understand the concept of Tables, Forms, Files, Basic Web server Controls.
2. Able to know Internet Basics and HTML.
3. To understand the concept of OLEDB connection class & Cookies.
4. Knowledge of solving web &client/server problems.

UNIT-I: Introduction to Web Designing

Internet Basic - Introduction to HTML - List - Creating Table - Linking document Frames - Graphics to HTML Doc - Style sheet - Style sheet basic - Add style to document - Creating Style sheet rules - Style sheet properties - Font - Text - List - Color and background color - Box - Display properties.

UNIT-II: Active Server Pages

ASP.NET Language Structure – Page Structure – Page event, Properties & Compiler Directives. HTML server controls – Anchor, Tables, Forms, Files. Basic Web server Controls- Label, Textbox, Button, Image, Links, Check & Radio button, Hyperlink.

UNIT-III: Designing Controls

Data List - Web Server Controls - Check box list, Radio button list, Drop down list, List box, Data grid, Repeater.

UNIT-IV: Database Connectivity

Request and Response Objects, Cookies, Working with Data - OLEDB connection class, command class, transaction class, data adaptor class, data set class. Advanced Issues - Email, Application Issues, Working with IIS and page Directives.

UNIT-V: Security

Error handling. Security - Authentication, Internet protocol (IP) Address, Secure by Secure Socket Layer (SSL) and Client Certificates

TEXT BOOK

Deitel&Deitel - Internet & World Wide Web - How to program, Pearson Education, 2012.

REFERENCE BOOKS

1.I.Bayross - Web Enabled Commercial Application Development Using HTML, DHTML, Javascript, Pen CGI - BPB Publications, 2000
2. J.Jaworski - Mastering Javascript - BPB Publications, 1999
3. T.A.Powell - Complete Reference HTML (Third Edition) - TMH, 2002
4. G.Buczek - ASP.NET Developers Guide - TMH, 2002

COURSE OUTCOMES

On the successful completion of the course, students will be able to

CO1: Learn to design web pages using HTML– K1

CO2: To gain knowledge on creating interactive web pages using ASP.Net – K2

CO3: To understand how to use Cookies and DOM – K2

CO4: To develop server-side scripting using OLEDB – K3

CO5: To gain knowledge of handling client – server programs – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	S	S	S	M	S
CO2	S	S	S	S	S	W	S	S	S	S
CO3	S	M	M	M	M	M	M	M	M	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	M	M	W	S	S	S	S	S	M

S – Strongly Correlating - 3 Marks

M – Moderately Correlating - 2 Marks

W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSP43	WEB TECHNOLOGY LAB	L	T	P	C
CORE VII			-	-	4	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. Apply the knowledge of the internet and related internet concepts that are vital in understanding web application development and analyze the insights of internet programming to implement complete application over the web.
2. To understand, analyze and apply the role of markup languages in the workings of the web applications
3. To automate the real time problems by developing & analyzing a web project and identify its elements and attributes in comparison to traditional projects.
4. The Students can choose best technologies for solving web client/server problems.

Programs using the following concepts

VB.NET

1. Enumeration
2. Exception handling
3. Constructor
4. Destructor
5. Inheritance
6. Polymorphism
7. Interface

ASP.NET

1. Designing simple Form
2. Data Grid
3. Request and Response Object
4. Cookies
5. Ad Rotator Control
6. Validator Control
7. String Functions
8. OLEDB
9. Generate the Hotspots in the image

VB SCRIPT

1. branching statements
2. Sorting
3. Looping through Arrays
4. Functions
5. Forms

TEXT BOOK

Deitel&Deitel - Internet & World Wide Web - How to program, Pearson Education, 2012.

REFERENCE BOOKS

1. I.Bayross - Web Enabled Commercial Application Development Using HTML, DHTML, Javascript, Pen CGI - BPB Publications, 2000
2. J.Jaworski - Mastering Javascript - BPB Publications, 1999
3. T.A.Powell - Complete Reference HTML (Third Edition) - TMH, 2002
4. G.Buczek - ASP.NET Developers Guide - TMH, 2002

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: To perform the basic functions of VB.NET – K2
CO2: Perform tests, resolve defects and revise existing code – K2
CO3: Develop dynamic web applications, create and consume web services – K3
CO4: Use appropriate data sources and data bindings in VB.NET / ASP.Net – K3
CO5: To develop &analyse web based projects using web technology tools – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	M	M	S	M	M
CO2	S	S	S	M	S	W	S	M	S	S
CO3	S	S	W	S	S	S	S	S	S	S
CO4	S	S	S	S	M	M	M	S	M	M
CO5	S	S	S	M	S	S	S	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSA44	FUNDAMENTALS OF COMPUTER ALGORITHMS	L	T	P	C
ALLIED -IV			4	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To write rigorous correctness proofs for algorithms.
2. To understand about the major algorithms and data structures.
3. To apply important algorithmic design paradigms and methods of analysis.
4. To analyze the complexities of various problems in different domains.

UNIT I: Introduction

Introduction: Divide and conquer: General Method-binary search-finding the maximum and minimum – Merge sort – Quick sort – Selection sort.

UNIT II: Greedy Approach

The greedy method: General method –Prim's Algorithm – Kruskal Algorithm- Minimum spanning trees- Single Source Shortest path (Dijkstra's Algorithm).

UNIT III: Dynamic Programming

Dynamic Programming: General method – Multistage graphs – All pairs shortest paths – Optimum Binary search Trees –0/1 Knapsack – the travelling salesman problem

UNIT IV: Traversal Techniques

Basic search and Traversal Techniques: The techniques – Code optimization – AND/OR graphs – Bi-connected components and Depth first search – Breadth first search.

UNIT V: Backtracking

Backtracking: General Method- 8 Queens Problem – Hamiltonian cycles – Knapsack problem – Euler circuit. Branch and bound: Assignment Problem - Travelling Salesman

TEXT BOOKS:

1. AnanyLevitin – Introduction to the Design and Analysis of Algorithms – Pearson Education 2003

REFERENCE BOOKS

1. Ellis Horowitz, SartajSahni&SanguthevarRajasekaran - Fundamentals of Computer Algorithms - India: Galgotia Publications. (2005).
2. Clifford Stein, Thomas H. Cormen, Charles E. Leiserson& Ronald L.Rivest - Introduction to Algorithms - India: Prentice Hall of India. (2006).

COURSE OUTCOMES

On completion of the course, the student will be able to

CO1: Understand the concepts of Divide and Conquer technique and have the skills to write efficient procedures like sorting, searching etc. – K3

CO2: Understand the concepts and working procedure for Greedy techniques – K3

CO3: Acquire the knowledge to solve backtracking and Branch-and-Bound techniques – K1

CO4: Analyze the algorithms based on time complexity – K4

CO5: Acquire the knowledge to develop optimal procedures for problems like minimum spanning tree construction, single source shortest paths – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S	S	S	M	S	M
CO2	S	S	S	S	S	S	S	S	M	S
CO3	S	S	S	W	S	S	S	S	S	S
CO4	S	M	S	S	S	S	S	M	S	M
CO5	S	S	S	S	S	S	S	W	S	S

S – Strongly Correlating - 3 Marks

M – Moderately Correlating - 2 Marks

W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSE421	CHOICE I	L	T	P	C
ELECTIVE II		SYSTEM SOFTWARE	3	-	-	3
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand the relationship between system software and machine architecture.
2. To know the design and implementation of assemblers, macro processors, loaders, linkers and compilers.
3. To understand the process of scanning and parsing of a program.
4. To have clear knowledge about system software like assemblers, loaders, linkers, macro processors and compilers.

UNIT I: Background

Introduction – System Software and Machine Architecture – The Simplified Instructional Computer (SIC) – Traditional (CISC) machines – RISC Machines

UNIT II: Assemblers

Basic Assembler Functions – Machine-Dependent Assembler Features – Machine-Independent Assembler Features – Assembler Design Options

UNIT III:Loaders and Linkers

Basic Loader Functions – Machine-Dependent Loader Features - Machine-Independent Loader Features - Loader Design Options

UNIT IV:Macro Processors

Basic Macro Processor Functions – Machine-Independent Macro Processor Features – Macro Processor Design Options

UNIT V: Compilers

Basic Compiler Functions – Machine-Dependent Compiler Features - Machine-Independent Compiler Features

TEXT BOOK

1. Leland L. Beck &Manjula. D - System Software - An Introduction to Systems Programming - 3rd Edition. India: Pearson Education (2009)..

REFERENCE BOOKS

1. Dhamdhere.D.M - System Programming and Operating Systems - India: Tata McGraw Hill Education Private Limited. (2006)
2. Donovan.J.J - Systems Programming - India: Tata McGraw Hill Education Private Limited. (2001).

COURSE OUTCOMES

On the Successful completion of the course, students will be able to

CO1: Understand the relationship between System Software and Machine Architecture - K2

CO2: To know the design and implementation of assemblers, macro processors, loaders, linkers and compilers – K3
CO3: Interpret various concepts of scanning and parsing of a program – K2
CO4: Discuss the processing of a HLL program for execution on a computer system – K1
CO5: Familiar with system software components like compiler, loader & linker – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	S	S	M	S	S
CO2	S	S	M	W	S	S	S	S	S	S
CO3	S	S	M	M	S	S	S	M	W	S
CO4	M	S	M	S	S	M	S	S	S	S
CO5	S	S	M	M	S	S	S	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSE422	CHOICE II	L	T	P	C
ELECTIVE II		PHP with MySQL	3	-	-	3

Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze

OBJECTIVES:

1. To study the Web Programming concepts
2. To make use of PHP elements
3. To examine the working environment with WAMP, LAMP and XAMPP
4. To interpret the concepts of MySQL

UNIT I: GENESIS OF PHP

Introducing PHP: Use of PHP – the evolution of PHP. First PHP script: Installing PHP – other ways to run PHP - creating first script. PHP Language Basics: Using variables – data types – operators and expression – constants. Decision and loops: Making decisions – doing repetitive tasks with loops – making decision and looping. Strings: Creating and accessing strings – searching strings – replacing text within strings – *dealing with upper and lowercase – formatting strings.

UNIT II: ARRAYS AND FUNCTIONS

Arrays: Creating arrays – accessing array elements – looping through arrays with foreach – multidimensional arrays – manipulating arrays. Functions: Calling functions – working with variable functions – writing our own functions. Objects: Object oriented programming – advantages of OOP – understanding basic OOP concepts – creating classes and objects in PHP – creating and using properties – working with methods – automatically loading class files – storing objects as strings.

UNIT III: USING PHP WITH HTML

Handling HTML forms with PHP: Capturing form data with PHP - dealing with multi-value fields - generating web forms with PHP - storing PHP variables in forms - creating file upload forms - redirecting after a form submission. Preserving state with query strings, cookies, and sessions: Saving state with query strings - *working with cookies - using PHP sessions to store data. Working with files and directories: Getting information on files - opening and closing files - reading and writing to files - working with file permissions - copying, renaming, and deleting files - working with directories - building a text editor.

UNIT IV: PHP WITH MySQL

Introducing databases and SQL: Setting up MySQL - connecting to MySQL from PHP. Retrieving data from MySQL with PHP: Setting up the book club database - *retrieving data with select - creating a member record viewer. Manipulating MySQL data with PHP: Inserting records - updating records - deleting records - building a member registration application - creating a members' area - creating a member manager application.

UNIT V: PHP AND OUTSIDE WORLD

Generating images with PHP: Creating images - manipulating images - using text in images. String matching with regular expressions: Regular Expression - pattern matching in PHP - replacing text -

altering matching behavior with pattern modifiers - splitting a string with a regular expression. Working with XML: XML Document Structure – reading XML Documents with PHP – writing and manipulating XML documents with PHP - doing XML the easy way with simple XML – working with XSL and XSLT.

TEXT BOOK

1. Doyle. M., - Beginning PHP 5.3 - First Edition - Wiley Publications Ltd., Indianapolis, 2010.

REFERENCE BOOKS

1. Bayross.I., and S. Shah. - PHP 5.1 for Beginners -Tenth reprint, Shroff Publishers and Distributors, Mumbai, 2011.
2. Nixon.R. - Learning PHP, MySQL, JavaScript and CSS - Second Edition, O'Reilly Media, Sebastopol, 2012.
3. Rao.M.N. - Fundamentals of Open Source Software - First Edition, Prentice Hall of India Pvt Ltd., New Delhi, 2014.
4. Sklar.D. - Learning PHP 5 - First Edition, O Reilly Media, Sebastopol, 2004.
5. Ullman.L. - PHP and MySQL for Dynamic websites: Visual Quick Pro Guide - Fourth edition, Dorling Kindersley India Private Ltd, New Delhi, 2011.

COURSE OUTCOMES :

On the Successful completion of the course, students will be able to

CO1: Summarize Web Programming concepts – K1
CO2: Apply PHP elementsto solve real world problems – K3
CO3: Examine the working environment with WAMP, LAMP and XAMPP – K1
CO4: Interpret the concepts of MySQL with PHP – K2
CO5: Knowledge to develop PHP using XML documents – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	M	S	M	M	S
CO2	S	W	M	S	M	S	S	M	S	S
CO3	S	S	S	S	S	S	W	S	S	S
CO4	S	S	S	S	M	S	S	M	S	S
CO5	S	S	M	M	S	S	S	M	S	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

SEMESTER – V

COURSE CODE	U21CST51	RELATIONAL DATA BASE MANAGEMENT SYSTEM	L	T	P	C
CORE -VIII			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand the overview of Data Base systems & Data Models.
2. To modify and maintain the database structure.
3. To Understand about the PL/SQL &QL.
4. The students can able to handle the Database.

UNIT I: Introduction

Introduction: Purpose of Data Base Systems – View of Data – Data Models – Database Languages – Transaction Management – Storage Management – Database Administrator – Database Users – Overall System Structure.

UNIT II: E-R Model

Entity – Relationship Model - Basic Concepts – Design Issues – Mapping Cardinalities – Keys – E-R Diagrams – Weak Entity Sets – Extended E-R features – Design of an E-R Database scheme – Reduction of an E-R scheme to table.

UNIT III: Relational Model

Relational Model: Structure of relational databases – Relational algebra – The tuple relational calculus – The Domain Relational Calculus – Extended Relational Algebra operations – Modification of the Database – Views.

UNIT IV: Integrity Constraints

Other Relational Languages & Integrity Constraints: Query by Example – Quel – Datalog – Domain Constraints – Referential Integrity – Assertions – Triggers – Functional Dependencies.

UNIT V: PL/SQL

PL/SQL – Relationships between SQL & PL/SQL – Advantages of PL/SQL – Arithmetic & Expressions in PL/SQL – Loops and Conditional Statements in PL/SQL – Exceptions Handling – Cursor Management – Triggers – Functions & Procedures.

TEXT BOOK

1. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, Database System Concepts (third edition)- McGraw - Hill international editions, 1997.

REFERENCE BOOKS

1. S.Atre - Database Structured Techniques for Design, Performance & Management - John Wiley & sons, 1988.
2.James W, Martin N - Principles of database management - Prentice hall,1979.
3.C.J.Date - An Introduction to Database System - addition Wesley,1981.

COURSE OUTCOMES

On successful completion of the course, the student will be able to

CO1: Understand the fundamentals of database system – K2

CO2: Design and create tables in database and execute queries - K3

CO3: Have knowledge in network and hierarchical data base system – K2

CO4: Design a database based on a data models using normalization – K3.

CO5: Understand the important features available in PL/SQL – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	M	M	S	M	M
CO2	S	M	M	M	S	S	W	M	M	M
CO3	S	S	S	S	W	S	S	S	S	S
CO4	S	M	M	S	M	M	M	M	S	S
CO5	S	M	M	M	S	S	S	M	M	M

S – Strongly Correlating - 3 Marks

M – Moderately Correlating - 2 Marks

W-Weakly Correlating - 1 Mark

COURSE CODE	U21CST52	OPERATING SYSTEM CONCEPTS	L	T	P	C
CORE -IX			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To introduce various components of Computer Hardware and Operating Systems.
2. To discuss the structure of Operating System, its functions and algorithms.
3. To understand the working of operating system, its structures and functioning
4. To Learn various algorithms used in operating systems.

UNIT I: Introduction

Introduction — What is operating system do-operating System structure-operating system services-user operating system interface -system calls-Operating system design and implementation—operating –system structure. Process Management- Process scheduling-operations on processes Inter-process communication –Threads and concurrency-overview- multithreading models.

UNIT II: CPU Scheduling

CPU scheduling - Basic concepts-scheduling criteria - scheduling algorithms – Multiprocessor scheduling. Process Synchronization: Critical-Section Problem-Hardware support for Synchronization- Semaphores-Synchronization Examples-Classical Problems of Synchronization

UNIT III: Deadlock

Deadlocks: Deadlock Characterization- Methods for Handling Deadlocks-Deadlock Prevention-Avoidance-Detection-Recovery. Main Memory: Background-Contiguous Memory Allocation-paging- Structure of the page table-swapping

UNIT I V: Memory Management

Virtual Memory: Demand Paging-Copy on Write-Page Replacement-Allocation of Frames-Thrashing- Mass Storage Structure- RAID structure

UNIT V: File System

File System Interface: File Concepts- Access Methods Directory Structures –Protection-File System Implementation-File System Structures–Allocation Methods-Free Space Management. System Security: Security Problems – Program Threats –System and Network Threats

TEXT BOOK

1. Abraham Silberschatz, Peter Galvin, Greg Gagne, Operating System Concepts, Wiley Publications, 10th Edition, 2018.

REFERENCE BOOKS

1. Andrew S Tanenbaum, Herbert Bos - Modern Operating Systems - 4e Fourth Edition, Pearson Education, 2016
2. Abraham Silberschatz, Peter Galvin, Greg Gagne - Operating System Concepts - Wiley, 8th Edition, 2008.

COURSE OUTCOMES:
On the successful completion of the course, students will be able to
CO1: Understand the types, design, implementation of operating system and I/O programming concepts – K2
CO2: Recognize the management of main and virtual memory schemes - K1
CO3: Analyze different scheduling algorithms and the management of devices – K3
CO4: Understand and manage the information system using OS – K2
CO5: Realize the importance of file systems and its properties in OS – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	M	S	S	S	S
CO2	S	S	M	S	S	S	W	M	S	S
CO3	S	S	S	M	W	S	S	S	M	M
CO4	S	S	S	S	M	S	S	S	S	S
CO5	S	S	M	S	S	S	S	M	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CST53	COMPUTER NETWORKS	L	T	P	C
CORE -X			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To build an understanding of the fundamental concepts of Computer Networking
2. To identify various components in data communication system
3. To understand the working principles of various application protocols
4. Tobefamiliarwiththeconceptsofnetworkinterfaces, anddesign/performanceissuesin local areanetworks and wideareanetworks

UNIT I: Introduction

Introduction: Uses of Computer Networks–Types of Computer Networks-Network Technology – Examples of Networks – Network protocols-Reference Models – Network Standardization.

UNIT II: Physical Layer

Physical Layer: Guided Transmission Media – Wireless Transmission – The public switched Telephone system – Cellular Networks – Communication satellites.

UNIT III: Data Link Layer

Data Link Layer & Medium Access Layer – Data Link Layer – Design Issues – Elementary Data link protocols – Multiple Access Protocols – Ethernet, Wireless LAN, Bluetooth

UNIT IV: Network Layer

Network Layer & Transport Layer: Network Layer Design Issues – Routing Algorithms – Transport Layer- The Transport Service – Elements of Transport Protocol.

UNIT V: Application Layer

Application Layer &Security: DNS- E-Mail – Security – Cryptography – Digital Signature – Social Issues.

TEXT BOOK

1. Andrew S. Tanenbaum, Amsterdam, Nick Feamster, David J. Wetherall - Computer Networks - 6th Edition, Pearson, 2021

REFERENCE BOOKS

1) BehrouzA.Forouzan - Data Communications and Networking - Fifth Edition, TMH, 2013.
2) Andrew S. Tanenbaum, David J. Wetherall - Computer Network - Fifth Edition, Pearson Education, 2011.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Explain the concepts of various reference models, Internet and protocols – K1
CO2: Identify different transmission media and topologies - K1
CO3: Distinguish error detection and error correction of data - K2
CO4: Implement routing algorithms to determine the optimal path – K3
CO5: Recognise the performance issues in LAN & WAN- K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	M	S	S	M	M
CO2	S	S	M	S	M	S	S	M	S	M
CO3	S	M	S	S	M	W	S	M	S	S
CO4	S	M	S	S	S	S	S	S	S	S
CO5	S	S	M	S	S	S	W	M	S	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CST54	COMPUTER GRAPHICS	L	T	P	C
CORE XI			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand computational development of graphics
2. To analyze the concept of Line attribute & curve attribute
3. To design animation with rotation, translation and scaling
4. The student can gain in-depth knowledge about the current 3D graphics.

UNIT I: Overview of graphics systems

Overview of graphics systems: Video display devices – Raster-scan systems – Random-scan systems – Graphics monitors and workstation – Input devices – Hard-copy devices – Graphics software.

UNIT II: Output primitives

Output primitives: Points and lines – Line-drawing algorithms – DDA algorithm – Bresenham's line algorithm – Attributes of output primitives: Line attributes – Area-fill attributes – Character attributes – Bundled attributes.

UNIT III: Geometric transformations

Two-dimensional Geometric transformations: Basic transformations – Matrix representations – Composite transformations – Other transformations.

UNIT IV: Windowing and Clipping

Windowing and Clipping – Windowing concepts – Clipping Algorithms – Window to view port Transformations – segments – Interactive input methods – Physical input devices – logical classification of input devices – interactive picture construction techniques – input functions.

UNIT V: 3-D Concepts

Three dimensional concepts – 3D Display Methods – 3D Object representations – polygon surfaces-curved line and surfaces – 3D transformations- Translation-Rotation-Scaling- Other Transformations-Composite Transformations

TEXT BOOK

Donald Hearn and M.Pauline Baker - Computer Graphics - C Version - Second Edition, Pearson Education, 2006.

REFERENCE BOOKS:

1. William M.Neuman and Robert F Sproul - Principles of Interactive computer Graphics - McGraw Hill International Edition, 2nd Edition, 2014.
2. Foley, van Dam, Feiner, and Hughes - Computer Graphics: Principles and Practice - 3rd edition, 2002.

COURSE OUTCOMES:

On the Successful completion of the course, students will be able to

CO1: Have a broad knowledge about the overview of Graphics System – K2

CO2: Analyse and design algorithms using attributes in graphics – K4

CO3: Recognise the properties of Two and Three-dimensional geometric transformations – K1

CO4: Understand the importance of Windowing and Clipping – K2

CO5: Gain in depth knowledge about 3D transformations – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	M	S	S	M	S
CO2	S	S	M	S	M	S	S	S	M	S
CO3	S	M	M	S	S	M	M	S	S	S
CO4	S	S	S	M	M	S	S	M	M	M
CO5	S	M	M	S	S	M	M	S	S	S

S – Strongly Correlating - 3 Marks

M – Moderately Correlating - 2 Marks

W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSP54	RELATIONAL DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
CORE XII			-	-	5	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES

1. To become familiar with SQL fundamental Concepts.
2. To apply Normalization techniques to summarize a database
3. To know the connectivity of databases with controls (DAO,ADO& RDO)
4. The Student can Gain a good understanding of the architecture and functioning of Database Management Systems as well as associated tools and techniques.

LIST OF PROGRAMS

1. Queries using DDL commands
2. Queries using DML commands
3. Program using conditional control, interactive controls & sequential controls.
4. Program using excepting handling
5. Programs using explicit cursors & implicit cursors
6. Program using PL/SQL tables & records
7. Programs using database triggers
8. Program to design procedures using In, Out, Parameter
9. Program to design procedures using functions
10. Program to design procedures using packages
11. Program using ADO connectivity.
12. Program using DAO connectivity.
13. Program using RDO connectivity.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Describe the concepts of database technologies – K1
CO2: Discuss PL/SQL including stored procedures, stored functions, cursors, packages – K1
CO3:Apply constraints on a database using RDBMS – K3
CO4:Demonstrate the concept of Triggers and Subroutines – K3
CO5:Recognise the concepts of ADO, DAO & RDO – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	M	S	M	M	S
CO2	S	S	M	S	M	S	W	S	S	S
CO3	S	S	S	S	M	W	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	M
CO5	S	M	M	S	S	M	M	S	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSE531	CHOICE -I	L	T	P	C
ELECTIVE -III		MULTIMEDIA & APPLICATIONS	3	-	-	3
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand the concept of Multimedia & its Architecture
2. To Design & apply various Authoring Tools
3. To Gain the importance of Internet in multimedia.
4. The student can able to work with the current multimedia applications

UNIT I: INTRODUCTION

Introduction- Brief history of Multimedia – Resources for multimedia developers – Types of products – Multimedia Computer Architecture

UNIT II: AUDIO AND VIDEO

Digital Audio – Characteristics of sound and Digital Audio – Digital Audio Systems – MIDI – Audio File Formats - Using Audio in Multimedia Applications – Digital Video – Background on Video – Characteristics of Digital Video – Digital Video Data Sizing – Video Capture and Playback Systems – Computer Animation – Using Digital Video in Multimedia Applications.

UNIT – III: AUTHORING

Product Design – Building Blocks – Classes of products – Content Organizational Strategies – Story Boarding – Authoring Tool – Categories of Authoring Tools – Selecting the right Authoring paradigm

UNIT IV: MULTIMEDIA

Multimedia and the Internet – The Internet – HTM Land Web Authoring – Multimedia Considerations for the Internet – Design Considerations For Web Pages – Multimedia Development Team – Team Approach – Assembling a Multimedia Production Team.

UNIT V: TEXT

Text – Elements of Text – Text Data Files – Using Text in Multimedia Applications – Hypertext – Graphics – Element of Graphics – Images and Color – Graphics file and Application Formats – Obtaining Images for Multimedia Use – Using Graphics in Multimedia Applications.

TEXT BOOKS:

1. David Hillman, Multimedia Technology and Applications — Galgotia Publications Pvt. Ltd., 1998.

REFERENCE BOOKS:

1. Tay Vaughan -Multimedia making it work –TMH 1996.

COURSE OUTCOMES

After completing the course, the students can able to

CO1: Define multimedia to potential clients – K1

CO2: Identify and describe the function of the general skill sets in the multimedia industry – K1

CO 3: Identify the basic components of a multimedia project- K1

CO 4: Work with text files and graphics files - K2

CO5: Knowledge about the applications of Multimedia – K1

MAPPING OF COS WITH POS AND PSOS :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	S	W	S	M	S	M
CO2	S	S	M	S	S	S	S	S	S	S
CO3	S	S	M	M	S	W	S	M	S	M
CO4	M	S	M	S	S	M	S	S	S	S
CO5	S	S	M	M	S	S	S	M	S	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSE532	CHOICE -II	L	T	P	C
ELECTIVE -III		CLOUD COMPUTING	3	-	-	3
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand the cloud computing concepts & its benefits
2. To analyze the implementation of virtualization in Cloud Computing
2. To interpret the security issues and threats in Cloud
3. To explore various web services in Cloud Computing

UNIT I: Introduction

Cloud Computing – An Overview: Introduction – History of Cloud Computing – Characteristics of Cloud – Cloud Computing Model. Issues and Challenges for Cloud Computing – Advantages and Disadvantages of Cloud computing – Security, Privacy and Trust – Virtualization – Threats to Cloud Computing – Next Generation of Cloud Computing. Cloud Computing Architecture: Introduction – Cloud Architecture – Cloud Computing models – Comparisons of Service models – Deployment Models – Identity as a Service (IDaaS).

UNIT II: Virtualization

Virtualization in Cloud: Introduction – Virtualization – Implementation of Virtualization– Virtualization support at the OS level – Middleware Support for Virtualization –Advantages of Virtualization – Application Virtualization – Virtualization Implementations Techniques – Hardware Virtualization – Types of virtualization – Load balancing in Cloud Computing – Logical Cloud Computing Model – Virtualization for Data-Centre.

UNIT III: Security Issues and Challenges

Security Issues and Challenges in Cloud Computing: Introduction – Security Challenges in Cloud Computing – Information Security in Cloud Computing – Security, Privacy and Trust. Security Management: Introduction – Security Reference Architecture – Security Issues in Cloud Computing – Classification of Security Issues – Types of Attackers – Security Risks in Cloud Computing – Security Threats against Cloud Computing – Novel Security Approaches.

UNIT IV: Web Services

Web Services: Introduction – Amazon Web Services – Microsoft Azure – Google App Engine. Data Security and Privacy: Introduction – Data Security – Privacy.

UNIT V: Applications

Cloud Computing Applications: Introduction – Business Applications – Finance and Banking Application – Cloud Computing in Education. Mobile Cloud Computing: Introduction – Need of Mobile Cloud Computing – Mobile Computing Architecture – Technologies of MCC – MCC Applications – Issues in MCC – Challenges in Building Applications – Platforms.

TEXT BOOK

1. Pachghare .V.K. - Cloud Computing - PHI Learning Private Limited, 2016

REFERENCE BOOKS

1. Anthony T.Velte, Toby J.Velte& Robert Elsenpeter - Cloud Computing - A Practical Approach, 5th Reprint. New Delhi: Tata McGraw-Hill Education Private Limited, 2011.
2. Barrie Sosinsky - Cloud Computing Bible, Wiley India Private Limited, 2011.

COURSE OUTCOMES

On the Successful completion of the course, students will be able to
CO1: Understand the need for cloud computing– K2
CO2: Comprehend virtualization concept in cloud – K2
CO3: Get an idea of security threats in cloud – K2
CO4: Know the available web services in cloud computing – K1
CO5: Understand and use the web services available in Cloud Computing – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	M	S	M	S	S
CO2	S	S	M	S	M	S	S	S	S	S
CO3	S	S	M	M	S	M	S	M	S	M
CO4	S	S	S	M	S	S	M	S	M	M
CO5	S	S	M	M	S	M	S	M	S	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSS53	OPERATING SYSTEM LAB	L	T	P	C
SKILL BASED ELECTIVE III			-	-	2	2
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To write shell script programs to solve problems.
2. To implement some standard Linux utilities using system calls.
3. To run various UNIX commands on a standard UNIX/LINUX Operating system.
4. To do shell programming on UNIX OS.

LIST OF EXERCISES:

1. Creation of a child, orphan and Zombie process.
2. Execution of various file/directory handling commands.
3. Shell scripts to check various attributes of files and directories.
4. Shell scripts to perform various operations on given strings.
5. write a shell script to find the factorial of given integer
6. Shell scripts to explore system variables such as PATH, HOME etc.
7. Shell scripts to check and list attributes of processes.
8. Execution of various system administrative commands.
9. Write a shell script to display list of users currently logged in.
10. Write a shell script to delete all the temporary files.
11. Simulation of FCFS process scheduling.
12. Simulation of ROUND ROBIN process scheduling.
13. Simulation of SJF process scheduling.
14. Demonstration of process synchronization using signals.
15. Demonstration of process synchronization using semaphores.
16. Deadlock avoidance using banker's algorithm.

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1: Learn basic Linux commands – K1

CO2: Understand the basic behaviour of operating system – K2

CO3: Demonstrate different process scheduling and executing algorithm – K3

CO4: Do shell programming on LINUX OS – K3

CO5: Simulate FCFSprocess scheduling in Linux – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	M	S	S	M	S
CO2	S	S	M	W	M	S	S	M	S	M
CO3	S	S	S	S	M	S	S	M	S	S
CO4	S	S	S	S	S	S	W	S	S	S
CO5	S	S	M	S	M	S	S	M	S	M

S – Strongly Correlating - 3 Marks

M – Moderately Correlating - 2 Marks

W-Weakly Correlating - 1 Mark

SEMESTER VI

COURSE CODE	U21CST61	SOFTWARE ENGINEERING	L	T	P	C
CORE -XIII			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To describe the processes of software development
2. To develop software design and modules for real time system
3. To analyze verification & validation techniques
4. To identify, formulate, and solve engineering problems.

UNIT I: Introduction

Introduction to Software engineering some definitions – some size factors – quality to productivity factors – managerial Issue. Planning a software project: defining the problems developing a solution strategy – planning on organization structure – other planning activities.

UNIT II: Cost estimation

Software cost estimation: Software cost factors – Software cost estimation techniques – staffing – level estimation – estimative software maintenance costs.

UNIT III: Requirements

Software requirements, definition: the software requirements specifications – formal specification techniques – language and processors for requirements specification.

UNIT IV: Design

Software Design: fundamentals Descartes concepts – Modules and Modularizing criteria - Design techniques – detailed design considerations – real time and distributed system design – test plan – mile – stones walk through and inspection – design guide line.

UNIT V: Verification and validation

Verification and validation techniques: Quality Assurance – static analysis – symbolic execution – unit testing and debugging system - testing formal verification.

Software maintenance: enhancing maintainability during developments managerial aspects of software maintenance – configuration management – sources code metrics – other maintenance tools and techniques.

TEXT BOOK:

Richard E. Fairley - Software Engineering Concepts - McGraw Hill pvt ltd, 2001

REFERENCE BOOKS:

1. Roger S, Pressman - Software Engineering, A Practitioner's Approach,.(2014).
2. PankajJalote - An Integrated Approach to Software Engineering - Narosa, 3rd Edition, 2005

COURSE OUTCOMES:
After Completion of this Course, Students will be able to
CO1: Understand the factors and strategies in Software Engineering – K3
CO2: Recognize the cost metrics and feasibility study in Software estimation - K1
CO3: Create software design using real time applications – K3
CO4: Analyze the quality based on validation and verification techniques in Software development – K4
CO5: Develop & design Software modules for real world environment – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	M	M	S	M	S
CO2	S	S	M	S	M	M	W	S	M	S
CO3	S	S	S	M	M	S	M	M	M	M
CO4	S	W	S	S	W	S	S	S	S	S
CO5	S	S	M	S	M	M	S	S	M	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CST62	MOBILE APPLICATION DEVELOPMENT	L	T	P	C
CORE -XIV			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand the requirements of Mobile programming environment.
2. To Learn about basic methods, tools and techniques for developing Apps
3. To Explore and practice App development on Android Platform
4. To develop working prototypes of Mobile systems for various uses in daily lives.

UNIT I: **Introduction to Android Operating System**:
Definition of Android – Open Handset Alliance – Android Ecosystem – Need for Android – Android Versions – Features of Android – Android Architecture – Stack Linux Kernel. Configuration of Android Environment: Operating System – Java JDK – Android SDK – Android Development Tools (ADT) – Android Virtual Devices (AVDs) – Emulators – Steps to install and configure Eclipse and SDK.

UNIT II: **Creating the First Android Application**
Directory Structure. Android User Interface: Understanding the components of a screen – Linear Layout – Absolute Layout – Frame Layout – Relative Layout – Table Layout. Designing Your User Interface with View: TextView – Button – A standard push button – ImageButton – EditText.

UNIT III: Designing Your User Interface with View:
CheckBox – ToggleButton – RadioButton and RadioGroup – Progress Bar – AutoComplete TextView – Spinner – ListView – GridView – ImageView – ScrollView – Custom Toast Alert – Time and Date Picker.

UNIT IV: Inactivity:
Introduction – Intent – Intent filter – Activity Life Cycle – Broadcast Life Cycle – Service.

UNIT V: SQLite Database in Android:
SQLite Database – Need for SQLite – Creation and connection of the database – Extracting value from Cursors – Transactions.

TEXT BOOK :
1.Prasanna Kumar Dixit – Android - Vikas Publishing House Private Ltd. ,2014

REFERENCE BOOKS
1. Reto Meier - Professional Android 4 Application development - John Wiley & Sons Inc. , 2012
2. John Horton - Android programming for beginners - 2nd edition, 2018
3. Dawn Griffiths- Head first android Development: A brain- friendly guide, 2nd edition, 2017

COURSE OUTCOME:
On the successful completion of the course, students will be able to
CO1: Gain basic idea of XML and using it to develop an Android application – K1
CO2: Familiarize themselves with the concept of UI components and SQLite Database – K1
CO3: Implement GUI concepts in Android Platform – K3
CO4: Build any application for Android devices – K3
CO5: Knowledge to design mobileapp development on Android APP – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	M	M	S	M	M
CO2	S	S	M	W	M	M	S	S	M	M
CO3	S	S	S	M	M	S	M	M	M	M
CO4	S	S	S	S	S	S	S	S	W	S
CO5	S	S	M	S	M	M	S	S	M	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSP65	MOBILE APPLICATION DEVELOPMENT LAB	L	T	P	C
CORE -XVI			-	-	5	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To learn the basics of Android app
2. To understand how to create an android app
3. To practice the various features of android application
4. To practice mobileapp with SQLite database

Develop ANDROID programs for the following

1. Install Android Studio and Run Hello World Program.
2. Create an application with login module. (Username and Password).
3. Create spinner with strings taken from resource folder (res>>value folder) and on changing the spinner value, Image will change.
4. Create a menu with 5 options and selected option should appear in text box.
5. Create a list of all subjects in your course and on selecting a particular subject teacher – in -charge of that subject should appear at the bottom of the screen.
6. Create an application with three option buttons. On clicking a button, color of the screen will change.
7. Create an application for hotel menu card using CheckBox widget and provide toast message for displaying item names with quantity ordered and total price of the items.
8. Create an application for rating two images and display highest rating value using RatingBar.
9. Create a Login application. On successful login, pop up the message.
10. Create an application using Date and Time Component display your Birthdate and Birth time
11. Create an application to perform create, insert, update, delete and retrieve operations on SQLite database.
12. Create an application to perform update operation on SQLite database.
13. Create an application to perform delete and retrieve operations on SQLite database.

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: Design and develop applications for mobile devices – K3
CO2: Develop applications with various UI components using Java and XML – K3
CO3: Build an application using SQLite Database – K3
CO4: Know how to launch developed applications in mobile devices – K1
CO5: Design an application using SQlite database – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	M	M	S	M	S
CO2	S	S	M	S	M	M	S	S	M	S
CO3	S	S	W	M	M	S	M	M	M	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	M	W	M	M	M	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CST63	ARTIFICIAL INTELLIGENCE	L	T	P	C
CORE -XV			5	-	-	4
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To summarize the basics of AI and Machine learning.
2. To understand different search methods in AI
3. To analyze the various logics and applications of Machine Learning
4. To interpret the different learning methods in Expert Systems

UNIT I: Definition

Artificial intelligence meaning- The AI problems – The underlying assumption – What is an AI Techniques? – The level of the model. Problems, problem spaces, and search: Defining the system – problem characteristics – production system characteristics.

UNIT II: **Heuristic search techniques**

Heuristic search techniques: Generate and Test – Hill climbing – Best –first search – Problem reduction – Constraint satisfaction – Means –ends analysis. Knowledge representation issues: Representations and mappings – Approaches to knowledge representation.

UNIT III: **Predicate logic**

Using predicate logic: Representing simple facts in logic – Representing instance and ISA relationships – computable functions and predicates resolution – natural deduction. Representing Knowledge using rules: Procedural versus declarative knowledge – Logic programming – Forward versus Backward reasoning – Matching – Control Knowledge.

UNIT IV: **Game playing**

Game playing: Overview – The minimax search procedure – Adding alpha – beta cutoffs – Additional refinements – Iterative Deepening – References on specific games. Understanding: What understands? What makes understanding hard? Planning- The blocks world- components of a planning system –Good stack planning-Coral Stack planning-Non linear planning using constraint posting.

UNIT V: Expert systems

Expert systems: Representing & using domain knowledge – Expert system shells – Knowledge acquisition. Perception and Action: Real-time search – perception- Action – Robot Architectures.

TEXT BOOK:

1. Elaine rich, Kevin Knight, Shivashankar B Nair - Artificial Intelligence - Tata McGraw Hill 3rd Edition, 2011

REFERENCE BOOKS:

1. Stuart Russell - Artificial Intelligence: A Modern Approach - Pearson 3rd Edition, 2013
2. Deepak Khemani - A First Course in Artificial Intelligence - McGraw Hill 2013
3. Mishra R. B. - Artificial Intelligence - Prentice Hall of India 2010

COURSE OUTCOMES:

On the Successful completion of the course, students will be able to

CO1: Learn about the artificial intelligence problem and its characteristics – K1

CO2: Demonstrate the fundamentals of heuristic search techniques and reasoning for problem solving – K3

CO3: Understand the problem-solving using predicates – K2

CO4: Describe the concepts of expert systems with case studies for various applications – K1

CO5: Interpret different learning methods in expert systems – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	M	S	M	S	S
CO2	S	S	M	S	M	S	S	S	M	M
CO3	S	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	M	S	S	M	S	S	M	M

S – Strongly Correlating - 3 Marks

M – Moderately Correlating - 2 Marks

W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSE641	CHOICE I	L	T	P	C
ELECTIVE IV		INTERNET OF THINGS	3	-	-	3
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To explore various components of Internet of things such as Sensors, inter-networking and cyber space.
2. To design and implement IoT circuits and solutions.
3. To understand the concepts of Internet of Things
4. To build IoT applications.

UNIT I: Introduction to IoT

Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs

UNIT II: IoT& M2M

Machine to Machine, Difference between IoT and M2M, Software define Network

UNIT III: Network& Communication aspects

Wireless medium access issues, MAC protocol survey, Survey routing protocols, Sensor deployment & Node discovery, Data aggregation & dissemination.

UNIT IV: Challenges in IoT

Design challenges, Development challenges, Security challenges, Other challenges - Domain specific applications of IoT Home automation, Industry applications, Surveillance applications, Other IoT applications.

UNIT V: DevelopingIoTs

Introduction to Python, Introduction to different IoT tools, Developing applications through IoT tools, Developing sensor based application through embedded system platform, Implementing IoT concepts with python.

TEXT BOOK

Vijay Madisetti, ArshdeepBahga - Internet of Things: A Hands-On Approach - Orient Blackswan Private Limited - New Delhi, 2014

REFERENCE BOOKS:

1. Samuel Greengard, The Internet of things, The MIT Press, 2015.

COURSE OUTCOMES:

On Successful completion of the course, students will be able to

CO1: Explain the components of IoT – K1

CO2: Make use of IoT Circuits to obtain solutions – K3

CO3: Interpret different design challenges faced in IoT– K2

CO4: DevelopIoTapplications in Python – K3

CO5: Deign sensor based application using Python – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	M	S	M	S	S
CO2	S	S	S	S	M	W	S	S	S	S
CO3	S	W	S	M	S	S	S	S	S	M
CO4	S	S	S	S	S	S	W	S	S	S
CO5	S	S	S	M	S	S	S	S	S	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSE642	CHOICE II	L	T	P	C
ELECTIVE IV		R PROGRAMMING	3	-	-	3
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To learn R-Programming environment and libraries
2. To understand the basics in R programming in terms of constructs, control statements and built-in functions
3. To analyze to apply R programming for matrix and vector processing
4. To visualize data using graphs and chart

UNIT I INTRODUCTION:

Getting R - Downloading R - R Version -32-bit vs. 64-bit - Installing - Installing on Windows - Installing on Mac OS X - Installing on Linux - Microsoft R Open - Conclusion. The R Environment - Command Line Interface - RStudio - RStudio Projects - RStudio Tools - Git Integration - Microsoft Visual Studio - R Packages - Installing Packages - Uninstalling Packages - Loading Packages - Unloading Packages - Building a Package

UNIT II BASICS OF R:

Basics of R –Basic Math–Variables–Variable Assignment– Removing Variables–Data Types–Numeric Data–Character Data–Dates–Logical. Vectors–Vector Operations–Factor Vectors.Calling Functions–Function Documentation–Missing Data– Pipes–Advanced Data Structures–dataframes–Lists–Matrices–Arrays.

UNIT IIIREADING DATA INTO R:

Reading Data into R - Reading CSVs - read_delim- fread. Excel Data - Reading from Databases - Data from Other Statistical Tools- R Binary Files- Data Included with R - Extract Data from Web Sites - Simple HTML Tables - Scraping Web Data - Reading JSON Data

UNIT IVGRAPHICS IN R:

Statistical Graphics - Base Graphics - Base Histograms - Base Scatterplot -Boxplots. ggplot2 - ggplot2 Histograms and Densities- ggplot2 Scatterplots - ggplot2 Boxplots and Violins Plots - ggplot2 Line Graphs - Themes. Writing R functions - Hello, World! - Function Arguments- Default Arguments - Extra Arguments- Return Values- do call.

UNIT VCONTROL STATEMENTS:

Control Statements - if and else - switch–ifelse - Compound Tests. Loops, the Un-R Way to Iterate - for Loops - while Loops - Controlling Loops. Group Manipulation - Apply Family - aggregate - Speed versus Convenience–datatable - Keys–data table Aggregation.

TEXT BOOK

1. Jared P. Lander - R for Everyone: Advanced Analytics and Graphics - Addison-Wesley Professional, 2nd Edition, 2017

REFERENCE BOOKS:

1. Gardener. M -Beginning R: The Statistical Programming Language - Wiley India Pvt. Ltd., New Delhi, First Edition, 2017.

2. Kabacoff, R.I. - R in Action: Data analysis and graphics with R - Manning publications company, Shelter Island, Second Edition, 2011.
3. Andrie de Vries, JorisMeys - R Programming for Dummies - Wiley India Private Ltd., New Delhi, Second Edition, 2015.

COURSE OUTCOMES:

On the Successful completion of the course, students will be able to

CO1: Explain the basic R programming concepts – K1
CO2: Make use of functions and packages in R – K3
CO3: Interpret various statistical models in R Program – K2
CO4: Develop functions and control statements in R – K3
CO5: Knowledge to apply R programming for matrix and vector processing – K1, K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	M	S	S	M	S
CO2	S	S	S	W	M	S	S	M	S	M
CO3	S	S	S	M	S	S	W	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSS64	IMAGE PROCESSING LAB	L	T	P	C
SKILL BASED ELECTIVE -IV			2	-	-	2
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To understand the spatial image enhancement functions on Bitmap image
2. To practice filter operations in image processing
3. To perform Smoothening & sharpening concepts in image processing
4. To expertise in performing image processing tools with various techniques

List of Programs

1. Implement the spatial image enhancement functions on a bitmap image – mirroring(Inversion)
2. Implement the spatial image enhancement functions on a bitmap image – notation(Clockwise)
3. Implement the spatial image enhancement functions on a bitmap image – Enlargement (Double Size)
4. Implement (a) Low Pass Filter (b) High Pass Filter
5. Implement (a) Arithmetic Mean Filter (b) Geometric Mean Filter
6. Implement Smoothing and Sharpening of an eight bit color image
7. Implement (a) Boundary Extraction Algorithm (b) Graham & #39; Scan Algorithm
8. Implement (a) Edge Detection (b) Line Detection
9. Display an image and its histogram
10. Write a Program to Perform Shrinking, Zooming and Cropping of an image
11. Write a Program to perform the experiment for histogram equalization.
12. Write a Program to Perform blurring and de-blurring on an image.
13. Write a Program to Remove salt and pepper noise in an image.
14. Write a Program to Perform Edge detection using Operators.
15. Write a Program to Perform2-D DFT and DCT.
16. Write a Program to Perform DWT of images.
17. Implement a function for image segmentation.
18. Implement a function for image morphology that analyze the form and shape detail of image structures.
19. Implement a function for Image Restoration.
20. Models for representing the color and methods of processing the color plane

COURSE OUTCOMES:

On the Successful completion of the course, students will be able to

CO1: Explain the spatial image enhancement concept – K1
CO2: Make use of filter and sharpening techniques in image processing – K2
CO3: Interpret zooming and cropping methods inimage processing – K2
CO4: Implement image enhancement, restoration and segmentation techniques – K3
CO5: Create models & methods for processing color pane – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	M	S	S	M	S
CO2	S	S	S	S	M	S	W	M	S	S
CO3	S	S	S	M	W	S	S	S	S	M
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	M	S	S	S	S	S	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

NON-MAJOR ELECTIVE
(OFFERED BY PARENT DEPARTMENT)

COURSE CODE	U21CSN31	WEB DESIGNING USING HTML LAB	L	T	P	C
NME - I			2	-	-	2
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To Use formatting tags in HTML
2. To recognize How to Insert the Image file in web pages.
3. To understand How to navigate through web pages.
4. To become Master in creating Web pages using basic HTM tags.

LAB Exercises

1. Web page creation using head, title, body, h1 – h6.
2. Web page creation using formatting tags (bold, italic, underline etc)
3. Ordered list
4. Unordered list
5. Definition list
6. Marquee creation
7. Web page with images
8. Web page creation with various font styles and body colors.
9. Hyper link
10. Tables
11. Frames
12. Forms

COURSE OUTCOMES:

On the Successful completion of the course, students will be able to

CO1: Understand the concepts of webpage - K2
CO2: Analyze various tags in HTML – K4
CO3: Gain knowledge in creating webpage – K1
CO4: Design new webpages using HTML – K3
CO5: Recognize to navigate the web pages using HTML – K2

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	M	S	S	S	S
CO2	S	S	M	S	M	W	S	S	S	S
CO3	S	W	M	S	S	S	S	S	S	S
CO4	S	S	S	M	S	S	M	M	M	M
CO5	S	S	S	M	S	S	S	W	S	M

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	U21CSN42	PHOTO DESIGNING TOOLS	L	T	P	C
NME - II			2	-	-	2
Cognitive Level	K1: RecallK2: UnderstandK3: ApplyK4: Analyze					

OBJECTIVES:

1. To navigate Photoshop's Workspace, Create & setup documents
2. To Understand about the Layers and Masking.
3. To work with effects, filters and adjustments
4. To create a broad range of design skills pertaining to publication & web design.

Exercises

1. Album preparation
2. Invitation Preparation
3. Wall Papers
4. Visiting Card
5. Background Changing and Removing
6. Birthday Card
7. Friendship Card
8. Wedding invitation Card
9. Cloning an Image
10. Flex Designing
11. Photo Editing
12. Book Cover

COURSE OUTCOMES

On completion of the course, the student will be able to

CO1: Design real world applications using photoshop – K3
CO2: Analyze new features in Photoshop – K4
CO3: Develop new drawings using Photoshop – K3
CO4: Expertise to work with Photoshop – K1
CO5: Design skills pertaining to publication & web design – K3

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	M	S	S	M	S
CO2	S	S	M	S	M	W	S	S	M	S
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	S	W	M	S	S	S	M	S	M
CO5	S	S	M	S	S	S	S	S	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

Value Added Course

COURSE CODE	U21CSV51	QUANTITATIVE APTITUDE	Hours	C
SEMESTER V			30	2
Cognitive Level	K1: Recall	K2: Understand	K3: Apply	K4: Analyze

OBJECTIVES:
1. To equip with the relevant skills to appear for various competitive examinations.
2. To acquire right skills to tackle aptitude problems.
3. To improve the speed of solving problems
4. To solve problems with ease and confidence.

UNIT I: Numbers - HCF & LCM of numbers – Decimal fraction
UNIT II: Average - Problems on numbers – Problems on Ages
UNIT III: Percentage – Profit &loss - Ratio& Proportion
UNIT IV: Time &work – Time & Distance – Problems on Trains
UNIT V: Simple Interest – Compound Interest - Permutation & Combination. (13 Hours)

TEXT BOOK
1. Aggarwal, R.S. - Quantitative Aptitude for Competitive Examinations, New Delhi: S.Chand Publications, Seventh Revised Edition, Reprint 2008.

COURSE OUTCOMES
After Completion of this Course, Students will be able to
CO1: Acquire right skills to tackle aptitude problems – K1
CO2: Improve mental calculations – K2
CO3: Solve problems with ease and confidence – K3
CO4: Improve the speed of solving problems and equip them employable – K2
CO5: Realize the importance of quantitative aptitude methods – K1

MAPPING OF CO'S WITH PO'S AND PSO'S

CO/PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	M	S	S	S	M	S
CO2	S	S	M	S	S	M	W	S	S	M
CO3	S	S	M	S	S	S	S	S	S	S
CO4	S	M	S	M	S	W	S	M	S	W
CO5	S	S	M	S	S	S	S	S	S	S

S – Strongly Correlating - 3 Marks
M – Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

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MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL

DEPARTMENT OF COMPUTER SCIENCE

M.Phil. Computer Science

SYLLABUS

With Effect from 2021-2022

CURRICULUM UNDER CHOICE BASED CREDIT SYSTEM

M.PHIL. COMPUTER SCIENCE

Semester	Course Code	Title of the Paper	Hours	Credits	Int. Marks	Ext. Marks	Total Marks
I	M21CST11	Research Methodology	10	4	40	60	100
	M21CST12	High Performance Computing	10	4	40	60	100
	M21PST13	Professional Skills	10	4	40	60	100
	Total		**30**	**12**			**300**
II	M21CST21	SPECIAL PAPER	10	4	40	60	100
	M21CSD22	Dissertation and Viva-voce	20	14 (12+2)	120	80	200
	Total		**30**	**18**			**300**
	TOTAL		**60**	**30**	**Total Marks**		**600**

For each course other than the Dissertation

Continuous Internal Assessment : 40 Marks

End Semester Examination : 60 Marks

Total : 100 Marks

Question Pattern

Answer any Five Questions (5 x 15 = 75)

Question 1 (or) Question 2 → Unit 1

Question 3 (or) Question 4 → Unit 2

Question 5 (or) Question 6 → Unit 3

Question 7 (or) Question 8 → Unit 4

Question 9 (or) Question 10 → Unit 5

Special Paper related to Project

S.No.	Course
1	Digital Image Processing
2	Cloud Computing
3	Network Security
4	Biometrics
5	Advanced Databases
6	Machine Learning Techniques
7	Internet of Things
	Directed Study*
	Any UGC approved online course related to Research

*Any new course can be added as a Special paper by getting permission from BoS and Academic Council

PROGRAMME OUTCOMES

PO 1 : Develop and integrate effectively for mastery in Research Methodology
PO 2 : Create significant contributions in scientific knowledge in their area of research
PO 3 : Analyze and publish research in a clear and effective manner
PO 4 : Engage and equip with productive research with publications and conference presentations
PO 5 : Use their knowledge to analyze, interpret the data and synthesis the information
PO 6 : Expertise in developing application with required domain knowledge

PROGRAMME SPECIFIC OUTCOMES

PSO 1 : Developing knowledge of the literature and comprehensive understanding of Scientific methods and techniques applicable to their own research.
PSO 2 : Demonstrate originality in the application of knowledge, together with a practical Understanding of how research and enquiry are used to create and interpret knowledge in their field
PSO 3 : Develop the ability to critically evaluate current research and research techniques and methodologies.
PSO 4 : Inculcate self-direction and originality in tackling and problems solving ability.

M21CST11	Research Methodology		
	Semester I	**Credits: 4**	**Hours: 10**
Cognitive Level	K2: Understand K3: Apply K4: Analyze		
Objectives	1. To create awareness on the research concepts 2. To understand the overall process of designing a research study 3. To learn the components of literature review process. 4. To identify and formulate a research problem		

Unit I: Research Methodology

Introduction – Mathematical tools for analysis – Research problems – Types of research – Research Process – Data Collection – Primary data – Secondary data – Data Presentation – Mathematical Tool for Analysis – Ethics in Research – Importance – Integrity in Research – Scientific Misconduct and Consequences.

Unit II: Scientific Research Methods

Research process – Criteria for good Research – Problems encountered by Researchers - Journal Reading Techniques - Defining the Research problem– Selecting the Problem – Necessity of Defining the problem – Technique involved in Defining the Problem – An illustration.

Research Design – Need for Research Design – Features of good design – Important concepts relating to Research Design – Different Research Design – Basic principles of Experimental Designs – Conclusion – Developing a Research Plan.

Unit III: Algorithmic Research

Algorithmic Research Problems: Polynomial Problem – Combinational/NP hard problems – Types of Algorithmic Research– Solution Procedure/Algorithm: Polynomial Algorithms – Exponential Algorithms – Scope of Algorithms – Steps in Development of Algorithms –Time and Space Complexity of Algorithms

Unit IV: Design of Algorithms

Backtracking - Subset sum problem – Branch and Bound - Assignment problem – Methods to solve assignment problem: Enumeration method – Simplex method – Transportation method – Hungarian method – Knapsack problem – Traveling salesman problem – Greedy method – Prim's algorithm – Kruskal's algorithm – Dijkstra's algorithm.

Unit V: Thesis Writing

Literature Survey - Writing at the Tertiary Level – Planning the thesis – Computer tools for writing and publishing – Publishing of Papers - The General Format – Page and Chapter Format – Footnotes – Tables and Figures – References – Appendices - Plagiarism – Citation and Acknowledgement.

References:

1. C.R. Kothari, "Research Methodology Methods and Techniques", 2nd Edition New Age International Publishers, 2009.
2. R Pannerselvam, "Design and Analysis of Algorithms", PHI, New Delhi, 2007.
3. Behrouz A. Forouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", McGraw Hill, 2011.
4. Anderson, Berny H.Dujrston, H.Pode, "Thesis & Assignment Writing" Wiley Publications , 4th Edition, NewDelhi, 2008.
5. T.S.Rajasekaran & G.A. Vijaylakshmi Pai, "Neural Networks, Fuzzy Logic & Genetic Algorithms– Synthesis & applications", PHI, 2009.

Course Outcomes:

After successful completion of the Course, Scholar shall be able to

CO 1: Gain the Scientific knowledge in the area of Research K2
CO 2: Acquire the significance of carrying out their research work in latest technology K2
CO 3: Obtain proficiency of computing for Technical paper and thesis writing K3
CO 4: Aware about the knowledge of Research Ethics K4

<u>Mapping of Cos with Pos and PSOs :</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1		M	M	S		M	M		M	
CO2	M	S	M				S			M
CO3	M	S	M				S			M
CO4	M	M			M	S	S	S	M	M

S – Strongly Correlating M- Moderately Correlating

M21CST12	High Performance Computing		
	Semester I	**Credits: 4**	**Hours: 10**
Cognitive Level	K2-Understand K3-Apply K6-Analyze		
Objectives	1. To introduce the concepts of advance computing. 2. To understand about IOT and Image Processing techniques. 3. To study and analyze the techniques on Data Mining and Network Security. 4. To identify and formulate the Research Domain.		

Unit I: Emerging Technologies

Grid and Cloud Computing: Computational grid – Data grid – Collaborative grid – Difference between grid and cloud computing – Types of cloud computing - Mobile computing: Mobile communication – Mobile Hardware – Mobile Software - Internet of Things - Logical Design of IoT - Physical Design of IoT– IoT Enabling Technologies – IoT & Deployment Templates

Unit II: Advanced Computing Methods

Fundamentals of Neural Networks: Properties – Architecture - Learning methods: activation functions, Feed forward, Feedback, Recurrent Neural Networks, Convolutional Neural Networks - Genetic Algorithm: Basic concept - Role of GA in optimization - Fitness function - Cross over – Mutation – Inversion – Deletion

Unit III: Digital Image Processing

Digital Image Fundamentals - Components of Image Processing System- Sampling and Quantization - Color Image Processing – Color models – Pseudo color Image processing - Image Segmentation- Detection of discontinuities – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation

Unit IV: Data Mining

Introduction to Data Mining: Functionalities – Classification of Data Mining Systems – Characterization and Comparison - Association Rule Mining - Clustering - Classification and prediction.

Machine Learning Techniques: Supervised and Unsupervised Machine Learning – Bayesian and Computational Learning – Advanced Learning

Unit V: Network Security

Cryptography - Introduction -Submission Ciphers – Transposition Ciphers - One-time pads – Cryptographic Principles – Symmetric Key Algorithms: DES - AES – Cipher Modes - Cryptanalysis –Public Key Algorithms – Digital Signatures: Symmetric Key Signatures – Public Key Signatures - Message Digests.

References:

1. Ellis Horowtz and Sartaj Sahni, "Fundamentals of Computer algorithms", Galgotia Publications, New Delhi, 2008.
2. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Pearson Education, New Delhi, Fourth Edition, 2018.
3. Jiawei Han and Micheline Kamber, "Data Mining: Concepts and Techniques", Morgan Kaufman Publishers (Elsevier Science), 2006.
4. ArshdeepBahga, Vijay Madisetti, "Internet of Things", Universities Press(INDIA) Private Ltd., 2015.
5. William Stallings, "Cryptography and New Network Security", Pearson Education, Delhi, 2017.
6. Mark A. Weiss Addison Wesley, "Data Structures and Algorithm Analysis in Java", 2/E, 2006.

Course Outcomes:

After successful completion of the Course, Scholar shall be able to

CO 1: Understand the role of HPC in science and engineering. K2

CO 2: Use HPC platforms and parallel programming models. K3

CO 3: Able to measure, analyse and assess the performance of HPC applications and their supporting hardware. K3,K6

CO 4: Analyse the suitability of different HPC solutions to common problems found in Computational Science. K2

CO 5: Able to administration, scheduling, code portability and data management in an HPC environment, with particular reference to Grid Computing. K3

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	M		M		M	S		S	M
CO2	S	M		M		M	S		S	M
CO3		M		S		S	S	S	M	
CO4	S	M		M		M	S		S	M
CO5	S	M		M		M	S		S	M

S – Strongly Correlating M- Moderately Correlating

M21CST21	Special Paper - Digital Image Processing		
	Semester II	**Credits: 4**	**Hours: 10**
Cognitive Level	K2-Understand K3-Apply K4-Analyze		
Objectives	1. To know the basic components of Digital Image Processing system. 2. To Analyze and implement image processing algorithms 3. To understand the differences between computer vision and image processing. 4. To develop Application-Specific Algorithms for image processing		

Unit I: Introduction

Digital Image representation - Fundamental steps in Image Processing - Elements of Digital Image Processing Systems - Sampling and Quantization: Basic concepts in sampling and quantization – representing digital images – spatial and intensity resolution – image interpolation.

Unit II: Image Fundamentals and Intensity Transformations

Basic relationships between pixels: Neighbours of a pixel – Adjacency, Connectivity, Regions and Boundaries – Distance measures - Imaging Geometry - Transformation Technology - Basic Intensity Transformation functions - The Fourier Transform, The Hadamard Transform, The Discrete Cosine Transform.

Unit III: Image Enhancement

The Spatial Domain Methods, The Frequency Domain Methods - Image Segmentation: Pixel Classification by Thresholding, Histogram Techniques: Histogram Equalization – Histogram Matching – Local Histogram Processing – Using Histogram statistics for Image Enhancement, Smoothing and Thresholding - Gradient Based Segmentation: Gradient Image, Boundary Tracking, Laplacian Edge Detection.

Unit IV: Color Image Processing

Color models – Pseudo color Image processing: Intensity Slicing – Intensity to Color Transformations – Basic of full color Image Processing – Color transformations: Formulation – Color Complements - Color Slicing – Tone and Color Corrections - Histogram Processing – Smoothing and Sharpening – Color Segmentation – Noise in Color Images – Color Image Compression.

Unit V: Image Segmentation

Detection of discontinuities – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation: Region Growing – Region Splitting and Merging – Segmentation by Morphological Watersheds:– Watershed Segmentation Algorithm – Use of Markers – The Use of Motion in Segmentation: Spatial Techniques – Frequency Domain Techniques.

References:

1. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, Eastern Economy Edition, 1992.
2. C. Gonzalez and R.E. Woods, “Digital Image Processing", Addison Wasley, 2012.
3. A.K.Jain, “Fundamentals of Digital Image Processing", Prentice Hall of India, 2014.

Course Outcomes:

After completion of the course, Student shall be able to

CO 1: Understand how digital images are represented and manipulated in computer K2
CO 2: Analyse the basic algorithms used for image processing. K3
CO 3: Evaluate the techniques for image enhancement and image restoration. K4
CO 4: Interpret image segmentation and representation techniques. K4
CO 5: Identify, Analyse and categorize the image compression techniques K3,K4

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	M		M	M	M	M	S	M	S
CO2		S	M	S	M		S	M	S	
CO3	S	M		M	M	M	M	S	M	S
CO4	S	M	S	M	M	M	M	S	M	S
CO5	M	S	M	S	M		S	M	S	M

S – Strongly Correlating M- Moderately Correlating

M21CST21	Special Paper - Cloud Computing		
	Semester II	**Credits: 4**	**Hours: 10**
Cognitive Level	K2-Understand K4-Analyze		
Objectives	1. To understand the principle of cloud virtualization, cloud storage, data management and data visualization. 2. To learn the key dimensions and challenges of Cloud Computing. 3. To facilitate to choose the appropriate technologies, algorithms, and approaches for the related issues. 4. Able to develop and deploy cloud application using popular cloud platforms.		

Unit I: Distributed Computing

Overview of Distributed Computing - Trends of computing - Introduction to distributed computing – Types of Distributed computing: Network Centric – Server based Computing – Peer to peer computing - Next big thing: cloud computing - Application availability, performance, security and disaster recovery - Next generation Cloud Applications.

Unit II: Introduction to Cloud Computing

What's cloud computing – Public cloud – Private cloud – Hybrid cloud – Cloud computing methodologies - Properties & Characteristics - Service Models – Difference between service models - Deployment models - Cloud architecture - Advantages and Disadvantages – Uses of cloud computing – Cloud Applications.

Unit III: Infrastructure as a Service (IaaS)

Introduction to IaaS – IaaS Architecture - Characteristics of IaaS - Resource Virtualization – Server-Storage Network - Case studies - Performance and scalability of services - Tools and technologies used to manage cloud services deployment – Advantages and Disadvantages of IaaS.

Unit IV: Platform as a Service (PaaS)

Introduction to PaaS - PaaS Architecture - Characteristics of PaaS – Uses of PaaS and its Deployment – Development Tools - Cloud platform and Management – Computation – Storage - Case studies - Advantages and Disadvantages of PaaS – How is PaaS different from server less computing? - Communication PaaS – Mobile Paas – Open PaaS

Unit V: Software as a Service (SaaS)

Introduction to SaaS - SaaS Architecture - Characteristics of SaaS - Web services - Cloud based service - Applications and development - Platform deployment so as to improve the total cost of ownership (TCO) – Adoption drivers – Adoption challenges - Advantages and Disadvantages of SaaS – Security and Privacy - Popular SaaS providers.

References:

1. Barrie Sosinsky, “Cloud Computing Bible”, Wiley-India, 2010.
2. James Broberg, Andrzej M. Goscinski, “Cloud Computing: Principles and Paradigms”, 2011.
3. Lee Gillam, “Cloud Computing: Principles, Systems and Applications”, Springer, 2012.
4. Ronald L. Krutz, Russell Dean Vines, “Cloud Security: A Comprehensive Guide to Secure Cloud Computing”, Wiley-India, 2010.

Course Outcomes:

After successful completion of this course, the students shall be able to

CO1: Understand the concepts, characteristics, delivery models and benefits of cloud computing K2

CO2: Understand the key security and compliance challenges of cloud computing K4

CO3: Understand the key technical and organisational challenges K2

CO4: Understand the different characteristics of public, private and hybrid cloud deployment models. K2

<u>Mapping of Cos with Pos and PSOs</u> :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	M		M	M	S	M	M	S	
CO2	M	M		S		M	M	S	S	M
CO3	S	M		M	M	S	M	M	S	
CO4	S	M		M	M	S	M	M	S	

S – Strongly Correlating M- Moderately Correlating

M21CST21	Special Paper-Network Security		
	Semester II	**Credits: 4**	**Hours: 10**
Cognitive Level	K2-Understand K3-Apply K4-Analyze		
Objectives	1. To understand the security design principles 2. To learn secure programming techniques in networking 3. To Understand the security requirements in operating systems and databases 4. To make familiar with security applications in wireless environment		

Unit I: Introduction

Services and Mechanism: Security Attacks, Security Services - Classical Encryption Techniques - Cipher Principles - Data Encryption Standard - Block Cipher Design Principles and modes of Operation - Evaluation criteria for AES - AES Cipher - Triple DES - Placement of Encryption function - Traffic Confidentiality.

Unit II: Public Key Encryption

Public Key Cryptography: Principles of public Key Cryptosystems – The RSA Algorithm - Key Management - Diffie-Hellman Key Exchange - Elliptic Curve Architecture and Cryptography - Introduction to Number Theory: Prime and Relatively Prime Numbers – Modular Arithmetic – Fermat's and Euler's Theorems – Testing for Primarily - Euclid's Algorithm – The Chinese Remainder Theorem - Discrete Logarithms - Confidentiality using Symmetric Encryption.

Unit III: Hash Functions

Message Authentication and Hash Functions: Authentication requirements - Authentication Functions - Message Authentication Codes – Hash Functions - Security of Hash Functions and MACs – Hash and Mac Algorithms: MD5 message digest algorithm - Secure Hash Algorithm – RIPEMD – HMAC – Digital Signatures and Authentication Protocols: Digital Signatures - Authentication Protocols - Digital Signature Standard.

Unit IV: Network Security

Authentication Applications: Kerberos - X.509 Authentication Service - Electronic Mail Security – PGP - S/MIME - IP Security: IP Security Overview – IP Security Architecture – Authentication Header – Encapsulating Security Payload – Combining Security Associations – Key Management - Web Security: Web Security Requirements – Secure Sockets Layer and Transport Layer Security – Secure Electronic Transaction.

Unit V: System Security

Intrusion Detection - Password management - Viruses and related Threats - Virus Counter measures – Firewalls: Firewall Design principles – Trusted Systems, SSL, SET.

References:

1. Williams Stallings, "Cryptography and Network Security-Principles and Practices", Prentice Hall of India, Third Edition, 2003.
2. Atual Kahate, "Cryptography and Network Security", McGraw Hill, 2019.
3. Bruce Schenier, "Applied Cryptography", John Wiley & Sons Inc, 2001.

Course Outcomes:

After completion of the Course, students shall be able to

CO 1: Apply cryptographic utilities and authentication mechanisms to design secure applications K2

CO 2: Understand the design issues in Network Security K2

CO 3: Identify security threats, security services and mechanisms to counter them. K4

CO 4: Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication K3

CO 5: Apply different digital signature algorithms to achieve authentication and create secure applications K4

<u>Mapping of Cos with Pos and PSOs :</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	M		S		M	S	M	S	M
CO2	S	M		S	M	M	S	M	S	
CO3		M	M		S	M	M	M	M	S
CO4	S	M		S	M	M	S	M	S	M
CO5	S	M	M		S	M	M	M	M	S

S – Strongly Correlating M - Moderately Correlating

M21CST21	Special Paper - Biometric Gait Analysis		
	Semester II	**Credits: 4**	**Hours: 10**
Cognitive Level	K2-Understand K3-Apply K4-Analyze		
Objectives	1. To recognize the Gait characteristics using Biometrics 2. To understand the strength and weakness of biometric gait recognition 3. To analyze signals based on image and video through biometric 4. To evaluate the error distribution and quality of gait recognition technique		

Unit I : Introduction

Biometric gait recognition: MV-based gait recognition – FS-based gait recognition – WS-based gait recognition - Behavioral biometric: Keystroke dynamics – Gait analysis – Voice ID – Mouse use characteristics – Signature Analysis – Biometric sensing from distance - Gait as a biometric - Gait authentication – Identification – Challenges - Issues and prospects.

Unit II: Fundamentals of Biometric Gait Recognition

Strength and weakness – Why gait recognition – Keystroke dynamics in gait recognition – Motion - based gait recognition – Model based gait recognition – Types of phases in gait cycle

Unit III: Gait Processing

Image based recognition – Signal based recognition: kinetic, kinematic, pose, Electronygraphy (EMG) – Marker based recognition- Devices used in biometric gait recognition.

Unit IV: Gait Analysis

2D and 3D Analysis- Biomechanics of standing – Ground reaction of normal gait- pressure and movement, measurement, evaluation, description – Technology challenges- clinical gait analysis

Unit V: Error Distribution

Error types – Threshold score distribution – FAR/FRR – System design issues – Gait velocity matching performance – system vulnerabilities – Circumvention – Covert acquisition – Quality control – Template generation – Interoperability – Data storage

References:

1. Christopher Kirtley, “Clinical Gait Analysis”, Elsevier Churchchill Livingstone, 2005.
2. Adam M.Fullenkamp, “A hybrid Gait recognition solution using video and ground contact information”, 2007.
3. Samir Nanavati, Michael Thieme, Raj Nanavati, “Biometrics – Identity”, 2002.

Course Outcomes:

After successful completion of the course, Student shall be able to:

CO1: Demonstrate deeper understanding of gait analysis .	K2
CO2: Evaluate gait process using various methods	K4
CO3: Understand the error distribution in gait analysis	K3
CO4: Implement dynamics in gait recognition	K2

Mapping of Cos with Pos and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S		S		M	M	S	M	
CO2	S	S	M	S	S	S	S	M	S	S
CO3	M	S		S	M	M	M	S	M	
CO4	M	S	M	S		M	M	S	M	S

S – Strongly Correlating M- Moderately Correlating

M21CST21	Special Paper - Advanced Databases		
	Semester II	**Credits:4**	**Hours: 10**
Cognitive Level	K2: Understand K3: Apply K4: Analyse K6: Create		
Objectives	1. To recognise the importance of Distributed Data processing and design issues 2. To understand and apply query processing and optimization 3. To categorize and analyze the Object oriented and Object Relational Database 4. To make familiar for database creation using advanced Concept		

Unit I: Distributed Databases

Introduction – Distributed Data Processing - Distributed Database System – Promises of DDBS - Problem Areas - Overview of Relational DBMS: Relational Database Concepts – Normalization - Integrity – Rules - Relational Data Languages.

Distributed DBMS Architecture: Architectural Models for Distributed DBMS - Distributed Database Design: Alternative Design Strategies - Distribution Design Issues – Fragmentation - Allocation.

Unit II: Query Processing and Decomposition

Query Processing Objectives - Characterization of Query Processors - Layers of Query Processing - Query Decomposition - Localization of Distributed Data - Distributed Query Optimization: Query Optimization - Centralized Query Optimization - Distributed Query Optimization Algorithms.

Unit III: Transaction Management

Definition – Characterization of Transactions – Formalization of Transaction concept - Properties of Transaction - Types of Transaction - Distributed Concurrency Control – Serialization - Concurrency control Mechanism and Algorithms - Time Stamped and Optimistic Concurrency Control Algorithms - Deadlock Management.

Unit IV: Distributed Object Database Management Systems

Fundamental Object Concepts and Models - Object Distributed Design: Horizontal Class Partitioning – Vertical Class Partitioning – Path Partitioning – Class Partitioning Algorithms – Allocation - Replication - Architectural Issues - Object Management: Object Identifier Management – Pointer Swizzling – Object Migration - Distributed Object Storage - Object Query Processing.

Unit V: Object Oriented Data Model

Components of Object oriented data model - Advantages and Disadvantages of Object Oriented Data Model – Abstract data types - Inheritance – Object Identity - Persistent

Programming Languages - Persistence of object - Comparing OODBMS and ORDBMS – Concurrent access – Support of transactions

References:

1. M.Texter OZSU and Patuck Valduries, "'Principles of Distributed Database Systems", Pearson Edition, 2001.
2. Stefan Cari and Willipse Peiagatti, "Distributed Database", McGraw Hill, 1988.
3. Henry P.Korth, A Silberschatz and Sundarshan, "Database System Concepts", McGraw Hill, 2019.
4. Raghuramakrishnan and Johanes Geheke, "Database Management Systems", McGraw Hill, 2014.

Course Outcomes:

After successful completion of the course, Student shall be able to:

CO 1: Understand the use of Structured Query Language (SQL)	K2
CO 2: Create E/R models from application descriptions.	K3
CO 3: Apply normalization techniques to standardize the database.	K3, K4
CO 4: Design and implement a database system for real time problem	K6
CO 5: Create databases in an RDBMS and enforce data integrity constraints and queries using SQL	K6

<u>Mapping of Cos with Pos and PSOs:</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	M	M	S	M	S	M	M
CO2	M	M	M	S	S	M	S	M	M	S
CO3	M	M	M	S	S	S	S	M	S	S
CO4	M	M	S	S	S	S	S	M	S	S
CO5	M	M	S	S	S	S	S	M	S	S

S – Strongly Correlating M- Moderately Correlating

M21CST21	Special Paper - Machine Learning Techniques		
	Semester II	**Credits: 4**	**Hours: 10**
Cognitive Level	K2-Understand K4-Analyze K6-Create		
Objectives	1. To Learn about Machine Intelligence and Machine Learning applications 2. To implement and apply machine learning algorithms to real-world applications. 3. To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems. 4. To understand how to perform evaluation of learning algorithms and model selection.		

Unit I: Introduction

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

Unit II: Neural Networks And Genetic Algorithms

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning – Advantages and Disadvantages of Genetic Algorithm.

Unit III: Bayesian And Computational Learning

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model**.**

Unit IV: Instant Based Learning

Nearest Neighbour - K-Nearest Neighbour Learning – K-Nearest Neighbour learning in Euclidean space – Distance weighted Nearest Neighbours - Advantages and Disadvantages of KNN - Locally weighted Regression – Radial Basis Functions – Case Based Reasoning – Advantages and Disadvantages of Instance based learning – Lazy vs. Eager Learning.

Unit V: Advanced Learning

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

Text Book:

1. Tom M. Mitchell, "Machine Learning", McGraw-Hill Education (India) Private Limited, 2013.

Reference Books:

1. EthemAlpaydin, "Introduction to Machine Learning (Adaptive Computation and Machine Learning)", The MIT Press, 2004.
2. Stephen Marsland, "Machine Learning: An Algorithmic Perspective", CRC Press, 2009.
3. Michael Affenzeller, Stephan Winkler, Stefan Wagner, Andreas Beham, "Genetic Algorithms and Genetic Programming", CRC Press Taylor and Francis Group, 2009.

Course Outcomes:

After successful completion of the course, Student shall be able to:

CO 1: Have a good understanding of the fundamental issues and challenges of machine learning concept K2

CO 2: Understand, Analyse and identify the strengths and weaknesses of many popular machine learning approaches. K2, K4

CO 3: Understand the underlying mathematical relationships across Machine Learning algorithms and the paradigms of supervised and un-supervised learning. K2

CO 4: Ability to design and implement various machine learning algorithms in a range of real-world applications. K4, K6

CO 5: Perform evaluation of machine learning algorithms and model selection. K4

<u>Mapping of Cos with Pos and PSOs :</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S		S		M	M	M	S	M
CO2	S	S		S	M	M	M	M	S	
CO3	S	M	M	S		M	M	M	S	M
CO4	M	S	S		M	S	M	S		S
CO5	M	S	S		M	S	M	S		S

S – Strongly Correlating M- Moderately Correlating

M21CST21	Special Paper - Internet of Things		
	Semester II	**Credits: 4**	**Hours: 10**
Cognitive Level	K2-Understand K3-Apply K4-Analyze		
Objectives	1. In order to gain knowledge on bases of Internet of Things (IoT) 2. To gain knowledge of IoT Architecture, and the Protocols related to IoT; 3. To understand the concept of the Web of Thing 4. To understand the relationship between the IoT and WoT		

Unit I: Introduction to IoT

Definition and characteristics of Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies: WSN – Cloud Computing – Big Data Analytics – Communication Protocols – Embedded Systems - IoT Levels and Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF - YANG- IoT Platforms Design Methodology.

Unit II: IoT Architecture

ETSI M2M high-level architecture: ETSI M2M SCL Resource Structure – Security in ETSI M2M Framework - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - Information model - Functional model - Communication model - IoT reference architecture.

Unit III: IoT Protocols

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol: Standardization – Technology – Security – BACnet over web services – Modbus – Zigbee Architecture – Network layer – APS Lauer - 6LowPAN – RPL - CoAP - Security

Unit IV: Web of Things:

Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

Unit V: Applications

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents – Applications - Smart Grid – Electrical Vehicle Charging – Case Study.

Text Books:

1. Arshdeep Bahga, Vijay Madisetti, “Internet of Things – A hands-on approach”, Universities Press, 2015.
2. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), “Architecting the Internet of Things”, Springer, 2011.

Reference Books:

1. Jan Ho¨ ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier, 2014.
2. David Easley and Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a Highly Connected World”, Cambridge University Press, 2010.
3. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things – Key Applications and Protocols”, Wiley, 2012.

Course Outcomes:

After successful completion of the course, Student shall be able to:

CO 1: Organize and Analyze Bigdata	K2
CO 2: Discover Useful Information for Decision Making	K2, K4
CO 3: Analyze applications of IoT in real time scenario	K2
CO 4: Design a portable IoT using Rasperry Pi	K4, K6
CO 5: Analyze various protocols in IoT	K4

<u>Mapping of Cos with Pos and PSOs :</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S		S		M	M	M	S	M
CO2	S	S		S	M	M	M	M	S	
CO3	S	M	M	S		M	M	M	S	M
CO4	M	S	S		M	S	M	S		S
CO5	M	S	S		M	S	M	S		S

S – Strongly Correlating M- Moderately Correlating

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MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL – 624 102

M.Sc. COMPUTER SCIENCE

Syllabus
(With Effect from 2021)

DEPARTMENT OF COMPUTER SCIENCE

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

DEPARTMENT OF COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM (CBCS)

(2021-2022 ONWARDS)

M.Sc. COMPUTER SCIENCE

1. About the Programme

M.Sc. in Computer Science is a two-year post-graduate programme with the objective to develop human resources with core competence in various thrust areas of Computer Science. The programme includes Software Engineering, System Development, Natural Computation, Mathematical Foundation, Data Analytics and Artificial Intelligence.

Other modules include programming, data analytics, software development, applied communications, network architecture, and database design. The coursework of the programme focuses on preparing students for innovation within major tech companies or entrepreneurship within startup ventures.

Students are provided with opportunities to develop and have core competency in the field of Computer Science and encourage them to make a mark in the much sought after IT industry. Guest lectures, case studies and presentations are organized from time to time to give an insight into the latest development and happenings in the industry

2. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO1	To provide technology-oriented students with the knowledge and ability to develop creative solutions.
PEO2	To develop skills to learn new technology.
PEO3	To apply computer science theory and software development concepts to construct computing-based solutions.
PEO4	To design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, cloud computing, Artificial Intelligence, Mobile applications.

3. Eligibility: B.Sc. CS / B.C.A. / B.Sc. IT

4. General Guidelines for PG Programme

i. **Duration:** The programme shall extend through a period of 4 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

- **Evaluation Pattern**

Evaluation Pattern	Theory		Practical	
	Min	Max	Min	Max
Internal	13	25	13	25
External	38	75	38	75

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	A	**10*1 Marks=10** Multiple Choice Questions (MCQs): 2 questions from each Unit	10
2	B	**5*4=20** Two questions from each Unit with Internal Choice (either / or)	20
3	C	**3*15=45** Open Choice: Any three questions out of 5 : one question from each unit	45
Total Marks			75

*** Minimum credits required to pass: 90**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks; External (Viva): 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade

(Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
00-49	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the Prescribed Form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the Prescribed Form with the prescribed fee along with the Medical Certificate. Students with attendance less than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and the Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the PG Programmes are also applicable for this Programme.

PROGRAMME OUTCOMES

After completing M.Sc. Computer Science Program, the students will be able to:

PO1	To provide advanced and in-depth knowledge of computer science and its applications
PO2	To prepare Post Graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, design and implementation skills.
PO3	To enable students pursue a professional career in Information and Communication
PO4	Technology in related industry, business and research.
PO5	To impart professional knowledge and practical skills to the students.
PO6	Apply computer science theory and software development concepts to construct computing-based solutions.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

After completing M.Sc. Computer Science Program, the students will be able to:

PSO1	Have the knowledge in the areas like Artificial Intelligence, Web Services, Cloud Computing, Paradigm of Programming language, Design and Analysis of Algorithms, Database Technologies Advanced Operating System, Mobile Technologies, Software Project Management and core computing subjects. Choose to study any one subject among recent trends in IT provided in the optional subjects.
PSO2	Understand all dimensions of the concepts of software application and projects.
PSO3	Understand the computer subjects with demonstration of all programming and theoretical concepts with the use of ICT.
PSO4	Develop in-house applications in terms of projects.

M.SC COMPUTER SCIENCE CURRICULUM

SEMESTER- I								
S.No.	**Course Code**	**Course Title**	**Credits**	**Hours**		**Int**	**Ext**	**Total**
				L	**P**			
1.	P21CST11	**Core-1**: Advanced JAVA Programming	4	5	-	25	75	100
2.	P21CST12	**Core-2**: Data Structures and Algorithms	4	5	-	25	75	100
3.	P21CST13	**Core-3**: Discrete Mathematical Structure	4	5	-	25	75	100
4.	P21CST14	**Core-4:** Compiler Design	4	5	-	25	75	100
5.	P21CSP11	**Core–5**: **Computing-Lab1** (Advanced JAVA and Data Structures & Algorithms)	4	-	6	25	75	100
6.	P21CSS11	**Supportive Course I**: Computer Skills for Web Designing and Video Editing	2	-	4	25	75	100
	Sub Total		**22**	**30**				**600**
SEMESTER – II								
7	P21CST21	**Core-6**: Python Programming	4	4	-	25	75	100
8	P21CST22	**Core-7**: Cryptography and Network Security	4	4	-	25	75	100
9	P21CST23	**Core-8**: Distributed Operating System	4	4	-	25	75	100
10	P21CST24	**Coure-9**: NoSQL Databases	4	4	-	25	75	100
11	P21CSP22	**Core-10**: **Computing-Lab2** (Python Programming & Operating System)	4	-	6	25	75	100
12		**Non Major Elective**	4	-	6	25	75	100
13	P21CSS22	**Supportive Course – 2**: Web Programming	2	-	2	25	75	100
	Sub Total		**26**	**30**				**700**
SEMESTER – III								
14	P21CST31	**Core-11**: Digital Image Processing	4	4	-	25	75	100
15	P21CST32	**Core-12**: Cloud Computing	4	4	-	25	75	100
16	P21CST33	**Core-13**: Artificial Intelligence and Machine Learning Algorithms	4	4	-	25	75	100
17	P21CST34	**Core-14**: Internet of things	4	4	-	25	75	100
18	P21CSP33	**Core-15**: **Computing-Lab3** (Image Processing)	4	-	6	25	75	100
19	P21CSP34	**Core-16**: **Computing-Lab4** (R Programming)	4	-	6	25	75	100
20	P21WSS33	**Supportive Course – 3**: Women Empowerment	2	2	-	25	75	100
	Sub Total		**26**	**30**				**700**
SEMESTER – IV								
21	P21CSE411/	**Elective – I***	4	4	-	25	75	100

	P21CSE412/ P21CSE413	1. Object Oriented Analysis and Design 2. Computational Linguistics 3. Client Server Computing 4. Any MOOC Course$						
22	P21CSE421/ P21CSE422/ P21CSE423/	**Elective – II*** 1. Big Data Analytics 2. Soft Computing 3. Wireless Sensor Networks 4. Any MOOC Course$	4	4	-	25	75	100
23	P21CSR41	**Core-17**: Project	8	-	22	25	75	100
	Sub Total		**16**	**30**				**300**
	Total		**90**	**120**				**2300**

Non Major Elective

The candidates who have joined the PG Programme, can also undergo Non Major Elective offered by other Departments.

List of Non-Major Electives:

S.No.	Course code	Non Major Elective Course Name
1	P21CSN211	C Programming
2	P21CSN212	Photo Designing
3	P21CSN213	Big Data Analytics
4	P21CSN214	Digital Image Processing
5	P21CSN215	Mobile Computing
6	P21CSN216	Data Communication and Networking
7	P21CSN217	Cloud Computing

ADDITIONAL CREDIT COURSES

P21CSV11	Big Data Analytics Lab	I Semester – 2 Credits
P21CSI21	Internship	II Semester – 2 Credits
P21CSO31	MOOC	III Semester – 2 Credits
P21CSV42	Soft Computing Lab	IV Semester – 2 credits

*Those who have CGPA 9 and want to do the project in Industry / Institution during 4th semester, these two elective papers in IV semester can be opted in third semester itself.

$For Elective – I / Elective- II, the students can also take either one 4-credit course or two 2-credit courses in MOOC, with the approval of Departmental Committee.

SEMESTER -I

COURSE CODE	P21CST11	ADVANCED JAVA PROGRAMMING	L	T	P	C
CORE - I			5	-	-	4

Cognitive Level	**K1:** Recall**K2:** Understand**K3:** Apply**K4:**Analyse
Course Objectives	• To Understand the Basic Programming Concepts of Java. • To know how to import user defined package, to create thread program and string methods • To learn about the Input/output and Networking package classes and methods • To learn about the Abstract Windowing Toolkit and Applet package classes and methods

UNITI: Applets
Applet Fundamental – Applet Class – Applet Life Cycle – Developing An Applet Program-Passing Values Through Parameters - Graphics In An Applet – Event Handling.

UNIT II :GUI Applications
Graphical User Interface-Creating Windows-Dialog Boxes-Layout Managers- AWT Component Classes- Swing Component Classes-Event Handling-AWT graphics classes.

UNIT III: Networking
Basics Of Networking - Networking In Java - Socket Programming Using TCP/IP – Socket Programming Using UDP – URL And INET Address Classes. **Java Database Connectivity:** Types Of Drivers- JDBC Architecture- JDBC Classes And Interfaces-Basic Steps In Developing JDBC Applications-Creating a New Database And Table With JDBC.

UNITIV: Servlets
Basics – Advantages Over Applets – Servlet Alternatives – Servlet Strengths - Servlet Architecture - Servlet Life Cycle - Generic Servlet- HTTP Servlet-Passing Parameters To Servlet – Server-Side Include – Cookies – Filters-Security Issues.

UNITV: Java Server Pages
Overview – JSP and HTTP – JSP Engines – Working Of JSP – Anatomy of A JSP Page- JSP Syntax-Creating A Simple JSP Page-Components Of Java Server Pages – Implicit Objects – Client Side Validation Using JavaScript – Handling Request And Response.

TEXTBOOK(S):

1. Herbert Schildt, Java The Complete Reference, McGraw Hill Education, 10th Edition,New York, 2017

REFERENCEBOOKS:

2. UttamK.Roy, Advanced Java Programming, Oxford University Press,2017.
3. Black Book, Core and Advanced Java, Dreamtech Press, 2017

COURSE OUCOMES

CO1: Define the Applet fundamentals, GUI applications and AWT components. K1
CO2: Discuss about Networking in java and Java database connectivity. K2
CO3: Understand the concept of Servlets. K2
CO4: Understand the concepts JSP and HTTP. K3
CO5: Discuss about the Web programming on client side and server side. K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	M	M	M	M	M	S	M	S
CO4	M	S	M	S	M	S	M	S	S	S
CO5	S	M	S	S	S	S	M	M	S	S

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CST12	DATA STRUCTURES AND ALGORITHM	L	T	P	C
CORE – II			5	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:**Analyse
Objectives	• To introduce algorithm analysis framework for recursive and non-recursive algorithms • To acquire knowledge on ADTs such as List, Stack and Queue • To explore the binary trees and the priority queues with their applications • To learn the various hashing techniques and Set ADT

UNITI: Trees
Heaps – Binary Search Trees – Selection Trees – Forests – representation of Disjoint Sets – Counting Binary Trees.
Graphs: The Graph Abstract Data type – Elementary Graph Operations – Minimum Cost Spanning Trees – Shortest Paths and Transitive Closure – Activity Networks.

UNITII: Hashing:
Introduction – Static hashing – Dynamic hashing – Bloom filters.
Priority Queues:
Single and Double ended priority queues – Left Trees – Binomial Heaps
Fibonacci Heaps – Pairing Heaps – Symmetric Min – Max Heaps – Interval Heaps.

UNIT III : Efficient Binary Search trees:
Optimal Binary Search Trees – AVL Trees – Red – Black Trees – Splay Trees.
Multiway Search Trees: m-way Search Trees – B –Trees – B^+-Trees.

UNIT IV : Dynamic Programming:
The General Method – Multistage graphs – All-pairs shortest paths – Single-source shortest paths – Optimal binary search trees – string editing – 0/1 knapsack–reliability design–The Travelling Sales person problem – flow shop scheduling.
Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

UNITV: Backtracking:
The General Method – The 8-Queens Problem – Sum of subsets –Graph coloring – Hamiltonian cycles–Knapsack problem.
Branch and Bound: The Method – 0/1 Knapsack problem – Traveling Sales person (*) –Efficiency considerations.

TEXTBOOK(S):

1. Ellis Horowitz, SartajSahni, Dinesh Mehta, Fundamentals of Data Structures in C++, University Press (India) Private Limited, Second Edition, Reprinted , 2017.

2. Alfred V.Aho, John E. Hopcraft and Jeffrey D.Ullman, Data Structures and Algorithms, Pearson Education, Fourteenth Impression, 2013.

REFERENCEBOOK(S):

1. Timothy A.Budd, Classic Data Structures in C++,– Addison Wesley Publishing Co., First Edition., 1994.
2. Timothy A.Budd, Data Structure and Algorithm Analysis in C, Mark Allen Weiss, Second Edition, Addison Wesley Publishing Company, 1997.
3. Sara Baase and Allen Van Gelder, Computer Algorithms – Introduction to Design & Analysis, Third Edition, Pearson Education, New Delhi, 2000.
4. P.T.Rajan, Data Structures, A. Chitra, Vijay Nicol Imprints Pvt Ltd, McGraw Hill Education of India Pvt. Ltd., 2006.
5. S.Sridhar, Design and Analysis of Algorithms, Oxford University Press,2015
6. Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, Fundamentals of Computer Algorithms – University Press (India) Private Limited, Second Edition, Reprinted, 2017.

COURSE OUTCOMES

CO1: Describe the dynamicstructures–treesandgraphsanddiscusstheapplicationofthesestructures in finding simplified solutions K1

CO2: Describe hash and priority queues and its application K2

CO3: Implement binary search tree, balanced tree and multi–way indexed tree K2

CO4: Solve problems using dynamic programming and apply traversal techniques of trees and graphs K3

CO5: Analyze and solve problems using backtracking and branch-and-bound technique. K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	M	M	M	M	M	S	M	M
CO4	S	S	M	S	M	S	M	S	S	S
CO5	S	M	S	S	S	S	M	M	S	S

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**

W-Weakly Correlating - 1 Mark

COURSE CODE	P21CST13	DISCRETE MATHEMATICAL STRUCTURES	L	T	P	C
CORE - III			5	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:**Analyse
Objectives	• To study features of mathematical logic and inference. • To understand the relations and functions • To learn the automata theory. • To gain knowledge on probability and graph.

UNIT–I: MATHEMATICAL LOGIC AND INFERENCE

Statements and Notations – Connectives – Negation – Conjunction – Disjunction – Statement Formulas and Truth Tables – Conditional and Bi-conditional – Well Formed Formulas Tautology – Equivalence of formulas – Duality of Law – Tautological Implications. The theory of inference for statement calculus – Validity using truth table – rules of inference– consistency of premises and indirect method of proof.

UNIT – II: RELATIONS AND FUNCTIONS

Cartesian product of Two Sets –Relations– Representation of Relation– Operations on relation– Equivalence Relation, Function and Operator – One to one, onto functions – Special Type ofFunctions.

UNIT – III: AUTOMATA THEORY

Introduction – Alphabet, Words, Free semi group, Languages – Regular Expressions, Regular Languages – Finite State Automata – Grammars – Finite state Machine – Turing machine.

UNIT–IV: PROBABILITY THEORY

Introduction – Sample space and Event – Finite Probability Space– Conditional Probability – Independent Events.

UNIT–V: GRAPH THEORY

Introduction – Data structures – Graph and multi graph Sub graph, Isomorphic and homeomorphism graphs – Path, connectivity – Bridges of Konigsberg, Traceable multigraph.

TEXTBOOKS:

1. J.P.Trembly, R.Manohar, Discrete Mathematical structures with applications to computer science, Tata McGraw Hill Publications, 1997.
2. Dr.M.K.Venkatraman, Dr.N.Sridhran, N.Chandrasekaran, Discrete Mathematics, The National Publishing Company, 2012.
3. Seymour Lipschutz, Mark Lipson, Discrete mathematics, Schaum's outlines, 2nd Edition., Tata McGraw Hill Edition, 7threprint, 2007.

REFERENCEBOOKS:

1. John EHopcroft, Jeffery D.Ullman, Introduction to Automata Theory, languages and computation, Narosa Publishing House, 2006.
2. NarsinghDeo, Graph Theory with Applications to Engineering and Computer Science, Prentice Hall of India, 2005.
3. Frank Harary, Graphtheory, Narosa Publishing House.

COURSE OUTCOMES

CO1:Impart knowledge on mathematical logic and theory of inference K1
CO2:Understand the concept of sets, relations, functions and mapping. K2
CO3: Understand the concepts of Automata Theory, Regular expressions, NFA and Turing Machine K3
CO4: Understand the concept of Probability theory. K3
CO5: Understand the graph theory concepts and applications in computer science. K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	S	M	M	M	M	S	M	M
CO4	S	S	M	S	M	S	M	S	S	S
CO5	S	S	S	S	S	S	M	M	S	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CST14	COMPILER DESIGN	L	T	P	C
CORE - IV			5	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:**Analyse
Objectives	• To study features of Compilers and Translators. • To understand the lexical analyzer • To learn the LR AND SLR. • To gain knowledge on. Symbol and optimization

UNIT I: Introduction to Compilers:
Compilers and Translators-Why Do We Need Translators?-The Structure of A Compiler – Lexical Analysis – Syntax Analysis - Intermediate Code Generation – Optimization – Code Generation – Book Keeping – Error Handling – Compiler – Writing Tools – Getting started.

UNIT II: Lexical Analysis:
The role of the lexical analyzer-Simple approach to design of a lexical analyzer – Regular Expressions – Finite Automata –From regular expression to finite automata – Minimizing the number of states of a DFA-A language for specifying lexical analyzer - Implementing a lexical analyzer.

UNIT III: Semantic Analysis:
The Syntactic Specification of Programming Languages- Context free grammars -Derivation and Parse Trees – Parsers – Shift-reduce Parsing – Operator-precedence parsing – Top – down parsing – Predictive Parsers.

UNIT IV: Syntax Analysis:
LR parsers-The canonical collection of LR(0) items-constructing SLR parsing tables – constructing canonical LR parsing tables – constructing SLR parsing tables – constructing LALR parsing tables.
Syntax directed translation schemes – Implementation of syntax directed schemes – Intermediate Code - Parse Tree and Syntax Trees -Three Address code, quadruples, and triples – Translation of assignment statements.

UNIT V: Code Optimization Code Generation:
The contents of a symbol tables-Data structure for a symbol table-Representing Scope information. Code Optimization-The principal sources of optimization – Loop optimization – The DAG representation of basic blocks –Peep hole Optimization.

TEXTBOOK(S):

1. Principles of Compiler Design, Alfred V.Aho and Jeffrey D.Ullman, 25th Reprint, 2002.

REFERENCEBOOK(S):

1. C.Allen Compiler Designing, I. Holub Prentice Hall of India, 2003.
2. C.N.Fischer and R. J.LeBlanc, Crafting a compiler with C , Benjamin Cummings, 2003.
3. J.P.Bennet, Introduction to Compiler Techniques, Second Edition, Tata Mc. GrawHill,2003.

COURSE OUTCOMES

CO1**:** Describe the basics of Compiler Structure K3

CO2: Analyze the functioning of Lexical Analyzer and implementation using Finite Automata. K2

CO3**:** Understand the role of Context Free Grammar and Parsing Techniques K1

CO4**:** Analyze the working methodology of LR Parsers and Representation of Intermediate Code Generation Phase K4

CO5**:** Discuss about the Data Structures used by Compiler, various Code Optimization Sources and apply the techniques K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	S	M	M	M	M	S	M	M
CO4	S	S	M	S	M	S	M	S	S	S
CO5	S	S	S	S	S	S	M	M	S	S

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSP11	COMPUTING-LAB1 (ADVANCED JAVA PROGRAMMING& DATA STRUCTURES AND ALORITHMS)	L	T	P	C
CORE - V			-	-	6	4

Java List

1. Program to display life cycle of an applet
2. Program to display digital clock using applet
3. Program to display different graphical shapes in applet
4. Program to display graphical bar chart by passing parameters in applet
5. Write an Applet which will play two sound notes in a sequence continuously use theplay() methods available in the applet class and the methods in the Audio clip interface.
6. Program to find factorial value of N using AWT high level event handling
7. Program to illustrate window closing using AWT low level event handling.
8. Program to illustrate TCP based network communication.
9. Program to illustrate UDP based network communication.
10. Program to find sum of digits using RMI
11. Program to find length of the given string using RMI
12. Program using HTML/Java script to find length of the given string.
13. Use JDBC connectivity and create Table, insert and update data.
14. Write a program in Java to create a Cookie and set the expiry time of the same.
15. Write a program in Java to create Servlet to count the number of visitors to awebpage.

Data Structures and Algorithms List

1. Implementation of Stack using Array
2. Implementation of Queue using Linked List
3. Implementation of Heap Tree.
4. Implementation of Tree Traversal.
5. Implementation of BFS.
6. Implementation of DFS.
7. Implementation of Merge Sort using Divide and Conquer.
8. Implementation of Warshall's Algorithm using Dynamic Programming.
9. Implementation of Prim's Algorithm using Greedy Technique.
10. Implementation of n-queens Problem using Backtracking.

SEMESTER - II

COURSE CODE	P21CST21	PYTHON PROGRAMMING	L	T	P	C
CORE - VI			4	-	-	4

Cognitive Level	**K1:** Recall**K2:** Understand**K3:** Apply**K4:**Analyse
Objectives	• To understand why Python is a useful scripting language for developers. • To learn how to design and program Python applications. • To learn how to use lists, tuples, and dictionaries in Python programs. • To learn how to identify Python object types.

UNIT I : Python Programming: An Introduction
IDLE an Interpreter for Python, Python Strings, Relational Operators, Logical Operators, Bitwise Operators, Variables and Assignment Statements, Keywords, Script Mode. **Functions -** Built-in Functions ,Function Definition and Call, Importing User-defined Module**,** Assert Statement, Command Line Arguments. **Control Structures -** if Conditional Statement, Iteration (for and while Statements).

UNITII: **Scope**
Objects and Object IDs, Scope of Objects and Names. **Strings:** Strings, String Processing Examples, Pattern Matching. **Mutable and Immutable Objects –** Lists, Sets, Tuples, Dictionary.

UNIT III :**Recursion**
Recursive Solutions for Problems on Numeric Data, Recursive Solutions for Problems on Strings, Recursive Solutions for Problems on Lists, Problem of Tower of Hanoi. **Files and Exceptions:** File Handling, Writing Structures to a File, Errors and Exceptions, Handling Exceptions Using try…except, File Processing Example.

UNITIV: **Classes I**
Classes and Objects, Person: An Example of Class, Class as Abstract Data Type, Date Class. **Classes II -** Polymorphism, Encapsulation, Data Hiding, and Data Abstraction, Modifier and Accessor Methods, Static Method, Adding Methods Dynamically, Composition, Inheritance, Built-in Functions for Classes.

UNIT V: **Graphics**
2D Graphics, Animation – Bouncing Ball.
Applications of Python
- Collecting Information from Twitter, Sharing Data Using Sockets, Managing Databases using Structured Query Language (SQL), Developing Mobile Application for Android, Integrating Java with Python.

TEXTBOOK(S):
1. SheetalTaneja, Naveen Kumar, Python Programming, a Modular Approach with Graphics, Database, Mobile, and Web Applications, Pearson Publication, 2018.

REFERENCEBOOK(S):

1. ReemaThareja, Python Programming, Oxford UniversityPress,2017
2. Lambert, Fundamentals of Python Programming, C engage Publications, 2017
3. E.Balagurusamy, Problem Solving using Python, McGraw Hill Education Ltd., 2017 CRC Press.
4. Dieter Uckelmann; Mark Harrison; Architecting the Internet of Things Florian Michahelles, (Eds.) Springer, 2011.
5. Oliver Hersent, David Boswarthick, Omar Elloumi, The Internet of Things, Key Applications and Protocols, Wiley , 2017

COURSE OUTCOMES

CO1:Describe the basic concepts of python programming, Functions and control structures. K2
CO2:Understand Strings, Mutable and immutable objects. K3
CO3:Understand Recursion and Files and exception. K2
CO4:Discuss classes, objects, polymorphism, encapsulation and inheritance. K3
CO5:Apply python for collecting information from twitter, sharing data using sockets, managing database, and mobile application for android. K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	S	M	M	M	M	S	M	M
CO4	S	S	M	S	M	S	M	S	S	S
CO5	S	S	S	S	S	S	M	M	S	S

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**

W-Weakly Correlating - 1 Mark

COURSE CODE	P21CST22	CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
CORE - VII			4	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:**Analyse
Objectives	• To learn about the Number Theory • To Understand the basics of Cryptography • To Understand Hash Functions and Cryptography • To Know about Security Procedure and System Security .

UNIT – I: Introduction& Number Theory

Services, Mechanisms and attacks – the OSI security architecture - Network security model - Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography). FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields - Polynomial Arithmetic – Prime numbers-Fermat's and Euler's theorem-Testing for primality - The Chinese remainder theorem- Discrete logarithms.

UNIT – II: Block Ciphers & Public Key Cryptography

Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES) - Triple DES – Blowfish - RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange - Elliptic curve arithmetic - Elliptic curve cryptography.

UNIT – III: Hash Functions and Digital Signatures

Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 - SHA - HMAC – CMAC - Digital signature and authentication protocols – DSS – EI Gamal – Schnorr.

UNIT – IV: Security Practice & System Security

Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

UNIT V: E-Mail, IP & Web Security

E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSL Attacks fixed in v3- Exportability-Encoding-Secure Electronic Transaction (SET).

Text Book(s):

1. William Stallings, Cryptography and Network Security, 6 th Edition, Pearson Education, March, 2013.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002.

Reference Book(s):

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata McGraw Hill, 2007.
2. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
3. Charles P Fleeger, "Security in Computing", 4th Edition, Prentice Hall of India, 2006.
4. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication in Public World", PHI, 2002.
6. Bruce Schneier and Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
7. Douglas R Simson "Cryptography – Theory and practice", First Edition, CRC Press, 1995.

COURSEOUTCOMES

CO1: Understand the Number Theory K1
CO2: Understand the basics of Cryptography K2
CO3: Understand Hash Functions and Cryptography K3
CO4: Understand Security Procedure and System Security K3
CO5: Understand the various Security Services K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	S	S	S
CO3	S	S	S	S	M	M	M	S	M	M
CO4	S	S	S	S	S	S	M	S	M	S
CO5	S	S	M	S	S	S	M	S	S	S

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CST23	DISTRIBUTED OPERATING SYSTEM	L	T	P	C
CORE - VIII			4	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze
Objectives	• To study features of Distributed operating system. • To understand the communication of different hardware and software in distributed environment. • To learn the distributed resource management components. • To gain knowledge on modern operating system working principles.

UNIT - I: Introduction
Introduction – Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock – Conditions for Deadlock – System with single-unit requests, Consumable Resources , Reusable Resources.

UNIT - II: Distributed Operating Systems
Distributed Operating Systems: Introduction- Issues – Communication Primitives – Inherent Limitations –Lamport‟s Logical Clock, Vector Clock, Global State , Cuts – Termination Detection – Distributed Mutual Exclusion – Non Token Based Algorithms – Lamport'sAlgorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement protocols.

UNIT - III Distributed Resource Management
Distributed Resource Management – Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm – Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms.

UNIT - IV Failure Recovery and Fault Tolerance
Failure Recovery and Fault Tolerance – Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems – Synchronous and Asynchronous Check pointing and Recovery –Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Non-blocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols.

UNIT - V: Multiprocessor and Database OS
Multiprocessor and Database Operating Systems –Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems.

Text Book(s):
1. MukeshSinghalN.G.Shivaratri, "Advanced Concepts in Operating Systems", McGraw Hill, 2000.
2. Andrew S.Tanenbaum, Distributed Operating System, PHI, 1994.

Reference Book(s):

1. Abraham Silberschatz, Peter B.Galvin, G.Gagne, "Operating Concepts", 6th Edition Addison Wesley publications, 2003.
2. Andrew S.Tanenbaum, "Modern Operating Systems", 2nd Edition Addison Wesley, 2001

COURSE OUTCOMES

CO1**:** Understand the Operating System Structure and its Services K1
CO2**:** Understand the efficient Scheduling of Multiple Process Execution. K2
CO3**:**Understand the efficient allocation of available memory among multiple processes K3
CO4**:** Understand the Device Management System K3
CO5**:** Compare and Contrast the features of Windows and LINUX operating Systems in terms of their services. K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO 1	PSO 2	PSO 3	PSO 4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	S	M	M	M	M	S	M	M
CO4	S	S	M	S	M	S	M	S	S	S
CO5	S	S	S	S	S	S	M	M	S	S

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**

W-Weakly Correlating - 1 Mark

COURSE CODE	P21CST24	NoSQL DATABASES	L	T	P	C
CORE – IX			4	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:** Analyze
Objectives	• Distinguish the different types of NoSQL databases • To learn the Database Terminology • To understand Document Database • To learn Column Family Database.

UNIT I: Introduction

Database System Applications - View of Data - Database Languages - Relational Databases - Database Design - Data Storage and Querying - Transaction Management - Database Architecture - Data Mining and Information Retrieval - Specialty Databases - Database Users and Administrators - History of Database Systems.

Relational Databases: **Introduction to the Relational Model**: Structure of Relational Databases - Database Schema - Keys - Schema Diagrams - Relational Query Languages –Relational Operations.

UNIT II: Variety of NoSQL Databases :

Data Management with Distributed Databases - ACID and BASE - Four Types of NoSQL Databases. **Key-Value Databases:** From Arrays to Key-Value Databases - Essential Features of Key-Value Databases - Keys: More Than Meaningless Identifiers.

Key-Value Database Terminology: Key-Value Database Modeling Terms - Key-Value Architecture Terms - Key-Value Implementation Terms.

UNIT III: Document Databases:

What is a Document - Avoid Explicit Schema Definitions - Basic Operations on Document Databases. **Document Database Terminology:** Document and Collection Terms - Types of Partitions - Data Modeling and Query Processing.

Designing for Document Databases: Normalization, Denormalization, and the Search for Proper Balance - Planning for Mutable Documents - The Goldilocks Zone of Indexes - Modeling Common Relations.

UNIT IV: Family Databases

Column Family Databases: In the Beginning, There was Google Big Table - Differences and Similarities to Key-Value and Document - Architectures Used in Column Family Databases - When to Use Column Family Databases.

Column Family Database Terminology: Basic Components of Column Family Databases - Structures and Processes: Implementing Column Family -Processes and Protocols.

Designing for Column Family Databases: Guidelines for DesigningTables-GuidelinesforIndexing-ToolsforWorkingwithBigData

UNIT V:Graph Database

Graph Databases: What is a Graph - Graphs and Network Modeling - Advantages of Graph Databases.

Graph Database Terminology: Elements of Graphs - Operations on Graphs - Properties of Graphs and Nodes - Types of Graphs.

Designing for Graph Databases: Getting Started with Graph Design - Querying a Graph - Tips and Traps of Graph Database Design.

BOOKS FOR STUDY:

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "**Database System Concepts",** Sixth Edition, McGrawHill,2016.
   UNITI : Chapters: 1, 2
2. Dan Sullivan, Addison-Wesley, **"NoSQL for Mere Mortals",** Pearson India Education Services Pvt. Ltd.,2016.

BOOKS FOR REFERENCE:

1. SAMS, Brad Dayley, **"NoSQL with MongoDB in 24 Hours"**, Pearson Education, First Edition,2015.
2. Kyle Banker, Peter Bakkum, Shaun Verch, Douglas Garrett, Tim Hawkins, **"MongoDB in Action",** Dreamtech Press, Second Edition,2017.

COURSE OUTCOMES

CO1: Acquire a deep knowledge on relational Database, Structured Query Language and Data Modeling K1
CO2**:** Acquire the Knowledge on MongoDB query language K2
CO3: Comprehend the principles of NoSQL K2
CO4: Differentiate NoSQL key value database and Document database K2
CO5: Know the concept of Column database and Understand the data modeling techniques K2

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	M	S	S	S	M	S	M	M	S
CO3	S	S	S	S	S	M	M	S	S	M
CO4	S	S	M	M	S	S	M	S	S	S
CO5	S	M	S	M	M	S	M	M	S	M

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSP22	COMPUTING-LAB2 (PYTHON PROGRAMMING & OPERATING SYSTEM LAB)	L	T	P	C
CORE – X			-	-	6	4

PYTHON PROGRAM LIST

Exercise1-Basics

a) Running instructions in Interactive interpreter and a Python Script
b) Write a program to purpose fully raise Indentation Error and Correct it

Exercise 2 - Operations

a) Write a program to compute distance between two points taking input from the user (Pythagorean Theorem)
b) Write a program add.py that takes 2 numbers as command line arguments and prints it's sum.

Exercise - 3 Control Flow

a) Write a Program for checking whether the given number is a even number or not.

b) Usingaforloop,writeaprogramthatprintsoutthedecimalequivalentsof1/2,1/3,1/4,...,1/10

c) Write a program using a for loop that loops over a sequence. What is sequence?

d) Write a program using a while loop that asks the user for a number, and prints a count down from that number to zero.

e) Find the sum of all the primes below two million.
Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be:

1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...

f) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Exercise - 4 - DS

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure

b) Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.

c) Write a program combine_lists that combines these lists into a dictionary.

d) Write a program to count frequency of characters in a given file. Can you use character frequency to tell whether the given file is a Python program file, C program file or a text file?

Exercise - 5 Files

a) Write a program to print each line of a file in reverse order.

b) Write a program to compute the number of characters, words and lines in a file.

Exercise - 6 Functions

a) Write a function ball collides that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding. Hint: Represent a ball on a plane as a tupelo of(x,y,r), r being the radius
If(distance between two balls centers) <= (sum of the irradii) then(they are colliding)

b) Find mean, median, mode for the given set of numbers in a list.
c) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.
d) Write a function dups to find all duplicates in the list.
e) Write a function unique to find all the unique elements of a list.

Exercise - 7 - Functions - Problem Solving

a) Write a function cumulative product to compute cumulative product of a list of numbers.
b) Write a function reverse to reverse a list without, using the reverse function.
c) Write function to compute GCD, LCM of two numbers. Each function shouldn't exceed one line.

Exercise - 8 - Multi-D Lists

a) Write a program that defines a matrix and prints
b) Write a program to perform addition of two square matrices
c) Write a program to perform multiplication of two square matrices

Exercise - 9 - Modules

a) Install packages requests, flask and explore them using(pip)
b) Write a script that imports requests and fetch content from the page. Eg.(Wiki)
c) Write a simple script that serves a simple HTTP Response and a simple HTML Page

Exercise – 10 OOP

a) Class variables and instance variable and illustration of these lf variable
i) Robot
ii) ATM Machine

Exercise - 11 - Testing

a) Write a test-case to check the function even_numbers which return True on passing a list of all even numbers
b) Write a test- case to check the function reverse_string which returns the reversed string

Exercise - 12 - Advanced

a) Build any one classical data structure.
b) Write a program to solve Knapsack problem.

OPERATING SYSTEM LIST

1: Simulate the following CPU scheduling algorithms.

a) FCFS b) SJF c) Round Robin d) Priority.

2: Write a C program to simulate producer-consumer problem using Semaphores

3: Write a C program to simulate the concept of Dining-philosophers problem.

4: Simulate MVT and MFT.

5: Write a C program to simulate the following contiguous memory allocation Techniques

a) Worst fit b) Best fit c) First fit.

6: Simulate all page replacement algorithms a)FIFO b) LRU c) OPTIMAL

7: Simulate all File Organization Techniques a) Single level directory b) Two level directory

8: Simulate all file allocation strategies a) Sequential b) Indexed c) Linked.

9: Simulate Bankers Algorithm for Dead Lock Avoidance.

10: Simulate Bankers Algorithm for Dead Lock Prevention.

11: Write a C program to simulate disk scheduling algorithms. a) FCFS b) SCAN c) C-SCAN

COURSE CODE	P21CSS22	WEB PROGRAMMING LAB	L	T	P	C
SUPPORTIVE COURSE II			2	-	-	2

1. Develop and demonstrate a XHTML file that includes Java Script for the following problems:

   a) Input: A number n obtained using prompt Output: The first n Fibonacci numbers

   b) Input: A number n obtained using prompt Output: A table of numbers from 1 to n and their squares using alert

2. a) Develop and demonstrate, using Java script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.

   b) Modify the above program to get the current semester also (restricted to be a number from 1 to 8)

3. a) Develop and demonstrate, using Java script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.

   b) Modify the above document so that when a paragraph is moved from the top stacking position, it returns to its original position rather than to the bottom.

4. a) Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

   b) Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.

5. a) Write a Perl program to display various Server Information like Server Name, Server Software, Server protocol, CGI Revision etc.

   b) Write a Perl program to accept UNIX command from a HTML form and to display the output of the command executed.

6. a) Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting messages.

b) Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.

7. Write a Perl program to display a digital clock which displays the current time of the server.

8. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.

9. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.

10. Write a PHP program to store page views count in SESSION, to increment the count on each refresh, and to show the count on web page.

11. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name.

12. Build a Rails application to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings

SEMESTER – III

COURSE CODE	P21CST31	DIGITAL IMAGE PROCESSING	L	T	P	C
CORE – XI			4	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:**Analyse
Objectives	• To learn about the basic concepts of digital image processing and various image transforms. • To familiarize the student with the image enhancement techniques • To expose the student to a broad range of image processing techniques and their applications. • To appreciate the use of current technologies those are specific to image processing systems.

UNITI: Introduction to Image Processing

Overview of Image Processing - Nature of Image Processing - Digital Image Representation-Types of Images-Based on Nature - Based on Attributes - Based on Colour - Based on Dimensions – Based on Data Types – Domain Specific Images – Digital Image Processing Operations – Fundamental Steps In Image Processing – Image Enhancement – Image Restoration - Image Compression - Image Analysis – Image Synthesis.

Digital Imaging Systems: Overview of Digital Imaging Systems –Image Sensors – Image Storage – Image processors – Output Devices –Networking Components – Image Processing Software – Physical Aspects of Image Acquisition-Nature of Light - Simple Image Model - Colour Fundamentals - Lighting System Design-Simple Image Formation Process - Biological Aspects of Image Acquisition – Human Visual System – Properties of Human Visual System – Monochrome and Colour Image – Review of Digital Cameras – Sampling and Quantization – Sampling – Resampling - Image Quantization - Image Display Devices and Device Resolution – Digital Halftone Process - Random Dithering - Ordered Dithering - Non - periodic Dithering – Image Storage and File Formats - Need for File Formats -Types of File Formats - Structures of File Formats.

UNITII: Digital Image Processing Operations

Basic Relationships and Distance Metrics - Image Coordinate System - Image Topology - Connectivity-Relations-DistanceMeasures-ImportantImageCharacteristics-Classificationof Image Processing Operations - Arithmetic Operations. Logical Operations – Geometrical Operations - Image Interpolation Techniques - Set Operations.

Digital Image Transforms: Need for Image Transforms – Spatial Frequencies in Image Processing - Introduction to Fourier Transform – Discrete Fourier Transform – Fast Fourier Transform – Discrete Cosine Transform.

UNITIII: Image Enhancement

Image Quality and Need for Image Enhancement - Image Quality Factors - Image Quality Assessment Toll – Image Quality Metrics – Image Enhancement operations – Image Enhancement in Spatial Domain – Linear Point Transformations – Non – Linear Transformations – Square Function – Square root – Logarithmic Function – Exponential Function - Power Function - Gamma Correction - Histogram - Based techniques – Histogram Stretching – Histogram Sliding – Histogram Equalization – Histogram Specification – Local and Adaptive Contrast Enhancement – Spatial Filtering Concepts – Image Smoothing Spatial Filters- Box Filters - Gaussian Filters - Image Sharpening Spatial Filters

- Gradient and Laplacian Filters-High – boost Filters – Unsharp Masking.

Image Restoration: Introduction to Degradation - Types of Image Degradations - Image Degradation Model - Noise Modeling -Noise Categories Based on Distribution - Noise Categories Based on Correlation – Noise Categories Based on Nature – Noise Categories Based on Source- estimation by Observation Estimation by Experimentation - Estimation by Modeling - Image Restoration Techniques –Unconstrained Method – Inverse Filters – Wiener Filters.

UNITIV: Image Compression

Image Compression Model - Compression-Measures – Compression Algorithm and its Types – Entropy Coding - Predictive Coding - Transform Coding - Layered Coding - Types of Redundancy - Coding Redundancy - Inter pixel Redundancy - Psycho visual Redundancy -Chromatic Redundancy - Lossless Compression Algorithms - Run - length Coding – Huffman Coding - Bit plane Coding - Arithmetic Coding - Dictionary - based Coding – Lossless Predictive Coding - Lossy Predictive Coding - Vector Quantization – Codebook design –Generalized Lloyd algorithm.

UNITV: Image Segmentation:

Introduction – Formal Definition of Image Segmentation – Classification of Image Segmentation Algorithms - Detection of Discontinuities –Point Detection-Line Detection - Edge Detection - StagesinEdgeDetection-TypesofEdgedetectors-FirstorderEdgeDetection-Edgeoperatorperformance - Edge linking Algorithms - Principle of Thresholding - Principle of Region –growing.

Colour Image Processing - Introduction - Colour Image Storage and Processing -Colour Models - RGB Colour Model - HIS Colour Model - HSV Colour Model - HLS Colour Model - Printing Colour Models - Colour Quantization - Popularity or Populosity Algorithm – Median cut Algorithm – Octree based Algorithm – Pseudo colour Image Processing – Full colour Processing- Colour Transformations – Image Filters for Colour Image – Colour image Segmentation.

TEXTBOOK(S):

1. S.Sridhar, Digital Image Processing, Second Edition, OXFORD University Press, 2016.

REFERENCEBOOK(S):

1. Rafael C.Gonzalez, Richard E.Woods, Digital Image Processing using MATLAB, 2nd Edition, Prentice Hall of India, 2002.
2. A.Jain, Fundamentals of Digital Image Processing, Prentice Hall of India, 2010.
3. William K Pratt, Digital Image Processing, JohnWilley, 2002.

COURSE OUTCOMES

CO1: To impart the knowledge about image processing techniques and understand the concept of image analysis, storage formats of image K1

CO2: To analyze the attitude of image processing arithmetic operations and image transformation techniques. K2

CO3: Discuss about the image need for image enhancement and use of image restoration. K3

CO4: To understand the concept to fit image compression models, measures and algorithms. K3

CO5: Understand the role of image segmentation, various color models and color image transformation K4

MAPPING OF COs WITH POs AND PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	S	S	S	M	S	S	S
CO3	S	S	S	M	M	M	M	S	M	M
CO4	S	S	M	M	M	S	M	S	S	S
CO5	S	S	M	S	S	M	M	M	S	S

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CST32	CLOUD COMPUTING	L	T	P	C
CORE - XII			4	-	-	4

Cognitive Level	**K1:** Recall**K2:** Understand**K3:** Apply**K4:**Analyse
Objectives	• To learn the concepts of cloud computing, cloud services and platforms • To understand real – world cloud applications • To develop Cloud applications • Identify and define technical challenges for cloud applications and assess their importance.

UNIT I: Cloud Architecture and Model:
Technologies for Network-Based System – System Models for Distributed and Cloud Computing NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services– Cloud models(IaaS, PaaS, SaaS) – Public vs. Private Cloud – Cloud Solutions – Cloud ecosystem– Service management – Computing on demand.

UNIT II: Virtualization:
Basics of Virtualization - Types of Virtualization – Implementation Levels of Virtualization- Virtualization Structures – Tools and Mechanisms – Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-Center Automation.

UNIT III: Cloud Infrastructure:
Architectural Design of Compute and Storage Clouds –Layered Cloud Architecture Development – Design Challenges – Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

UNITIV:ProgrammingModel:
ParallelandDistributedProgrammingParadigms–MapReduce, Twister and Iterative MapReduce – Hadoop Library from Apache – Mapping Applications - Programming Support - Google App Engine, Amazon AWS - Cloud Software Environments - Eucalyptus, Open Nebula, Open Stack, Aneka, Cloud - Sim.

UNITV: Security in the Cloud:
Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security.

TEXTBOOK(S):

1. Distributed and Cloud Computing, From Parallel Processing to the Internet of Things Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Morgan Kaufmann Publishers,2012.

REFERENCEBOOK(S):

1. John W.Ritting house and James F.Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, 2010.
2. Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach, To by Velte, TMH, 2009.

3. Kumar Saurabh, Cloud Computing – Insights into New – Era Infrastructure, Wiley India, 2011.
4. James E.Smith, Ravi Nair, Virtual Machines: Versatile Platforms for Systems and Processes, Elsevier/Morgan Kaufmann, 2005.

COURSE OUTCOMES

CO1: Describe the Cloud Architecture and Model. K1

CO2: Analyze the basics and applications of Virtualization. K3

CO3: Understand the different Cloud Infrastructure. K2

CO4: Understand different programming model. K4

CO5: Discuss the Cloud Security Challenges and Risks. K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	M	M	M	M	S	S	M
CO2	S	S	M	M	S	S	M	S	S	S
CO3	S	S	S	M	M	M	M	S	M	M
CO4	S	S	M	S	M	S	M	S	M	S
CO5	S	S	S	S	S	S	M	M	S	S

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CST33	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING ALGORITHMS	L	T	P	C
CORE - XIII			4	-	-	4

Cognitive Level	**K1:** Recall**K2:** Understand**K3:** Apply**K4:**Analyse
Objectives	• To have an appreciation for and understanding of both the achievements of AI and the theory underlying those achievements. To have an appreciation for the engineering issues underlying the design of AI systems. • To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language. • To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs. • To understand and apply scaling up machine learning techniques and associated computing techniques andtechnologies.

UNITI: Introduction:
Introduction to Artificial Intelligence, Intelligence Problems and AI techniques, Solving problems by searching, Problem Formulation. Intelligent Agents: Structure of Intelligent agents, Types of Agents, Agent Environments PEAS representation for an Agent. Uninformed Search Techniques: DFS, BFS, Uniform cost search,

UNIT II: Depth Limited Search, Iterative Deepening, Bidirectional search, Comparing Different Techniques. Informed Search Methods:
Heuristic functions, Hill Climbing, Simulated Annealing, Best First Search, A*, IDA*, SMA*, Crypto Arithmetic Problem, Backtracking for CSP, Performance Evaluation. 6 Adversarial Search: Game Playing, Min-Max Search, Alpha Beta Pruning.

UNIT III: **Introduction to Machine Learning**: Introduction to Analytics and Machine Learning – Framework for developing Machine Learning Models – Probability Theory – Random Variables – Binomial Distribution – Poisson Distribution – Exponential Distribution – Normal Distribution – Central Limit Theorem – Hypothesis Test – Analysis of Variance (ANOVA).

UNIT IV: **Introduction to Linear Regression:**
Linear Regression – Steps in Building a Regression Model – Building Simple regression Model –Model Diagnostics – Multiple Linear Regression - Binary Logistic Regression – Credit Classification – Gain Chart and Lift Chart – Classification Tree.

UNIT V:**Gradient Descent Algorithm:**
Gradient Descent Algorithm –Advanced Machine Learning Algorithms: Dealing with Imbalanced Datasets – Advanced Regression Model – K-Nearest Neighbor Algorithm – Ensemble Methods – Random Forest.

Text Books:

1. Elaine Rich, Kevin Knight, ShivshankarBNair, Artificial Intelligence, McGraw Hill, 2008.

2. ManaranjanPradhan& U Dinesh Kumar, Machine Learning using Python, Wiley, 1st Edition, 2019.

Reference Book (S):

1. GeorgeLugar, AI-Structures and Strategies for Complex Problem Solving., 4/e, Pearson Education, 2002.
2. Nils J. Nilsson, Principles of Artificial Intelligence, Narosa Publication, 1980.
3. Patrick H.Winston, Artificial Intelligence, 3rd Edition, Pearson Education, 1992.
4. Deepak Khemani, A First Course in Artificial Intelligence, McGraw Hill Publication, 2018.
5. Dr.Dheeraj Mehrotra, Basics of Artificial Intelligence & Machine Learning, Notion Press, 1st Edition, 2019.

COURSE OUTCOMES

CO1: Understand the problem domain, problem formulation and introducing intelligent agents K1
CO2: Analyze the functioning of various searching methodologies in AI K2
CO3: Introduction to Machine Learning K3
CO4: Understand Regression Models K3
CO5: Understand Advanced Machine Learning Algorithms K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	S	S	S
CO3	S	S	S	M	M	M	M	S	M	M
CO4	S	S	M	S	S	S	M	S	M	S
CO5	S	S	M	S	S	S	M	S	S	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks W- Weakly Correlating - 1 Mark

COURSE CODE	P21CST34	INTERNET OF THINGS	L	T	P	C
CORE - XIV			4	-	-	4

Cognitive Level	**K1:** Recall**K2:** Understand**K3:** Apply**K4:**Analyse
Objectives	• To get familiar with the evolution of IOT with its design principles • To outline the functionalities and protocols of internet communication • To analyze the hardware and software components needed to construct IOT applications • To identify the appropriate protocol for API construction and writing embedded code

UNITI: Introduction to Internet of Things:

Introduction – Physical Design of IoT – Logical Design of IoT – IoT Enabling Technologies – IoT& Deployment Templates.**Domain Specific IoTs:** Introduction–Home Automation–Cities – Environment – Energy – Retail – Logistics Agriculture – Industry – Health & Lifestyle.

UNIT II: IoT and M2M :

Introduction : M2M – Difference between IoT and M2M – SDN and NFV for IoT. **IoT System Management with NETCONF-YANG :**Need for IoT Systems Management –Simple Network Management Protocol (SNMP) – Network Operator Requirements – NETCONF- YANG – IoT Systems Management with NETCONF_YANG.

UNIT III: IoT Platforms Design Methodology:

Introduction – IoT Design Methodology –Case Study on IoT System for Weather Monitoring– Motivation for using Python.
IoT Systems –Logical Design using Python: Introduction – Installing Python – Python Data types & Data Structures – Control Flow – Functions – Modules – Packages – File Handling –Date/Time Operations– Classes– Python packages of Interest for IoT.

UNITIV:IoT Physical Devices & Endpoints:

What is an IoT Device – Exemplary Device: Raspberry Pi – About the Board – Linux on Raspberry Pi – Raspberry Pi Interfaces –Programming Raspberry Pi with Python– Other IoTdevices.
IoT Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs – WAMP – Auto Bahn for IoT – Xively Cloud for IoT – Python Web application Framework – Django – Designing a RESTful Web API – Amazon Web Services for IoT – SkynetIoT messaging platform.

UNIT V: Case Studies Illustrating IoT Design:

Introduction – Home Automation – Cities –Environment– Agriculture– Productivity applications

Data Analytics for IoT : Introduction – Apache Hadoop – Using Hadoop MapReduce for Batch Data Analysis – Apache Oozier – Apache Spark – Apache Storm – Using Apache Storm for Real-time Data Analysis.

TEXTBOOK(S):

1. Arshdeep Bahga, Vijay Madisetti, Internet of Things, Universities Press (INDIA) Private Ltd., 2015.

REFERENCEBOOK(S):

1. Cuno P Fister, Getting Started with the Internet of Things, O'Relly, 2011.
2. Adrian Mcewen, HakinCassimally, Designing the Internet of Things, Willey, 2015.
3. Honbo Zhou, The Internet of Things in the Cloud: A Middleware Perspective, CRCPress, 2012.
4. Dieter Uckelmann; Architecting the Internet of Things, Mark Harrison; Florian Michahelles, (Eds.) Springer, 2011.
5. Oliver Hersent, David Boswarthick, Omar Elloumi, The Internet of Things, Key Applications and Protocols, Wiley , 2017

COURSE OUTCOMES

CO1: Understand the definition and significance of the **Internet of Things**. K1

CO2 : Discuss the architecture, operation, and business benefits of an **IoT** solution. K2

CO3: Examine the potential business opportunities that **IoT** can uncover. K3

CO4**:** Explore the relationship between **IoT**, cloud computing, and big data. K3

CO5**:** Identify how IoT differs from traditional data collection systems K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	S	S	S
CO3	S	S	S	M	M	M	M	S	M	M
CO4	S	S	M	S	S	S	M	S	M	S
CO5	S	S	M	S	S	S	M	S	S	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks W- Weakly Correlating - 1 Mark

COURSE CODE	P21CSP33	COMPUTING-LAB3 (IMAGE PROCESSING)	L	T	P	C
CORE - XV			-	-	6	4

1. Implement the spatial image enhancement functions on a bitmap image – mirroring(Inversion)
2. Implement the spatial image enhancement functions on a bitmap image – notation(Clockwise)
3. Implement the spatial image enhancement functions on a bitmap image –Enlargement (Double Size)
4. Implement (a) Low Pass Filter (b) High Pass Filter
5. Implement (a) Arithmetic Mean Filter (b) Geometric Mean Filter
6. Implement Smoothing and Sharpening of an eight bit color image
7. Implement (a) Boundary Extraction Algorithm (b) Graham & #39; Scan Algorithm
8. Implement (a) Edge Detection (b) Line Detection
9. Display an image and its histogram
10. Write a Program to Perform Shrinking, Zooming and Cropping of an image
11. Write a Program to perform the experiment for histogram equalization.
12. Write a Program to Perform blurring and de-blurring on an image.
13. Write a Program to Remove salt and pepper noise in an image.
14. Write a Program to Perform Edge detection using Operators.
15. Write a Program to Perform2-D DFT and DCT.
16. Write a Program to Perform DWT of images.
17. Implement a function for image segmentation.
18. Implement a function for image morphology that analyze the form and shape detail of image structures.
19. Implement a function for Image Restoration.
20. Models for representing the color and methods of processing the color plane

COURSE CODE	P21CSP34	COMPUTING-LAB4 (R PROGRAMMING)	L	T	P	C
CORE - XVI			-	-	6	4

1. Find Sum, Mean and Product of Vector in R
2. R Program to sample from a Population
3. R Program to Sort a Vector.
4. To combine the matrix using ***rbind*** and ***cbind*** methods.
5. Use seq() to create sequence.
6. Write a program to convert the table data into data frame.
7. Calculate student marklist and output it in dataframe.
8. R Program to Check Prime Number
9. R Program to Check for Leap Year.
10. R Program to Check if a Number is Odd or Even in R
11. R Program to Find the Sum of Natural Numbers
12. Convert Decimal into Binary using Recursion in R
13. R program to Find the Factorial of a Number Using Recursion
14. R Program to Make a Simple Calculator
15. Write a R Program to import CSV data into R.
16. Write a R Program to move the result data from R to CSV.
17. Draw the Line Graph for Student Data.
18. Draw the Pie-Chart for Employee Data.
19. Create a Table from the existing data set in Rand draw the chart.
20. Apply K-Means Algorithm for IRIS dataset and output it in graph
21. Get some input from mtcar dataset and perform analysis.

SEMESTER – IV

COURSE CODE	P21CSE411	CHOICE - I	L	T	P	C
ELECTIVE - I		OBJECT ORIENTED ANALYSIS AND DESIGN	4	-	-	4

Cognitive Level	**K1:** Recall**K2:** Understand**K3:** Apply**K4:**Analyse
Objectives	● To learn the basic principles of objects and Object Oriented System Development Life Cycle. ● Learn to apply the Unified Modeling Language(UML) to elementary object – oriented analysis and design concepts. ● UML presents the concepts and techniques necessary to effectively use system requirements to drive the development of a robust design model. ● Showing how implementation details of a system can be modeled.

UNIT - I: **Introductionto Object Oriented System Development:**
Introduction – Two Orthogonal views – object oriented Systems development Methodology – Object orientation – unified approach – Object Basics – object oriented philosophy – objects – classes – attributes – behavior and methods – Message passing -Encapsulation and information hiding – hierarchy – polymorphism – object relationship and associations– aggregation– a case study– advanced topics.

UNIT–II: Object Oriented System And Methodology Development:
Object oriented system development life cycle(SDLC) – development process – building high quality software – use-case driven approach – reusability –Object oriented methodologies – introduction – Booch methodology – Jacobson methodologies – patterns –frameworks – unified approach.

UNIT – III: Unified **Process and Use Case Diagrams**
Unified modeling language – introduction – static and dynamic models –modeling – unified modeling language -UML diagrams – UML class diagrams – Use-case diagram – UML dynamic modeling-model management –OOA process – introduction –difficulty in analysis – business object analysis – use-case driven object oriented analysis –business processing modeling – use-case model – developing effective documentation.

UNIT – IV: Object Classification
Object analysis – classification – common class patterns approach – use-case driven approach – CRC – naming classes – object relationships – associations – Super-Subclassrelationships–aggregation–classresponsibility–objectresponsibility-Objectorienteddesign process and design axioms – introduction – design process – design axioms- design patterns.

UNIT – V: Design Classes:
Designing classes – introduction - object oriented design philosophy – UML object constraint – designing classes – class visibility – defining attributes – designingmethodsandprotocols– Packagesandmanagingclasses–Accesslayer–Objectstorageandobject interoperability – introduction – object store and persistence – Database management systems– database organization and access control– distributed databases.

TEXTBOOK(S):

1. Ali Bahrami, Object Oriented Systems Development, IrwinMcGraw Hill Publications, 1999.

REFERENCEBOOK(S):

1. Grady Booch, Object Oriented Analysis and Design, Pearson, 2009.

COURSE OUTCOMES

CO1: Describe the basics of Object Oriented concepts K1

CO2: Analyze the function in g methodologies provided by Boochand Jacobson; Introduction on unified approach. K2

CO3: IllustrationofUMLdiagramsapplicabletovariousphasesofsoftwaredevelopment. K3

CO4: Study on Relationship between various objects in the application and various ways of their reorientations
K3

CO5: Import knowledge on packaging classes, distributing them among layers & introducing the object-oriented databases.
K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	M	M	S	S	M
CO2	S	S	M	S	M	S	M	S	S	S
CO3	S	S	S	S	M	M	M	S	M	M
CO4	S	S	S	S	S	S	M	S	M	S
CO5	S	S	M	S	S	S	M	S	S	S

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSE412	CHOICE - II	L	T	P	C
ELECTIVE - I		COMPUTATIONAL LINGUISTICS	4	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze
Objectives:	• To understand the computing Human Languages • To know the various models for computing human languages • To have competence of linguistic names which are indispensable for computing natural languages • To instruct linguistics nuances for computing human languages

Unit 1: Introduction to Tamil Linguistics

Tamil Computing Tools Development: Tamil Text Preprocessing tools: Sentence Splitter, Tokenizer, Word boundary identifier. Hands on these tools.

Unit 2: Shallow Parser

What is Shallow Parsing and How to develop a Shallow Parser (Rule based System development) Shallow parsing is an analysis of a sentence which first identifies constituent parts of sentences (nouns, verbs, adjectives, etc.) and then links them to higher order units that have discrete grammatical meanings (noun groups or phrases, verb groups, etc.). It is suitable for complex NLP applications; Morphological Analyser, Part of Speech Tagger, NP/VP Chunker, Clause Boundary Identifier.

Unit 3: Deep Parsing

Deep Parsing: Deep parsing is the search strategy which will give a complete syntactic structure to a sentence. It is the task of parsing a limited part of the syntactic information from the given task. Dependency Parser for Tamil; How to develop a dependency parser

Unit 4: Machine Translation

Application: Machine Translation

Unit 5: Applications of CL

Corpus Development in Tamil: Content Development using various methods such as Wikipedia and Blocks. Annotated Corpus of various Grammatical categories in Tamil using , Annotation tool (PALINKA for Tamil)

Text Books

1. kaNippoRiyil Tamil/கணிப்பொறியில்தமிழ்; T.Prakash/த.பிரகாஷ்Perikam/பெரிகாம் ,(நூல்வெளியீடுமற்றும்விற்பனை), 36, அசீஸ்முல்க்இரண்டாம்தெரு, ஆயிரம்விளக்கு, சென்னை-6. Tamil; 2005
2. IyarkaiMozhiyaaivuThamizh; Prof. subbaiyapillai/ கு. சுப்பையாபிள்ளை உலகத்தமிழ்ஆராய்ச்சிநிறுவனம்; 2012.
3. GATE.ac.uk - releases/gate-2.0alpha3-build516/doc/userguide.html
4. NLTK Website : 1. Language Processing and Python (nltk.org)
5. AU-KBC Tools: http://78.46.86.133:8080/aukbc-nlp/

6. Search Engine AU-KBC: Searchko: www.searchko.co.in
7. Corpus Linguistics: An Introduction Kindle Edition; Author: NiladriSekhar Dash; :Pearson; 1st edition (1 October 2007);
8. An Introduction to Corpus Linguistics; Author: Graeme Kennedy; Routledge:1998
9. PALinkA: A high-end tool for syntactic and semantic annotation for Tamil Text: Customized by AU-KBC for Tamil . To download: http://78.46.86.133/PALinkA.tar.gz
10. Natural Language Processing with Python: Analyzing Text with the Natural Language Toolkit 1st Edition; Steven Bird , Ewan Klein , Edward Loper
11. Machine Translation ; Pushpak Bhattacharyya ; Chapman and Hall/CRC; 2015

Course Outcomes:

After successful completion of the course, Student shall be able to:

CO1: Develop Tamil Computing Tools.	K2, K5
CO2: Analyse sentences using Shallow Parser.	K5
CO3: Extract Syntactic information using Deep Parser.	K4
CO4: Apply Machine Translation.	K3
CO5: Develop Tamil Corpus.	K4,K5

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	M	S	M	M	S	M	M	M	S
CO2	M	S	S	M	M	M	M	S	M	M
CO3	M	M	S	S	S	M	S	M	M	S
CO4	S	M	S	M	M	S	M	M	M	S
CO5	M	M	S	S	S	M	S	M	M	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks **W- Weakly Correlating - 1 Mark**

COURSE CODE	P21CSE413	CHOICE - III	L	T	P	C
ELECTIVE - I		CLIENT SERVER COMPUTING	4	-	-	4

Cognitive Level	**K1:** Recall**K2:** Understand**K3:** Apply**K4:**Analyse
Objectives	• To Learn about Client/Server Computing: An Introduction, features objective evaluations and details of Client/Server development tools, used operating system, • To know about database management system and its mechanism in respect of Client/Server computing • To Study about network components used in order to build effective Client/Server applications. • To provide the basic concepts of client server computing and the new technologies involved

UNIT I –INTRODUCTION

Introduction-Classification of Client/Server System: Two-tier Client/Server Model-Three-tier Client/Server Model-Client/Server Advantages and Disadvantages. Driving Forces behind Client/Server Computing: Driving Forces-Development of Client/Server Systems- Client/Server Standards- Client/Server Security-Improving Performance of Client/Server Applications-Downsizing and Rightsizing-Client/Server Methodology.

UNIT II: ARCHITECTURE OF CLIENT/SERVER SYSTEMS

Components - Principles behind Client/Server Systems - Client Components-Server Components - Communications Middleware Components - Architecture for Business Information System - Existing Client/Server Architecture.

CLIENT/SERVER AND DATABASES

Client/Server in Respect of Databases-Client/Server Database Architecture-Database Middleware Component-Access to Databases-Distributed Client/Server Database Systems-Distributed DBMS

UNIT III: CLIENT/SERVER APPLICATION COMPONENTS

Technologies for Client/Server Application-Service of a Client/Server Application-Categories of Client/Server Applications-Client Services-Server Services-Client/Server Application: Connectivity-Client/Server Application: Layered Architecture.

UNIT IV: SYSTEM DEVELOPMENT

Hardware Requirements-Software Requirements-Communication Interface Technology: Network Interface Card, LAN Cabling, WAN, ATM, Ethernet, Token Ring, FDDI, TCP/IP, SNMP, NFS, SMTP

UNIT V: CLIENT/SERVER TECHNOLOGY AND WEBSERVICES

Web Services History - Web Server Technology - Web Server - Web Server Communication - Role of JAVA for Client/Server on Web - Server Technology - Client/Server Technology and Web Applications - Server's Changing Role.

FUTURE OF CLIENT/SERVER COMPUTING: Technology of Next Generation - Enabling Technology - Client/Server Computing and the Intranet – Transformational System.

TEXT BOOK

1. Subhash Chandra Yadav, Sanjay Kumar Singh: An Introduction to Client/Server Computing, New Age International Publishers, 2009.

REFERENCES

1. Alex Berson, Client Server Architecture, McGraw Hill, 1992.
2. Patrick Smith, Steve Guengerich: Client Server Computing, Second Edition, Prentice Hall of India Pvt Ltd., 2011.
3. Robert Orfali, Dan Harkey and Jerri Edwards: Essential Client/Server Survival Guide, John Wiley &Sons Inc, 1996

COURSE OUTCOMES

CO1: Comprehend the basic concepts of the client-server model. K1
CO2**:** Understand how Client-Server systems work K2
CO3: Differentiate between two-tier and three-tier architectures. K3
CO4: Improve the performance and reliability of Client Server based systems. K3
CO5: Identify security and ethical issues in Client Server Computing K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	S	S	M	S	S	S
CO2	M	S	M	S	S	M	M	S	S	S
CO3	S	M	M	M	M	M	S	S	M	S
CO4	M	M	S	S	S	M	M	M	S	S
CO5	S	M	S	S	S	S	M	M	M	M

S – Strongly Correlating - 3 Marks **M- Moderately Correlating - 2 Marks**

W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSE421	CHOICE -I	L	T	P	C
ELECTIVE -II		BIG DATA ANALYTICS	4	-	-	4
Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze					
OBJECTIVES	• To understand and the basic concepts of Big Data • To understand about analytics and the purpose of it • To understand the Big Data Technologies. • To develop the critical thinking and analytical approach by using Hadoop.					

UNIT I: Introduction to Big Data

Introduction- Types of Digital Data: Classification of Digital Data, Introduction to Big Data: Characteristics of data - Evolution of Big data - Challenges of Big data - Other Characteristics of Data Which are not Definitional Traits of Big Data-Why Big Data? – Are we Just an Information Consumer or Do we also produce Information?-Traditional Business Intelligence (BI) versus Big Data – A Typical Data Warehouse Environment – A Typical Hadoop Environment – What is New Today? – What is changing in the Realms of Big Data?

UNIT – II :Analytics Basics:

Big Data Analytics: Where do we Begin? – What is Big Data Analytics? – What Big Data Analytics Isn't? – Why this Sudden Hype Around Big Data Analytics? Classification of Analytics – Greatest Challenges that Prevent Business from capitalizing on Big Data – Top Challenges Facing Big Data – why is Big Data Analytics Important? – What kind of Technologies are we looking Toward to Help Meet the Challenges Posed by Big Data? – Data Science – Data Scientist…Your New Best Friend – Terminologies Used in Big Data Environments – Basically available Soft State Eventual Consistency (BASE) – Few Top Analytics Tools

UNIT – III: Big Data Technologies:

The Big Data Technology Landscape: NoSQL (Not Only SQL) -Hadoop, Introduction to Hadoop: Introducing Hadoop – Why Hadoop? – Why not RDBMS? –RDBMS versus Hadoop – Distributed Computing Challenges – History of Hadoop – Hadoop Overview–Use Case of Hadoop – Hadoop Distributors – HDFS (Hadoop Distributed File System) Processing Data with Hadoop – Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator) – Interacting with Hadoop Ecosystem.

UNIT – IV: Introduction to MAPREDUCE Programming

Introduction – Mapper – Reducer –Combiner – Partitioner – Searching – Sorting – Compression, Introduction to Hive: What is Hive? – Hive Architecture – Hive Data Types – Hive File Format – Hive Query Language (HQL) –RC File Implementation – SerDe – User – Defined Function (UDF).

UNIT – V: Analytical Algorithms

Analytical Algorithms: Introduction to Machine Learning – Machine Learning Algorithms.

TEXT BOOKS:

1. SeemeAcharya, and SubhashiniChellappan, "Big Data and Analytics", Wiley India Pvt. Ltd., First Edition-2015.

REFERENCE BOOKS:

1. Nathan Marz, and James Warren, "Big Data – Principles and best practices of scalable real–time data systems", Manning Publication cp., USA-2015.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Indi a Pvt. Ltd - 2015.
3. Jared Deamn,"Big Data, Data Mining and Machine Learning" ,Willey India Pvt. Ltd, 2015.

COURSE OUTCOMES

CO1**:** Describe the basics of Big Data, Types of Data and Data Warehouse Environment K1
CO2**:** Understand the Data Analytics, Evolution, Importance, Tools, Technology and Data Science K3
CO3**:** Analyze the technologies and comparison of No SQL, RDMS, Hadoop, and YARN K2
CO4**:** Analyze the working methodology of Map Reduce and Hive Query Language K4
CO5**:** Implement the Machine Learning Algorithms K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO 3	PSO 4
CO1	S	S	M	S	M	M	M	S	S	M
CO2	S	S	M	S	M	M	M	S	S	S
CO3	S	S	S	S	M	M	M	S	M	S
CO4	S	S	S	S	M	S	M	S	M	S
CO5	S	S	M	S	S	S	M	S	M	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSE422	CHOICE - II	L	T	P	C
ELECTIVE - II		SOFT COMPUTING	4	-	-	4

Cognitive Level	**K1:** Recall **K2:** Understand **K3:** Apply **K4:**Analyse
Objectives	• To give students knowledge of soft computing theories fundamentals, • To learn the fundamentals of non-traditional technologies and approaches for solving hard real-world problems. • To learn and apply artificial neural networks, fuzzy sets and fuzzy logic, and genetic algorithms in problem solving and use of heuristics based on human experience • To introduce the ideas of fuzzy sets, fuzzy logic to become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inferencing systems

UNIT I: Introduction to Soft Computing
Introduction, Artificial Intelligence, Artificial Neural Networks, Fuzzy Systems, Genetic Algorithm and Evolutionary Programming, Swarm Intelligent Systems, Expert Systems.

UNITII:Introduction Neural network:
Artificial Neural Networks – First Generation - Introduction to Neural Networks, Biological Inspiration, Biological Neural Networks to Artificial Neural Networks, Classification of ANNs, First-generation Neural Networks.

UNITIII:Introduction fuzzy logic:
Fuzzy Logic – Introduction to Fuzzy Logic, Human Learning Ability, Imprecision, and Uncertainty, Undecidability, Probability Theory vs. Possibility Theory, Classical Sets and Fuzzy Sets, Fuzzy Set Operations, Fuzzy Relations, Fuzzy Composition**.**

UNITIV:Introduction Genetic Algorithms:
Genetic Algorithms and Evolutionary Programming – Introduction to Genetic Algorithms, Genetic Algorithms, Procedures of GAs, Genetic Representations, Selection, Genetic Operators, Mutation, Natural Inheritance Operators.

UNITV:Introduction to Swarm Intelligence:
Introduction to Swarm Intelligence – Background of Swarm Intelligent Systems, Ant Colony System, Ant Colony Optimization.

TEXTBOOK(S):

1. N.P.Padhy, S.P.Simon, 'Soft computing with MATLAB programming' Oxford University Press, First Edition, 2015

REFERENCEBOOK(S):

1. S.N.Sivanandam and S.N.Deepa, Principles of Soft computing, Wiley India Edition, 2nd Edition, 2013.
2. Simon Haykin, Neural Networks, Pearson Education, 2003.
3. John Yen & Reza Langari, Fuzzy Logic – Intelligence Control & Information , Pearson Education, New Delhi, 2003

4. N.P.Padhy, Artificial Intelligence and Intelligent Systems Oxford University Press,2013.

COURSE OUTCOMES

CO1**:** Introduce the basic concepts and techniques of Soft Computing K2
CO2: Differentiate Biological and Artificial Neural Network and Explain the types of Neural Networks K3
CO3: Analyze various fuzzy models in developing fuzzy inference systems to be appropriate with specific real time problems K4
CO4: Use genetic algorithms to combinatorial optimization problems K1
CO5: Discuss the Optimization techniques Swam Intelligence and Antcolony optimization K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	S	M	M	S	S	M
CO2	S	S	M	S	M	M	M	S	S	S
CO3	S	S	S	S	M	M	M	S	S	S
CO4	S	S	S	S	S	S	M	S	M	S
CO5	S	S	M	S	S	S	M	S	M	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks W- Weakly Correlating - 1 Mark

COURSE CODE	P21CSE423	CHOICE - III	L	T	P	C
ELECTIVE - II		WIRELESS SENSOR NETWORKS	4	-	-	4

Cognitive Level	**K1:** Recall**K2:** Understand**K3:** Apply**K4:**Analyse
Objectives	● To study the concepts of sensor networks. ● To study the research issues in different layers of sensor networks ● To program sensor motes using data centric Programming. ● To design and Develop wireless sensor node

UNIT I: Introduction:
The vision, Networked wireless sensor devices, Applications, Key design challenges. Network deployment: Structured versus randomized deployment, Network topology, Connectivity, Connectivity using power control, Coverage metrics, Mobile deployment.

UNITII: Localization:
Issues & approaches, Coarse – grained & Fine – grained node localization, Network - wide localization, Theoretical analysis of localization techniques. Synchronization: Issues & Traditional approaches, Fine – grained clock synchronization, and Coarse – grained data synchronization.

UNITIII: Wireless characteristics:
Basics, Wireless link quality, Radio energy considerations, SINR capture model for interference. Medium - access and sleep scheduling: Traditional MAC protocols, Energy efficiency in MAC protocols, Asynchronous sleep techniques, Sleep – scheduled techniques, and Contention – free protocols.

UNITIV: Sleep – based topology control:
Constructing topologies for connectivity, constructing topologies for coverage, SetK – cover algorithms. Routing: Metric – based approaches, Routing with diversity, Multi-path routing, Lifetime-maximizing energy – aware routing techniques, Geographic routing, Routing to mobile sinks.

UNIT V: Data-centric networking:
Data-centric routing, Data-gathering with compression, Querying, Data-centric storage and retrieval, the database perspective on sensor networks. Reliability and congestion control: Basic mechanisms and tunable parameters, Reliability guarantees, Congestion Control, Real-time scheduling.

TEXTBOOK(S):
1. Daniel Minoli, TaiebZnati, KazemSohraby, Wireless Sensor Networks: Technology, Protocols, and Applications, Wiley Inter Science, 2007.

COURSE OUTCOMES

CO1: Discuss about Networked wireless sensor devices, design challenges and topology K1
CO2: Analyze the Localization, synchronization issues and approaches K2
CO3: Understand the wireless characteristics, MAC protocols and contention free protocols K2

CO4: Construct topology for connectivity, coverage and routing techniques. K3
CO5: Discuss about the data centric routing and Reliability and congestion control K4

MAPPING OF COs WITH POs AND PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	S	M	M	S	S	M
CO2	S	S	M	S	M	M	M	S	S	S
CO3	S	S	S	S	M	M	M	S	S	S
CO4	S	S	S	S	S	S	M	S	M	S
CO5	S	S	M	S	S	S	M	S	M	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

NON MAJOR ELECTIVE
OFFERED FOR OTHER DEPARTMENT STUDENTS

COURSE CODE	P21CSN211	CHOICE – I	L	T	P	C
SEMESTER - II		C PROGRAMMING	4	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze
Objectives	• To introduce students to the basic knowledge of programming fundamentals of C language. • To impart writing skill of C programming to the students and solving problems. • To impart the concepts like looping, array. • To impart the knowledge on functions and pointers.

Lab Exercise:

Simple Programs:
1. Finding the largest, smallest among three numbers
2. Generate the Fibonacci sequence

Control Structures:
1. Find whether a number is prime or not
2. Find whether a given number is a perfect or not
3. Find the factorial of a number

Arrays:
1. Program for Sorting
2. Program to search an element
3. Find whether given string is a palindrome or not
4. Perform the addition of two matrices
5. Perform subtraction of two matrices
6. Perform multiplication of two matrices

Functions:
1. Program to apply Recursion
2. Program for Call by Value

Pointers:
1. Program to perform addition
2. Program for swapping two numbers

Structures:
1. Program to print student information using structures
2. Program for Array of structures

File:
1. Program for applying File operations
2. Program to get n numbers and find odd and even numbers using file.

COURSE CODE	P21CSN212	CHOICE – II	L	T	P	C
SEMESTER - II		PHOTO DESIGNING	4	-	-	4

Cognitive Level	K1: Recall K2: Understand K3: Apply K4: Analyze
Objectives	• Demonstrate knowledge of image resolution, image size, and image file format for web, video, and print. • Demonstrate knowledge of design principles, elements, and image composition. • Demonstrate knowledge of typography • Apply principles of composition to produce professional images

Unit I: Introduction

Getting into Photoshop: Introduction - Best in Photoshop 7.0 - Photoshop Interface-Saving the File-Importing Existing File.

Unit II : Editing and Retouching

Editing and Retouching: Working with Selections-Getting started with the Selection tool-Selection with Rectangle Marquee Tool-Selection with Elliptical Marquee Tool-Moving a Selection-Moving with Keyboard Shortcut-Selection with the Magic Wand-Selection with Lasso Tool-Adding and Subtraction Selection-Selection with the Magnetic Lasso-Transforming a Selection-Combining Selection Tools-Cropping the Completed Image-Quick Mask tool to make Selection-Enabling the Quick Mask Mode-Adjusting Quick Mask Setting-Patch Tool-Paint Tools-Image Color Adjustments.

Unit III: Photoshop

Making Artistic use of Photoshop: Painting Tools-Working with Brushes-Drawing-Eraser Tool-Brushes Palette-Pen Tool-Selecting an Image with Pen Tool-Editing and Cleaning Tools-Clone Stamp Tool-Healing Brush-Image Resizing.

Unit IV: Tools of Photoshop

Building Original Art work: Layers-Creating A Layer -Layer Mask-Transform-Custom shapes -Create Your own Custom shapes.

Unit V: Applications of Photoshop

Transforming Images with Filters: Filters-Text Tool-Text Wrap-Try it.

Text Book:

J. Jenitha, A. Diana, “Adobe Photoshop 7.0 - A Novice Guide” ACCA Publication, 2012.

Reference Book:

1. Deke McClelland, Laurie Ulrich Fuller Robert C. Fuller, "Photoshop CS2 Bible", Photoshop® CS2 Bible, Professional Edition, 2005.
2. “Photoshop CS6 in Simple Steps”, Kogent Learning Solutions Inc, Dreamtech Press, 2013.

COURSE OUTCOMES (CO):

CO1: Understand the different dimensions of digital data. K1
CO2: Apply the concept of data classification on different types of data K2
CO3: Analyze the characteristics of different patterns of data K3
CO4: Implement the concept of bigdata in different scenarios K4
CO5: Utilize relevant applications of tools and technology in the creation, reproduction, and distribution of visual messages. K4

Mapping of COs with POs and PSOs :

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	M	S	M	S	M	M	S	S	M	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	S	S	M	S	M	S	S	S	M	M
CO4	M	S	M	M	S	M	M	S	S	S
CO5	S	M	M	S	M	M	S	M	M	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSN213	CHOICE – III	L	T	P	C
SEMESTER - II		BIG DATA ANALYTICS	4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives	• To study the basic technologies that forms the foundations of Big Data • To understand and apply scaling up machine learning techniques and associated computing techniques andtechnologies. • To identify the characteristics of datasets and compare the trivial data and big data for various applications. • To recognize and implement various ways of selecting suitable model parameters for different machine learningtechniques.

Unit-I: Data Evolution

Data Development Time Line – ICT Advancement-a Perspective – Data Growth-a Perspective – IT Components-Business Process – Landscape-Data to Data Science – Understanding data: Introduction – Type of Data: Numeric – Categorical – Graphical – High Dimensional Data — Data Classification – Hot Data – Cold Data – Warm Data – Thick Data – Thin Data - Classification of digital Data: Structured, Semi-Structured and Un-Structured.

Unit-II: Sources Of Data

TimeSeries–TransactionalData–BiologicalData–SpatialData–SocialNetworkDataData Evolution – Data Sources
Data Science: Data Science-A Discipline – Data Science vs Statistics – Mathematics - Programming Language - Database, - Machine Learning. Data Analytics Relation: Data Science, Analytics, Big Data Analytics.

Unit-III: Data Science Components

Data Engineering, Data Analytics-Methods and Algorithm, Data Visualization Big Data: Introduction To Big Data: - Evolution What is Big Data – Sources of Big Data. Characteristics of Big Data 6Vs – Big data- Challenges of Conventional Systems.

Unit-IV: Data Processing Models
Data Processing Models – Limitation of Conventional Data Processing Approaches – Big Data Myths - Data Discovery-Traditional Approach, Big Data Technology: Big Data Exploration - Data Augmentation – Operational Analysis – 360 View of Customers – Security and Intelligence

Unit-V: Use Cases

Big Data Use cases –Big Data Technology Potentials – Limitations of Big Data and Challenges- Big Data Roles Data Scientist , Data Architect, Data Analyst – Skills – Case Study : Big Data – Customer Insights – Behavioral Analysis – Big Data Applications - Marketing – Retails – Insurance – Risk and Security – Healthcare.

Text Book:

- V. Bhuvaneswari, T. Devi, "Big Data Analytics: A Practitioner"s Approach" Sci-Tech Publishers Chennai 2016.

Reference Books:

1. Han Hu, Yonggang Wen, Tat-Seng, Chua, XuelongLi,"Toward Scalable Systems forBig data Analytic" (2016)
2. SeemaAcharya, SubhashniChellappan, "Big Data Analytics", Wiley, (2015).

Course Outcomes:

After completing this course, students will be able to:

CO1: Understand the key issues in big data management and its associated applications in intelligent business and scientific computing. K1

CO2: Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NO SQL in big data analytics. K2

CO3: Interpret business models and scientific computing paradigms, and apply software tools for big data analytics. K2

CO4: Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications. K3

CO5: Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc. K4

Mapping of COs with POs and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	M	S	S	S	M
CO2	S	M	S	M	S	S	M	S	M	M
CO3	S	M	M	M	S	M	S	M	S	S
CO4	M	S	M	S	M	S	S	S	M	M
CO5	M	S	M	S	M	S	M	S	M	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks

W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSN214	CHOICE - IV	L	T	P	C
SEMESTER - II		DIGITAL IMAGE PROCESSING	4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives	• To understand the basic fundamental concept of an image • To know the concepts of Image techniques, Sharpe and filtering ideas • To gain the knowledge about image patterns, structures and image compressions • To appreciate the use of current technologies those are specific to image processing systems.

Unit-I: Digital Image Fundamentals

Image formation, Image transforms – Fourier transforms, Walsh, Hadamard, Discrete cosine, Hostelling transforms.

Unit-II: Image Enhancement and Restoration

Histogram modification techniques - Image smoothening – Image sharpening - Image restoration - Degradation model – Noise models- Spatial filtering – Frequency domain filtering

Unit-III: Image compression and segmentation:

Compression Models - Elements of information theory - Error free compression - Image segmentation – Detection of discontinuities - Edge linking and boundary detection – Thresholding – Region based segmentation –Morphology

Unit- IV: Representation and description:

Representation schemes – Boundary descriptors – Regional descriptors –Relational descriptors

Unit- V: Object Recognition and Interpretation

Patterns and pattern classes - Decision - Theoretic methods -Structural methods.

Text Book:

1.Gonzalez, R.C., Woods, R.E., “Digital Image Processing”, 2nd Edition, Pearson Education,2002.

Reference Books:

1.Anil Jain, K., “Fundamentals of Digital image Processing” , Prentice all ofIndia,1989.

2.SidAhmed, “Image Processing”, McGraw Hill, New York,1995.

Course Outcomes:

After completing this course, students will be able to:

CO1: To remember the basic image concepts. K1
CO2: To know the image sharpens enhancement and compression models. K2
CO3: To apply various image techniques like edge linking and boundary detection. K3
CO4: To analyze basic requirements of image processing like structure, compression and resolution. K4
CO5: Understand the role of image segmentation, various color models and color image transformation K4

Mapping of COs with POs and PSOs :

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	S	S	S	S	S	S
CO2	M	M	S	M	S	S	M	S	M	S
CO3	S	M	S	M	M	S	S	M	S	S
CO4	S	S	M	S	S	M	S	S	M	M
CO5	S	M	M	M	S	S	M	M	S	M

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSN215	CHOICE - V	L	T	P	C
SEMESTER - II		MOBILE COMPUTING	4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives	• To learn the basic concepts of Mobile Computing and its Applications. • To provide various emerging technologies in Mobile computing services. • To gain knowledge about GSM, GPRS, CDMA and 3G. • To study the specifications and functionalities of various protocols/standards of mobile networks.

Unit I:Introduction

Mobility of bits and bytes, wireless- The beginning, mobile computing – Networks – Middleware and Gateways – Application and Services – Developing Mobile computing Applications – Security in Mobile Computing.

Unit II **Mobile Computing Architecture**

History of Computers – History of Internet – Internet – The ubiquitous network – Architecture for Mobile Computing– Three Tire Architecture - Design consideration for Mobile Computing- Mobile Computing through Internet – Making existing Applications Mobile –Enabled

Unit - III **Mobile Communication**

Global System For Mobile Communication (GSM): Global system for Mobile Communication- GSM Architecture – GSM entities – Call routing in GSM, PLMN Interface – GSM Address Identifiers – Network aspects in GSM- GSM frequency allocation – Authentication and Security. Short Message Service (SMS) : Mobile Computing over SMS - Short Message Service- Value added services through SMS – Accessing the SMS bearer.

Unit – IV: **General Packet Radio Service (GPRS)**

General Packet Radio Service (GPRS) : Introduction – GPRS and packet data network – GPRS network architecture – GPRS network operations – Data services in GPRS – Applications for GPRS- limitations of GPRS – Billing and Charging in GPRS. Wireless Application Protocol (WAP): Introduction – WAP – MMS- GPRS application

Unit V **CDMA AND 3G**

CDMA AND 3G : Introduction – Spread spectrum technology – IS 95- CDMA versus GSM – Wireless data–Third generation network – Application on 3G. WIRELESS LAN : Introduction – Wireless LAN advantages – IEEE 802.11 standards – Wireless LAN architectures – Mobility in Wireless LAN – Deploying Wireless LAN – Mobile Ad-hoc network and sensor network – Wireless LAN Security – WiFi versus 3G.

Text Book:

1.AshokTalukder,RoopaRYavagal,“MobileComputing”,TataMcGrawHillPublishingCompanyLtd, 2005.

Reference Books:

1. Jochen Schiller, (2004), “Mobile Communications”, Second Edition, Addision Wesely Publications.
2. UWE Hansmann, Lother Merk, Martin.S, (2006), “Principles of Mobile Computing”, Second Edition, Springer publications.
3 Jeyasri Arokiamary,(2005), “Mobile Communications”, First Edition, Anuradha Agencies.

Course Outcomes :

After completing this course, students will be able to:

CO1: To member the concept of Wireless LANs, PAN, Mobile Networks K1
CO2: To understand positioning techniques of location-based services and applications K2
CO3: To apply all techniques used in the GSM and GPRS K3
CO4: To analyze CDMA and wireless LANS. K4
CO5: To design a system, component or process as per needs and specifications K3

Mapping of COs with POs and PSOs :

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	S	S	M	S	M
CO2	M	S	S	M	S	S	M	S	S	S
CO3	S	S	M	S	S	M	S	M	S	S
CO4	M	S	M	S	S	S	S	S	S	M
CO5	S	M	M	M	S	S	M	S	M	M

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSN216	CHOICE - VI	L	T	P	C
SEMESTER - II		DATA COMMUNICATION AND NETWORKING	4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives:

- To educate the concepts of terminology and concepts of the OSI reference model and the TCP/IP reference model and protocols such as TCP, UDP and IP.
- To be familiar with the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide areanetworks.
- Introduce the student to a network routing for IP networks and how a collision occurs and how to solve it and how a frame is created and character count of each frame.
- An overview of security issues related to data communication in networks

Unit -I: Introduction

Introduction To Data Communications And Networking: Introduction-Fundamental Concepts - Data Communication – Protocols – Standards – Signal Propagation – Analog and Digital Signals. Information Encoding: Representing Different Symbols – Minimizing Errors - Analog and Digital Transmission Methods – Modes of Data Transmission and Multiplexing. Transmission Errors: Detection and Correction.

Unit-II: Transmission Media

Transmission Media: Guided Media - Unguided Media. Network Topologies: Mesh, Star, Tree, Ring, Bus – Switching: Circuit switching, Message switching, Packet switching. Routing Algorithms: Routers and Routing – Factors affecting Routing Algorithms – Routing Algorithms – Approaches to Routing – Network Protocols and OSI Model

Unit-III: LAN

Local Area Networks (LAN), Metropolitan Area Networks (MAN) and Wide Area Networks (WAN):LAN– Ethernet – MAN – Switched Multimegabit Data Services (SMDS) - WAN – WAN Architecture - WAN Transmission Mechanism - WAN Addressing – Packet Forwarding – Aloha - Integrated Services Digital Network (ISDN) – X.25 Protocol – Frame Relay.

Unit-IV: ATM

ynchronous Transfer Mode (ATM) - Internetworking Concepts, Devices, Internet Basics, History and Architecture – An Introduction to TCP / IP, IP, ARP, RARP, ICMP.

Unit-V: Transmission Control Protocol

Features of TCP, Relationship between TCP and IP *, Ports and Sockets, TCP connections, What makes TCP Reliable, TCP Packet Format – User Datagram Protocol (UDP): UDP Packet, Difference between UDP and TCP – Domain Name System (DNS) – Electronic Mail (Email) – File Transfer Protocol (FTP).

Text Book:

1. Achyut S. Godbole, (2007), “Data Communications and Networks”, Ninth reprint, Tata McGraw- Hill Publishing Company Limited.

Reference Books:

1. Behrouz A. Forouzan, (2007), “Data Communications and Networking”, Second Edition Update, Nineteenth reprint, Tata McGraw-Hill Publishing Company Limited.
2. Andrew S. Tanenbaum, (2001), “Computer Networks”, Third Edition, Prentice Hall

Course Outcomes :

After completing this course, students will be able to:

CO1: Understand the basics of data communication, networking, internet and their importance. K1
CO2: Understand Internet structure and can see how standard problems are solved and the use of cryptography and network security K2
CO3: Apply knowledge of different techniques of error detection and correction to detect and solve error bit during data transmission. K3
CO4: Identify the basic security threats of a network K4
CO5: Analyze TCP/IP and their protocols. K4

Mapping of COs with POs and PSOs :

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	S	S	M	S	M	S	S	S
CO2	S	S	S	M	S	S	S	M	S	S
CO3	M	S	M	M	S	S	S	S	M	M
CO4	S	S	M	S	S	M	M	S	S	S
CO5	M	S	M	M	S	M	S	M	S	M

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks
W-Weakly Correlating - 1 Mark

COURSE CODE	P21CSN217	CHOICE – VII	L	T	P	C
SEMESTER - II		CLOUD COMPUTING	4	-	-	4
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives	• To understand the basic knowledge about the cloud computing techniques and architecture. • To gain knowledge of cloud services and cloudsecurity. • To be able to understand Cloud Segment, Cloud Deployment Models and key cloud companies. • Identify and define technical challenges for cloud applications and assess their importance.

Unit –I: Introduction

Introduction - cloud computing at a glance – Historical development – Building cloud computing environment.

Unit-II: Parallel and Distributed Computing

Principles of parallel and distributed computing – Eras of computing – parallel Vs distributed computing – Elements of parallel computing – Elements of distributed computing – Technologies for distributed computing.

Unit-III: Architecture of Cloud Computing

Cloud Computing Architecture: Introduction – Cloud reference model – Types of clouds – Organizational aspects.

Unit-IV: Applications of Cloud Computing

Cloud Applications: Scientific Applications: Healthcare –Business and Consumer Applications: CRM and ERP – Media Applications – Multiplayer Online gaming

Unit-V:Cloud Security

Cloud Security – Cloud Computing Concept – Cloud Risk – Cloud Security Tools and Techniques – Data Production in Cloud – Cloud Storage – Data Loss Prevention – Cloud Application Security – Security Assertion Markup Language.

Text Books:

1.RajkumarBuyya, Christian vecchiola , Thamaraiselvi, (2013), “Mastering Cloud computing”, Mc Gram Hill Publication. (UNIT – I to UNIT–IV)
2.CharlesP.Pfleeger, Shari Lawrence Pfleeger, DevenN.Shan, (2007), “Security in Computing”, Fourth Edition, Prentice Hall Publication. (UNIT–V)

Reference Book:

1. Judith Hurwitz, Robin Bloon, (2009), “Cloud Computing for Dummies”

Course Outcomes:

After completing this course, students will be able to:

CO1: Identify the architecture and infrastructure of cloud computing including SaaS, PaaS, IaaS, public cloud, private cloud, and hybrid cloud. K1

CO2: Understand the core issues of cloud computing, security, privacy, and inter operability.K2

CO3: Apply the appropriate technologies and approaches for the related issues in Cloud Computing. K3

CO4: Analyze the suitable cloud computing solutions and recommendations according to the applications used. K4

CO5: Learn the Concept of Cloud Infrastructure Model. K1

Mapping of COs with POs and PSOs :

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PSO1	PSO2	PSO3	PSO4
CO1	S	S	M	S	M	S	M	S	M	S
CO2	S	S	M	S	S	M	M	S	S	S
CO3	S	M	M	M	S	M	M	S	M	S
CO4	M	M	S	S	M	S	M	M	S	S
CO5	S	S	M	M	M	S	M	S	M	S

S – Strongly Correlating - 3 Marks M- Moderately Correlating - 2 Marks

W-Weakly Correlating - 1 Mark

VALUE ADDED PROGRAMME

COURSE CODE	P21CSV11	BIG DATA ANALYTICS LAB	L	T	P	C
SEMESTER - I			-	-	-	2
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives:	• Conceptualization and Summarization of big data • Trivial data versus big data • Big data computing technologies • Machine learning techniques and Scaling up machine learning approaches

1. Installation of Hadoop:

   Three modes of Installation

   Stand Alone Mode:

   Pseudo Distributed Mode:

   Fully Distributed Mode

2. *Weather Report POC-Map Reduce Program to analyse time – temperature statistics and generate report with max/min temperature.*

   Problem Statement:

   1.The system receives temperatures of various cities (Austin, Boston, etc) of USA captured at regular intervals of time on each day in an input file.

   2.System will process the input data file and generates a report with Maximum and Minimum temperatures of each day along with time.

   3.Generateaseparateoutputreportforeachcity.Ex:Austin-r-00000 Boston-r-00000 Newjersy-r-00000 Baltimore-r-00000 California-r-00000 Newyork-r-00000

3. Implementing Matrix Multiplication with HadoopMapReduce

4. Pig Latin Scripts to sort, group, join, project, and filter our data.

5. Hive Databases, Tables, Views, Functions and Indexes

6. Hive Functions:
   a. Built-in Functions
      1. Collection Functions
      2. Date Functions
      3. Mathematical Functions
      4. Conditional Functions
      5. String Functions
      6. Miscellaneous Functions

   b. UDFs (User Defined Function)

COURSE CODE	P21CSV42	SOFTCOMPUTING LAB	L	T	P	C
SEMESTER - IV			-	-	-	2
Cognitive Level		K1: Recall K2: Understand K3: Apply K4: Analyze				

Objectives:	• Introduce Neural Networks, architecture, functions and various algorithms involved • Introduce Fuzzy Logic, Various fuzzy systems and their functions. • Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory. • Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

Section-A(FuzzyLogic)

1. a) Write a program (m.file) to calculate union, intersection, complement and difference of two fuzzy sets.
   b)Write a program (m.file) to calculate the Demorgan's Law.
2. Find whether the given matrix is (a) reflexive (b) tolerance and (c) transitivity matrix or not.
3. Find whether the given matrix is symmetry or not.
4. Find the fuzzy relation between two vectors *R* and *S*

   R=
   0.7 0.5
   0.8 0.4
   S =
   0.9 0.6 0.2
   0.1 0.7 0.5
   Using max–product and max-min method

5. a) Use command line commands to display the Gaussian membership function. Given x =0–10 with increment of 0.1 and Gaussian function is defined between 0.5 and −5. b) Use command line commands to display the triangular membership function. Given x = 0–10withincrement of0.2triangularmembership function is defined between [3 4 5].
6. Illustrate different types of generalized bell membership functions using a program
7. Using program, find the crisp lambda cutset relations for λ=0.2,the fuzzy matrix is given by

   R=
   0.2 0.7 0.8 1
   1 0.9 0.5 0.1
   0 0.8 1 0.6
   0. 0.4 1 0.3

8. Temperature control of the reactor where the error and change in error is given to the controller. Here the temperature of the reactor is controlled by the temperature bath around the reactor thus the temperature is controlled by controlling the flow of the coolant into the reactor. Form the membership function and the rule base using FIS editor.
9. Consider the water tank with following rules
   a) IF (level is okay) THEN (valve is no_change)(1)

b) IF (level is low) THEN (valve is open_fast)(1)
c) IF (level is high) THEN (valve is close_fast)(1)

Using Mamdani method and max–min method for fuzzification and method of centroid for de-fuzzification method construct a FIS. Before editing that rules, membership functions must be defined with membership function editor.

10. a)Formal fuzzy system, which approximates function *f*, when *x*[−10,10].Repeat the same by adding random, normally distributed noise with zero mean and Unit variance.

    b)Simulate the output when the input is sin(*t*). Observe what happens to the signal shape at the output.

11. Use Fuzzy Logic Toolbox to model the tip given after a dinner for two, where the food can be disgusting, not good, bland, satisfying, good, or delightful, and the service can be poor, average, or good. To get started, you type fuzzy in a window. Then use the fuzzy inference system and membership function editors to define and tune your rules.

Section-B (Neural Network)

12. Design networks of McCulloch –Pitts neurons that implement logical NOT, AND and OR gates. Draw each network and label all the weight and threshold values.

13. Derive expressions for the weights and thresholds of a McCulloch – Pitts neuron that can compute the following input-output mappings:
    *in1 in2 out.*Write code for the above ANN.

14. Investigate the use of back-propagation learning using asigmoidal non-linearity to achieve one-to-one mapping, as described here:

1.f(x) =1/x	1	≤x≤100
2.f(x) =$\log_{10}$x,	1	≤ x ≤ 10
3.f(x)=exp(-x),	1	≤ x ≤ 10
4.f(x) =sinx,	0	≤ x ≤ π/2

For each mapping, do the following:

(a) Set up two sets of data, one for network training, and the other for testing.
(b) Use the training data set compute the synaptic weights of the network, assumed to have a single hidden layer.
(c) Evaluate the computation accuracy of the network by using the test data. Use a single layer but with a variable number of hidden neurons. Investigate how the net work performance is affected by varying the size of the hidden layer.

15. The data presented in the Table P4.17 show the weights of eye lenses of wild Australian rabbits as a function of age. No simple analytical function can exactly interpolate these data, because we do not have a single valued function. Instead, we have a nonlinear least squares model of this dataset, using a negative exponential, as described by Y =2.33.846(1– exp(-0.006042x))

16. Using the back - propagation algorithm, design a multiplayer perceptron that provides a non linear least - squares approximation to this data set. Compare your result against the least – sequence model described.

TableP4.17Weights of Eye Lenses of Wild Australian Rabbits

Ages	Weights	Ages	Weights	Ages	Weights	Ages	Weights

(days)	(mg)	(days)	(mg)	(days)	(mg)	(days)	(mg)
15	21.66	75	94.6	218	174.18	338	203.23
15	22.75	82	92.5	218	173.03	347	188.38
15	22.3	85	105	219	173.54	354	189.7
18	31.25	91	101.7	224	178.86	357	195.31
28	44.79	91	102.9	225	177.68	375	202.63
29	40.55	97	110	227	173.73	394	224.82
37	50.25	98	104.3	232	159.98	513	203.3
37	46.88	25	134.9	232	161.29	535	209.7
44	52.03	142	130.68	237	187.07	554	233.9
50	63.47	142	140.58	26	176.13	591	234.7
50	61.13	147	155.3	258	183.4	648	244.3
60	81	147	152.2	276	186.26	660	231
61	73.09	150	144.5	285	189.66	705	242.4
64	79.09	159	142.15	300	186.09	723	230.77
65	79.51	165	139.81	301	186.7	756	242.57
65	65.31	183	153.22	305	186.8	768	232.12
72	71.9	192	145.72	312	195.1	860	246.7
75	86.1	195	161.1	317	216.41		

Section –C (Genetic Algorithm)

17. Write a program to implement Roulette wheel and ranking selection method.
    a) Write a program to maximize a function f(x,y) = xsin(4 x) + ysin(20x) subject to -3.0

Reference Books:

1.N.P.Padhy, S.P.Simon, Soft computing with P programming, Oxford University Press, First Edition, 2015.

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MOTHER TERESA WOMEN'S UNIVERSITY

KODAIKANAL-624101

SYLLABUS FOR

PGDCA

(CHOICE BASED CREDIT SYSTEM)

From 2021 Onwards

MOTHER TERESA WOMENS UNIVERSITY, KODAIKANAL

(AS PER TANSCHE RULES)

DEPARTMENT OF COMPUTER SCIENCE

P.G.D.C.A

ALLOCATION OF PAPERS AND CREDITS FOR PGDCA PROGRAMME – 2021-22 ACADEMIC YEAR

I SEMESTER

S.NO.	SUBJECT CODE	SUBJECT NAME	HOURS	CREDITS	INT	EXT	TOTAL
01.	PDCAT11	Programming in C	6	5	25	75	100
02.	PDCAT12	Office Automation	6	5	25	75	100
03.	PDCAT13	Foundation in Computer Science	6	5	25	75	100
04.	PDCAP14	Programming in C Lab	6	5	40	60	100
05.	PDCAP15	Office Automation Lab	6	5	40	60	100
Total			**30**	**25**			

II SEMESTER

S.NO.	SUBJECT CODE	SUBJECT NAME	HOURS	CREDITS	INT	EXT	TOTAL
01.	PDCAT21	Software Engineering	6	5	25	75	100
02.	PDCAT22	Internet and Web Technology	6	5	25	75	100
03.	PDCAT23	Desktop Publishing (DTP)	6	5	25	75	100
04.	PDCAP24	Desktop Publishing (DTP) Lab	6	5	40	60	100
05.	PDCAP25	Web Designing using HTML Lab	6	5	40	60	100
Total			**30**	**25**			

SCHEME OF EXAMINATION

Theory

Internal - 25

Test	-	15
Seminar/Activity	-	5
Assignment	-	5
Total	-	**25**

External - 75

Practical

Internal	**-**	**40**
External	**-**	**60**

QUESTION PATTERN

Theory – Internal

Part - A	-	10 X 1 MARKS =	10
Part - B	-	2 X 3 MARKS =	6
Part - C	-	1 X 9 MARKS =	9

Total	-		**25**

Theory - External

Part – A (OBJECTIVE TYPE)	-	10 X 1 MARKS	= 10
Part – B (EITHER OR CHOICE)		5 X 4 MARKS	= 20
Part – C (3/5)	-	3 X 15 MARKS	= 45

Total	-		**75**

Practical (Internal – 40)

Process	-	10
Result Verification	-	10
Viva	-	5

Total	-	25
Record	-	15

Total	-	**40**

Practical (External– 60)

Process	-	25
Result Verification	-	25
Viva	-	10

Total	-	**60**

PDCAT11 - PROGRAMMING IN C Hours - 6 Credits - 5

Objectives:

- **To understand the history of C and how to write a C program**
- **To be familiar with Operators, Conditional and Looping Statements in C**
- **To learn about Arrays and its applications with C**
- **To implement Functions and Strings in C**
- **To get knowledge about the usage of Pointers in C**

UNIT I

History of C- Importance of C- Basic Structure of C Programs- Executing a 'C' Program-Character Set-C Tokens-Keyword and Identifiers-Constants-Variables-Datatypes

UNIT II

Operators – Decision Making and Branching: If Statement- If….Else Statement- Nesting If….Else Statement- Else If Ladder- Switch Statement- Decision Making and Looping: While Statement-Do Statement- For Statement

UNIT III

Arrays- One-dimensional Arrays-Declaration and Initialization of One-dimensional Arrays-Two-dimensional Arrays-Function-Definition of Function- Function Declaration-Category of Function

UNIT IV

Strings- String-handling Functions- Structures- Defining a Structure- Declaring Structure Variables- Accessing Structure Members-Structure Initialization- Array of Structures- Unions

UNIT V

Pointers- Understanding Pointers-Accessing the Address of a Variable- Declaring Pointer Variable-Accessing a Variable through its Pointer-Chain of Pointer- Pointers and Arrays

TEXT BOOK:

1. E.Balagurusamy ,"Programming in ANSI C" ,Tata McGraw-Hill Education, Fourth Edition, 2008

REFERENCE BOOKS:

1 Programming with C - 2nd Edition by Byron Gottfried , Schaum Series
2 The C Programming Language" by Brian W Kernighan / Dennis Ritchie, Second Edition

PDCAT12 - OFFICE AUTOMATION Hours - 6 Credits - 5

Objectives:

- **To understand the basics of MS Word in Office Packages**
- **To get knowledge by comparing different office suites**
- **To study the advanced features of MS Office**
- **To explore Spreadsheet MS-Excel application and its advanced aspects**
- **To learn the usage of Presentation software MS-PowerPoint**

UNIT I

MS Word Basics: Introduction to MS Office, Introduction to MS Word, Features & area of use. Working with MS Word, Menus & Commands, Toolbars & Buttons, Shortcut Menus, Wizards & Templates, creating a New Document, Different Page Views and layouts, Paragraph and Page Formatting, Text Editing using various features; Bullets, Numbering, Autoformatting

UNIT II

Advanced Features of MS-Word: Spell Check, Thesaurus, Find & Replace; Headers & Footers, Insert Menu-Working with Columns, Tabs & Indents, Creation & Working with Tables-Margins & Space management, Adding References and Graphics, Mail Merge, Envelops & Mailing Labels.

UNIT III

MS Excel: Introduction - working with MS Excel, Toolbars, Menus and Keyboard Shortcuts, concepts of Workbook & Worksheets, Using Wizards, Various Data Types, using different features with Data, Cell and Texts -Working with Data & Ranges, Different Views of Worksheets.

UNIT IV

Advanced Features of MS Excel: Multiple Worksheets: Concept, Creating and Using Multiple Worksheets; Use of Formulas, Calculations & Functions, Various types of Functions, Working with Different Chart Types, Chart Wizard, Printing of Workbook -Database: Creation, Sorting, Query and Filtering a Database- Creating and Using Macros

UNIT V

MS PowerPoint: Introduction- Creating a New Presentation-Using Wizards; Slides- Inserting, Deleting and Copying of Slides; Working with Notes, Handouts, Columns & Lists, Adding Graphics, Sounds and Movies to a Slide; Working with PowerPoint Objects-Apply Animation, Printing Presentations, Notes, Handouts

TEXT BOOKS:

1. WINDOWS XP Complete Reference. BPB Publications
2. MS OFFICE XP Complete Reference. BPB Publications

REFERENCE BOOKS:

1. Microsoft Office for Windows by Sheila S.Djenu
2. MS Access Complete Reference by Anderson

PDCAT13 - FOUNDATION IN COMPUTER SCIENCE Hours - 6 Credits - 5

Objectives:

- **To understand the importance and use of operating systems**
- **To study the various types of operating system**
- **To learn about the Database Systems and its significance**
- **To explore the SQL commands in RDBMS**
- **To understand the concepts of Computer Network and its protocols**

UNIT I

Introduction to operating systems – Computer system organization, architecture – Operating system structure, operations – Process, memory, storage management – Protection– Distributed systems – Computing Environments – OS services – User operating-system interface

UNIT II

System calls – Types – System programs – OS structure – OS generation – System Boot – Process concept, scheduling – Operations on processes – Cooperating processes – Inter-process communication –Multithreading models – Thread Libraries – Threading issues – OS examples.

UNIT III

Database Systems-Database-System Applications-Purpose of Database Systems-View of Data-Database Languages-Database Design- Database Engine- Database and Application Architecture-History of Database-The Entity-Relational Model

UNIT IV

Structure of Relational Databases – Database Schema – Relational Query Languages – Overview of SQL – SQL Data Definition- SQL queries- Set Operations – Aggregate functions – Joins – Views

UNIT V

Overview: Data Communication - Network Types - TCP/IP Protocol Suite - The OSI Model - Digital Signals - Data rate limits - Performance - Line Coding - Block Coding - Transmission Media: Guided Media - Unguided Media

TEXT BOOKS:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, ―Operating System Concepts Essentials, John Wiley & Sons Inc., 2010.
2. Henry F Korth, Abraham Silberschatz, S. Sudharshan, “Database System Concepts”, McGraw Hill, Sixth Edition, 2011
3. Behrouz A. Foruzan, “Data communication and Networking”, Tata McGraw-Hill, Fifth Edition, 2013

REFERENCE BOOKS:

1. Operating Systems, William Stallings, Second edition, Maxvell McMillan, International Editions, 1997.
2. Computer Networks A Systems Approach, 5th Edition, by Larry Peterson Bruce Davie, publisher Morgan Kaufmann

PDCAP14 -PROGRAMMING IN C LAB Hours - 6 Credits - 5

Objectives:

- **To practice to implement a C program**
- **To understand the implementation of Operators and Arrays**
- **To study to handle Functions and the implementation in C**
- **To learn how to program Strings in C**
- **To explore how to use Pointers in C for various applications**

Write C Programs to implement the following,

1. Decision Making Statements (if, if-else, nested if, switch)
2. Looping Statements (for, while and do-while)
3. One Dimensional Array
4. Two-Dimensional Array
5. Function
6. String Handling Functions
7. Structure
8. Union
9. Pointers

PDCAP15- OFFICE AUTOMATION LAB Hours - 6 Credits - 5

Objectives:

- **To practice implementation of Table and Mail Merge in MS-Word**
- **To learn how to handle pictures and calculations in MS-Word**
- **To develop programming skills in MS-Excel**
- **To practice creation of database in MS-Excel**
- **To learn how to use Presentation software MS-PowerPoint**

MS WORD

1. Prepare Bio-data using Word
2. Design a Certificate using Word
3. Prepare a business letter and forward through Mail Merge
4. Design a Invitation using Word

MS EXCEL

5. Prepare an Excel sheet to perform sales analysis (Use Functions and Formula)
6. Prepare an Excel sheet to display the different Charts types for the given data
7. Prepare an Excel sheet and apply Filters on the given data.
8. Create Excel Database
9. Create Excel Macros

MS POWERPOINT

10. Create a PowerPoint presentation with all possible animation effects on the given topic

PDCAT21 - SOFTWARE ENGINEERING Hours - 6 Credits - 5

Objectives:

- **To understand the basic concepts of software**
- **To be expertise in Software Process Models**
- **To study about System analysis, DFD and data dictionary**
- **To know about various software, data designs**
- **To learn how to analyse, design and test a software**

UNIT I

The Evolving Role of Software – Software – The changing Nature of Software – Legacy software — A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) –Product and Process.

UNIT II

Process Models – The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models – Prototyping – The Spiral Model – The Concurrent Development Model

UNIT III

System Analysis-Requirement Analysis-Analysis Modeling Principles-Elements of Analysis Model-Data Modeling-Creating a Data Flow Model-Data Dictionary

UNIT IV

Software Design- Design Principles- Design Concepts- Effective Modular Design-Design Heuristics for Effective Modularity-The Design Model- Software Architecture- Data Design

UNIT V

Software Testing fundamentals – White Box Testing- Black Box Testing – Unit Testing- Integration Testing- Validation Testing- System Testing

TEXT BOOK:

1. Roger. S. Pressman, Software Engineering - A Practitioner's Approach, 7th Edition, McGraw Hill, 2010

REFERENCE BOOKS:

1. Rajib Mall, “Fundamental of Software Engineering “, 3rd edition, PHI, 2009.
2. Naseeb Singh Gill, “Software Engineering: Software reliability, testing and quality, Khanna Book Publishing, 2011.

PDCAT22 - INTERNET AND WEB TECHNOLOGY Hours - 6 Credits - 5

Objectives:

- **To gain knowledge of Internet and its components**
- **To learn about Search Engines and its different menu options**
- **To understand the various HTML Text formatting controls**
- **To study the Frames and Forms for effective web designing**
- **To be expertise with website creation using HTML controls**

UNIT I

Introduction to The Internet: Computer in Business - Networking - Internet - E-mail - Resource Sharing- Gopher - World Wide Web – Usenet- Telnet - Bulletin Board Service - Wide Area Information Service

UNIT II

Internet Technologies: Modem - Internet addressing - Physical connections - Telephone Lines: Leased Lines-Speed-Frame Relay-ISDN – Internet browsers - Internet Explorer - Netscape Navigator

UNIT III

Introduction to HTML: Designing a home page -History of HTML- HTML documents - Anchor tag - Hyper Links-Header- Title-Links- Web Page-Comment Lines-Paragraph- Images and Pictures

UNIT IV

Lists- Unordered Lists-Heading in a List-Ordered Lists- Nested Lists-Tables-Table creation-Width of the Table and Cell- Cell Spanning Multiple Rows/Columns-Coloring Cells- Column Specification- Frames-Frameset Definition -Frame Definition-Nested Framesets

UNIT V

Forms-Action Attribute-Method Attribute-Enctype Attribute-Drop Down List- DHTML and Style Sheets- Defining Styles-Elements of Styles-Linking a Style Sheet- Inline Styles-External Style Sheet-Internal Style Sheet

TEXT BOOK:

1. C Xavier, "World Wide Web Design with HTML", Tata McGraw Hill Publishing Company Ltd, 2000

REFERENCE BOOKS:

1. Pawel, Thomas A. HTML Complete Reference. New Delhi: Tata McGraw Hill,2010
2. H.M.Deital, P.J. Deital, "Internet and World Wide Web - How to Program", 4th Edition PHI Learning.

PDCAT23 -DESKTOP PUBLISHING (DTP) Hours - 6 Credits - 5

Objectives:

- **To familiarize the emerging trends in DTP**
- **To understand the significance of CorelDraw in designing**
- **To study the designing a document using PageMaker**
- **To design effectively using various tools in Photoshop**
- **To expose the real time applications of DTP tools**

UNIT I

Introduction-DTP-Letterpress Printing- Lithography and offset printing- hardware requirement- Software requirement-Text editors-Word Processors-Vector Illustration Applications-Bitmap Image Editing Applications- Page Layout Applications-Generic Process in Desktop Publishing

UNIT II

CorelDraw-Introduction- Opening – Dialog Box-Status Bar-Cartesian Coordinates-The Property Bar - Creating a Text File- Basic Terms-Toolbox-Page and Pasteboard- Standard Tool Bar-Handling Shapes using Property Bar

UNIT III

CorelDraw-Rotating Objects-Lines and Arrows-Page and Document Setup- Rulers, Guidelines and Grid- Using Dockers Windows- Using Text- Artistic Text-Paragraph Text-Formatting Text-Printing a Drawing- Arrangement of Objects

UNIT IV

Photoshop-Introduction-Opening-Saving-Closing an image-Creating a new image-using toolbox-Tool Option Bar-Using Layers-Fascinating colour -Inserting Text in images- Printing Images-Filters to improve the images

UNIT V

PageMaker-Creating a new publication- The Dialog Box- Text Blocks-Handling Pages-Using Tool Bar-Importing Text and Pictures- Wrapping Text around Pictures- Character-level formatting-Paragraph-level formatting-Using Story Editor- Using Styles

TEXT BOOK:

1. ShirishChavan, “Rapidex Desktop Publishing Course”, UNICORN Books Pvt. Ltd., 2007

REFERENCE BOOKS:

1. Learning Desk Top Publishing ,Bangia, Ramesh (2011).. Delhi : Khanna Book Publishing.
2. Comdex Desk Top Publishing, Gupta, Vikas (2004)..Delhi : Dream tech Press.
3. Sanjay Saxena,“A First Course in Computers”, Vikas Publishing House, 2005

PDCAP24 - DESKTOP PUBLISHING (DTP) LAB Hours - 6 Credits - 5

Objectives:

- **To be primed of Desktop Publishing**
- **To learn various facet of editing a picture using Coral Draw**
- **To practice designing and formatting images using Photoshop**
- **To practice about the designing and editing of books using page makers**
- **To learn how to design a Cards, Certificates and Pamphlet**

PHOTO SHOP

1. Create a Simple Photoshop page
2. Merge two picture into One Photoshop image
3. Write a name of picture on the picture
4. Apply additional effect on the photo

CORAL DRAW

5. Create a Brochures
6. Design a Friendship/ Business Card
7. Create a Logo

PAGE MAKER

8. Make an attractive visiting card of any titles (Subject) having size of 2" X 3.5" in Tall without layer.
9. Create an attractive book title of any given subject having size of 8" X 6" in Tall without layer.
10. Create an attractive poster of any given subject having size of 8" X 6" in Wide without layer.

PDCAP25 - WEB DESIGNING USING HTML LAB Hours - 6 Credits - 5

Objectives:

- **To be prepared of Web Designing**
- **To understand various aspects of designing a web page**
- **To practice creation of website with list and marquees**
- **To know how to create frames and forms in webpage**
- **To learn how to incorporate all elements in a webpage**

Design a Web Page by applying the following HTML Controls

1. head, title, body, H1, H2
2. Text formatting tags (Bold, Italic, Underline, etc.,)
3. Ordered List
4. Unordered list
5. Definition List
6. Marquee on Images
7. Font styles and body colors
8. Hyperlink
9. Tables
10. Frames
11. Forms
12. Style Sheets

Department of Business Administration

MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL

DEPARTMENT OF MANAGEMENT

BACHELOR OF BUSINESS ADMINISTRATION

SYLLABUS TO BE IMPLEMENTED FROM THE ACADEMIC YEAR 2021-2022 (CHOICE BASED CREDIT SYSTEM)

Mother Teresa Women's University, Kodaikanal
Department of Management
Choice Based Credit System (CBCS)
(2021-2022 onwards)
Bachelor of Business Administration

1. About the Programme

The Revised syllabus for BBA is recommended from the academic year2021– 2022 onwards. Regulations scheme of examinations and syllabus for BBA is based on UGC/TANSCHE guidelines under Choice Base Credit System (CBCS).The Bachelor's Degree in BBA is awarded to the student based on demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes, and values) and academic criteria expected of graduates at the end of the programme. Therefore, the learning outcomes of this particular programme are aimed at facilitating the students to acquire these attributes, keeping in view changes in the current socio-economic environment. The Learning Outcomes-based Curriculum Framework (LOCF) of BBA has been designed keeping in view the graduate attributes, qualification descriptors, programme learning outcomes, and course learning outcomes. The syllabus is framed to engage students through an all-encompassing knowledge impartation.

2. Programme Educational Objectives (PEOs)

PEO 1	Graduates will be capable of making a positive contribution to business, trade and industry in the national and global context
PEO 2	Graduates will be able to apply frameworks and tools to arrive at informed Decisions in profession and practice, striking a balance between business and social dimensions.
PEO 3	Graduates will have a solid foundation to pursue professional careers and take up higher learning courses such as MBA, M.Phil, PhD as well as research.
PEO 4	Graduates with a flair for self-employment will be able to initiate and build upon entrepreneurial ventures or demonstrate entrepreneurship for their employer organizations.
PEO 5	Graduates will recognize the need for adapting to change and have the aptitude and ability to engage in independent and life–long learning in the broadest context of socio-economic, technological and global change.

3. Eligibility :

Candidate should have passed the higher secondary examination or CBSE or other Equivalent examination from any schools.

3. General Guidelines for UG Programme

i. **Duration:** The programme shall extend through a period of 6 consecutive semesters and the duration of a semester shall normally be 90 days or 450 hours. Examinations shall be conducted at the end of each semester for the respective subjects.

ii. **Medium of Instruction:** English

iii. **Evaluation:** Evaluation of the candidates shall be through Internal Assessment and External Examination.

	Theory		Practical	
	Min	**Max**	**Min**	**Max**
Internal	**10**	**25**	**10**	**25**
External	**30**	**75**	**30**	**75**

- **Internal (Theory): Test (15) + Assignment (5) + Seminar/Quiz(5) = 25**
- **External Theory: 75**

- **Question Paper Pattern for External examination for all course papers.**

Max. Marks: 75 **Time: 3 Hrs.**

S.No.	Part	Type	Marks
1	**A**	**10*1 Marks=10** Multiple Choice Questions - 2 Questions from each Unit	**10**
2	**B**	**5*4=20** Two questions from each Unit with Internal choice (either / or)	**20**
3	**C**	**3*15=45** Open Choice- Any three Questions out of 5 - one Question from each Unit	**45**
Total Marks			**75**

*** Minimum credits required to pass :156**

- **Project Report**

A student should select a topic for the Project Work at the end of the third semester itself and submit the Project Report at the end of the fourth semester. The Project Report shall not exceed 75 typed pages in Times New Roman font with 1.5 line space.

- **Project Evaluation**

There is a Viva Voce Examination for Project Work. The Guide and an External Examiner shall evaluate and conduct the Viva Voce Examination. The Project Work carries 100 marks (Internal: 25 Marks, Viva: 75 Marks).

5. Conversion of Marks to Grade Points and Letter Grade (Performance in a Course/Paper)

Range of Marks	Grade Points	Letter Grade	Description
90 – 100	9.0 – 10.0	O	Outstanding
80-89	8.0 – 8.9	D+	Excellent
75-79	7.5 – 7.9	D	Distinction
70-74	7.0 – 7.4	A+	Very Good
60-69	6.0 – 6.9	A	Good
50-59	5.0 – 5.9	B	Average
40-49	4.0 – 4.9	C	Satisfactory
00-39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

6. Attendance

Students must have earned 75% of attendance in each course for appearing for the examination. Students with 71% to 74% of attendance must apply for condonation in the prescribed form with prescribed fee. Students with 65% to 70% of attendance must apply for condonation in the prescribed form with the prescribed fee along with the Medical Certificate. Students with attendance less than 65% are not eligible to appear for the examination and they shall re-do the course with the prior permission of the Head of the Department, Principal and the Registrar of the University.

7. Maternity Leave

The student who avails maternity leave may be considered to appear for the examination with the approval of Staff i/c, Head of the Department, Controller of Examination and The Registrar.

8. Any Other Information

In addition to the above mentioned regulations, any other common regulations pertaining to the UG Programmes are also applicable for this Programme.

PROGRAMME OUTCOMES:

PO1	Develop the knowledge, skill and attitude to creatively and systematically apply the principles and practices of management, accountancy, finance, business law, statistics, HR, operations and IT to management problems and work effectively in modern day business and non-business organizations.
PO2	Develop fundamental in-depth knowledge and understanding of the principles, concepts, values, substantive rules and development of the core areas of business such as finance, accounting, marketing, HR, operations along with the tools such as Tally, MS Excel, MS Office, etc.
PO3	Demonstrate the critical thinking mindset and the ability to identify and formulate research problems, research literature, design tools, analyse and interpret data, and synthesize the information to provide valid conclusions and contextual approaches across a variety of subject matter.
PO4	Exhibit self-confidence and awareness of general issues prevailing in the society and communicate effectively with the accounting, commerce, management, business, professional fraternity and with society at large through digital and non-digital mediums and using a variety of modes such as effective reports & documentation, effective presentations, and give and receive clear instructions.
PO5	Function effectively as an individual, and as a member or leader in teams, and in multidisciplinary settings by demonstrating life skills, coping skills and human values.

PROGRAMME SPECIFIC OUTCOMES:

PSO1	Get familiarized with the core concepts of Business and Management
PSO2	Able to apply leadership principles to manage in a diverse and global business environment
PSO3	Exposure to real business situations through field work, Industrial visits and projects
PSO4	Demonstrate the ability to identify and evaluate ethical business practices
PSO5	Develop Managerial and Job Readiness Skills to take up career in Corporates.

B.B.A CURRICULUM

Paper No.	Course Code	Course Title	Credits	Hours		CIA	ESE	Total
				T	P			
Semester I								
1	U21LTA11	Part I Tamil – I	3	6	-	25	75	100
2	U21LEN11	Part II English – I	3	6	-	25	75	100
3	U21BAT11	**Core-I** Fundamentals of Management	4	5	-	25	75	100
4	U21BAT12	**Core-II** Business Communication	4	5	-	25	75	100
5	U21BAA11	**Allied-I** Managerial Economics	4	6	-	25	75	100
6	U21EVS11	Environment Studies	2	2	-	25	75	100
7	U21PECM11	Professional English I	4	6	-	25	75	100
		Total	**24**	**36**				**700**
Semester II								
8	U21LTA22	Part I – Tamil – II	3	6	-	25	75	100
9	U21LEN22	Part II – English – II	3	6	-	25	75	100
10	U21BAT21	**Core-III** Financial Accounting	4	5	-	25	75	100
11	U21BAT22	**Core-IV** Business Environment	4	5	-	25	75	100
12	U21BAA22	**Allied-II** Computer Application - TALLY (Practical)	4	-	5	25	75	100
13	U21VAE21	Value Education	3	3	-	25	75	100
14	U21PECM22	Professional English II	4	6	-	25	75	100
		Total	**25**	**36**				**700**
Semester III								
15	U21LTA33	Part I Tamil – III	3	6	-	25	75	100
16	U21LEN33	Part II English – III	3	6	-	25	75	100
17	U21BAT31	**Core-V** Oraganisational Behaviour	4	5	-	25	75	100
18	U21BAA33	**Allied-III** Business Statistics	4	5	-	25	75	100

19	U21BAE31 U21BAE32	**Elective I-** Cost Accounting / Talent and Knowledge Management	3	4	-	25	75	100
20	U21CSS31	**Job oriented Course-SBE-I** Computer Skills for Office Management	2	-	2	25	75	100
21		NME - I	2	2	-	25	75	100
		Total	**21**	**30**				**700**
Semester IV								
22	U21LTA44	Part I – Tamil – IV	3	6	-	25	75	100
23	U21LEN44	Part II – English – IV	3	6	-	25	75	100
24	U21BAT41	**Core-VI** Research Methodology	4	4	-	25	75	100
25	U21BAT42	**Core-VII** Personality Development	4	4	-	25	75	100
26	U21BAA44	**Allied- IV**- GST Registration and Filing (Practical)	4	-	4	25	75	100
27	U21BAE41 U21BAE42	**Elective-II** Management Information System / Brand Management	3	3	-	25	75	100
28	U21MSS42	**Job Oriented Course-SBE-II-** Managerial Skills	2	2	-	25	75	100
29		NME-II	2	2	-	25	75	100
		Total	**25**	**31**				**800**
Semester V								
30	U21BAT51	**Core-VIII** Production Management	4	5	-	25	75	100

31	U21BAT52	**Core-IX** Management Accounting	4	5	-	25	75	100
32	U21BAT53	**Core-X** Marketing Management	4	5	-	25	75	100
33	U21BAT54	**Core- XI** Human Resource Management	4	5	-	25	75	100
34	U21BAT55	**Core-XII** Business Law	4	5	-	25	75	100
35	U21BAE51 U21BAE52	**Elective- III** Strategic Management / International Business	3	3	-	25	75	100
36	U21BAS53	**SBE III-** Entrepreneurship Development (Practical)	2	-	2	25	75	100
		Total	**25**	**30**				**700**
Semester VI								
37	U21BAT61	**Core-XIII** Financial Management	4	5	-	25	75	100
38	U21BAT62	**Core-XIV** Total Quality Management	4	5	-	25	75	100
39	U21BAT63	**Core-XV** Market Research	4	5	-	25	75	100
40	U21BAT64	**Core-XVI** E Commerce	4	-	5	25	75	100
41	U21BAT65	**Core-XVII** Skill Enhancement	4	5	-	25	75	100
42	U21BAE61 U21BAE62	**Elective- IV** Service Marketing / Consumer Behaviour	3	3	-	25	75	100
43	U21BAS64	**SBE-IV** Market Survey	2	-	2	25	75	100
44	U21EAS61	Extension Activities	3	-	-	100	-	100
		Total	**28**	**30**				**800**
		Grand Total	**148**	**193**				**4400**

Non Major Elective (NME)

1. NME-I- U21BAN31- (III Semester) - ESSENTIALS OF MANAGEMENT
2. NME-II -U21BAN42- (IV Semester) - PERSONALITY ENHANCEMENT

Additional Credit Courses

1. U21BAO31 - Online Course – III Semester,
2. U21BAI41 - Internship – IV Semester,
3. U21BAV51 - Value added course – V Semester- GENERAL APTITUDE & REASONING

SEMESTER-I

COURSE CODE	U21BAT11	FUNDAMENTALS OF MANAGEMENT	L	T	P	C
CORE -I			5	-	-	4
Cognitive Level		**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyse**				
Course Objectives		The course aims to 1. introduce students to the basic principles and practices of management. 2. build a base for learning management knowledge and to acquire prerequisite skills. 3. provide a basis of understanding to the students concerning working of a business organization through the process of management. 4. present new perspectives in management 5. examine and explain the management evolution and how it will affect future managers.				

Unit-1: Management:

Management: Definition – Nature – Scope – Importance – Process – Skills required of a manager – Administration Vs Management – Management functions – Theories of Management.

Unit–2: Planning

Planning: Nature and Importance – Principles and Process – Types of Plans –Steps in planning – Management by Objectives (MBO) – Decision making.

Unit-3: Organization:

Organization: Principles and process – Organization structure – Formal &Informal organization – Meaning of Delegation – Authority and Responsibility – Centralization and Decentralization

Unit-4: Direction and Control

Direction and Control: Meaning – Principles – Importance – Techniques – Control: Meaning – Objectives – Types of control – Control process – Control techniques – Coordination: Need – Techniques.

Unit-5: Motivation & Leadership

Motivation & Leadership: Meaning – Types – Theories of Motivation: Maslow, Herzberg, X, Y Theories – Leadership: Meaning – Styles.

Text Book:

1. K.Natarajan&K.P.Ganesan, Principles of Management, Himalaya Publishing House, 2015.

Reference Books:

1. C.B.Gupta, Management Theory &Practice, S. Chand Company, 2017.
2. Koontz and O'Donnell, Principles of Management, Tata McGraw Hill Publication, 2004.
3. L.M. Prasad, Essentials of Management, S. Chand Company, 2015.
4. P.C. Tripathi and P.N.Reddy, Fundamentals of Management, McGraw Hill Education, 2017.
5. R.S.N.Pillai and S.Kala, Principles and Practice f Management, S. Chand Company, 2013.

Note: Question Paper shall cover 100% Theory

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	examine and explain the management evolution and how it will affect future managers.	K1
CO2	estimate the conceptual framework of planning and decision-making in day to day life.	K2
CO3	explain the various managerial functions to achieve the goals and objectives of the organization.	K1
CO4	analyze the theories of motivation, leadership and communication in a variety of circumstances and management practices in organizations.	K4
CO5	identify and explain the importance of the management process and identify some of the key skills required for the contemporary management practice.	K3

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze;

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	S	S	S	S	M
CO2	M	S	M	S	S	S	M	S	S	S
CO3	S	S	M	M	S	S	M	M	M	S
CO4	S	M	S	S	S	M	S	S	S	S
CO5	S	S	S	S	M	S	S	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAT12	BUSINESS COMMUNICATION	L	T	P	C
CORE -II			5	-	-	4
Cognitive Level	**K3: Apply** **K4: Analyse** **K6: Create**					
Course Objectives	The course aims to 1. understand the concept, process and importance of communication. 2. gain knowledge of media of communication. 3. develop skills of effective communication – both written and oral. 4. acquaint with the application of communication skills in the business world. 5. learn the appropriate ways to meet industry standards; apply critical evaluation techniques to business documents.					

Unit-1: Introduction to Communication

Introduction to Communication: Definition of Business Communication – Difference between communication & Business Communication, Business Communication - Objectives, Importance – Process of Communication – Principles of Effective Communication – Barriers of Communication – Communication Ethics.

Unit–2: Types of Communication

Types of Communication**:** Formal and Informal Communication, Inter – Personal and Intrapersonal Communication – Verbal Communication and its types – Non –Verbal Communication and its types.

Unit-3: Business Correspondence:

Business Correspondence: Need – Functions – Importance – Layout of business letter.

Unit-4: Letter Writing

Letter Writing:Letters relating to Enquiries and Replies – Order and Execution – Circular – Sales Letter.

Unit-5: Report Writing

Report Writing: Meaning – Types – Mechanics of Report writing – Content of Report.

Text Book:

1. Rajendra Pal, J.S.Korlahalli, Essentials of Business Communication, S. Chand Company, 2013

Reference Books:

1. Paten Shetty, R., Business Communication, S.Chand& Company, 2019.
2. Hory Sankar Mukarjee, Business Communication, Oxford University Press, 2016
3. PayalMehra, Business Communication for Managers, Pearson Education India, 2016.
4. Meenashi Raman, Business Communication, Oxford Publication,2012

Note: Question Paper shall cover 100% Theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level** (According to Bloom's Taxonomy)
CO1	learnand apply effective written communication techniques.	K3
CO2	reviewand refine communications skills.	K4
CO3	developand deliver effective presentations of letters.	K6
CO4	developand draft circulars.	K6
CO5	developskills in report writing.	K6

K3 - Apply; K4 - Analyze; K6 – Create

Mapping of COs with POS & PSOs

CO/ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	S	S	S	M	S	S	M
CO2	S	M	S	M	S	S	S	S	S	S
CO3	S	S	S	S	S	M	S	S	M	S
CO4	S	S	S	S	M	S	S	M	S	S
CO5	M	S	M	S	S	S	S	S	S	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21BAA11	MANAGERIAL ECONOMICS	L	T	P	C
ALLIED-I			6	-	-	4

Cognitive Level	**K2: Understand** **K4: Analyse** **K5: Evaluate** **K6: Create**
Course Objectives	The Course aims to 1. expose basic micro economic concepts. 2. apply economic analysis in the formulation of business policies. 3. use economic reasoning to problems of business. 4. build a wide knowledge about basic Indian economic system. 5. identify the effective applications of factors of production and BEP Analysis

Unit 1: Managerial Economics

Managerial Economics: Definition, Nature and Scope - Role of Managerial Economics – Concept of Utility – Law of Diminishing Marginal Utility

Unit 2: Theory of Demand:

Theory of Demand: Determinants – Law of demand – Demand functions – Demand curve – Types of demand – Elasticity of demand – Supply: Law of supply – Elasticity of supply.

Unit 3: Production Function

Production Function:Laws of Production function – Law of Variable Proportion – Isoquants – Marginal rate of substitution – Economies of Scale – Law of Returns to Scale – Cobb Douglas Production function.

Unit 4: Cost Concepts

Cost Concepts**:** Cost and output relationship – Total, Average and Marginal cost analysis – Short run and Long run – Break even analysis.

Unit 5: Market Structure

Market Structure: Different types of market – Pricing under Perfect competition – Monopoly: Meaning – Methods of pricing.

Text Book:

1. R.L. Varshhney& K.L. Maheswari, Managerial Economics, S. Chand, 2018

Reference Books:

1. S.Sankaran, Managerial Economics, Margham Publication, 2015
2. K.P.M. Sundaram, Economic Analysis, S.Chand Company, 2015
3. G.S. Gupta , Managerial Economics, McGraw Hill Education, 2012.
4. VanithaAgarwal, Managerial Economics, Pearson Education, 2013

Note: Question Paper shall cover 100% Theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level** (According to Bloom's Taxonomy)
CO1	understandthe concepts of utility	K2
CO2	applythe objectives of business firms, demand analysis and elasticity of demand in daily life and their career.	K6
CO3	understandthe production function.	K2
CO4	identify the effective applications of factors of production and BEP Analysis	K4
CO5	evaluatethe performance of different market structures.	K5

K2 – Understand; K4 - Analyze; K5 - Evaluate; K6 – Create

Mapping of COs with POS & PSOs

CO/ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	M	S	S	S	S	M	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	M	M	S	S	S	M	M	S	S
CO4	M	S	M	S	M	M	S	M	S	M
CO5	S	S	S	S	M	S	S	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

SEMESTER- II

COURSE CODE	U21BAT21	FINANCIAL ACCOUNTING	L	T	P	C
CORE –III			5	-	-	4

Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply** **K5: Evaluate**
Course Objectives	The Course aims to 1. acquire knowledge of accounting concepts, principles and practices. 2. apply financial concepts in business administration to manage and be effective in decision making in functional areas like finance and accounting transactions. 3. provide wide knowledge about final accounts. 4. inculcate basic depreciation accounting concepts. 5. illustrate the accounts for non-trading institutions through income and expenditure, receipts and payments accounts.

Unit 1: Accounting

Accounting: Definition – Nature of Accounting – Accounting Concepts and Postulates –Double Entry Vs Single entry – Books of Accounts: Journal – Ledger – Subsidiary Books: Cashbook – Purchase book – Sales book – Sales return book – Purchase return book.

Unit 2: Rectification of Errors

Rectification of Errors**:** Trial Balance – Errors – Verifications of Errors – Bank reconciliation statement.

Unit 3: Final Accounts

Final Accounts: Preparation of Trading & Profit and Loss Account and Balance Sheet with simple adjustments.

Unit 4:Depreciation:

Depreciation: Meaning – Causes – Methods of Depreciation: Straight Line Method – Written Down Value Method – Annuity Method.

Unit 5:Capital and Revenue Account

Capital and Revenue Account: Accounts of Non-trading organizations – Income and Expenditure Account – Receipts and Payments Account

Text Books

1. Dr. S. N. Maheswari, Financial Accounting, Vikas Publishing House, 2018

Reference Books:

1. S.P.Jain&K.L.Narang, Advanced Accountancy, Kalyani Publishers, 2014
2. M.C.Shukla, T.S.Grewal&S.C.Gupta, Advanced Accountancy, S.Chand& Sons, 2016
3. R.L.Gupta&Radhasamy, Advanced Accountancy, S.Chand& Sons, 2014
4. P.C.Tulsian, Financial Accounting, S.Chand Publications, 2016

Note: Question Paper shall cover 40% Theory and Problems 60%

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level** (According to Bloom's Taxonomy)
CO1	recall the accounting concepts and understand the rules of the double entry system, journalizing and posting to the ledger in the business transactions.	K1
CO2	interpret the trial balance; identify the errors and reconcile the bank statement by cash book.	K2
CO3	summaries the trading, profit & loss account and balance sheet with the support of financial and accounting transactions.	K5
CO4	illustrate the different methods of depreciation.	K3
CO5	classify the revenue and capital items, understand accounting statements of a non-trading concern	K2

K1 - Remember; K2 - Understand; K3 - Apply; K5 - Evaluate

Mapping of COs with POS & PSOs

CO/ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	M	S	M	S	S	M	S	M
CO3	M	S	S	S	S	S	S	S	S	S
CO4	S	S	S	S	S	S	S	S	S	S
CO5	S	S	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21BAT22	BUSINESS ENVIRONMENT	L	T	P	C
CORE -IV			5	-	-	4

Cognitive Level	**K2: Understand** **K3: Apply** **K4: Analyse**
Course Objectives	The Course aims to 1. familiarize the nature of the business environment and its components in business decision making. 2. increase the awareness of the interconnected nature of today's world, and how economic, social, political and environmental issues can impact international integration and business. 3. impart the environmental scanning skills to identify the business opportunity and challenges. 4. analyze and interpret the current events relating to globalization and international business. 5. analyze the various economic conditions and effects of government policy on business performance.

Unit 1:Business Environment

Business Environment: Meaning – Concept – Nature – Significance – Various environments affecting Business: Social economic political and legal, culture, competitive, demographic, technological and their impact in business.

Unit 2:Government & Political Environment

Government & Political Environment: Government and business relationship in India – Provision of Indian constitution about business – State regulations on business.

Unit 3:Society and Culture Environment

Society and Culture Environment: Culture – Elements of culture – Impact of a foreign culture – Joint family system. Social responsibilities of Business – Responsibilities of share holders, customers, community, and the government.

Unit 4:Economic Environment

Economic Environment: Economic system, Socialism – Capitalism – Mixed economy –their impact on business– Public sector, Private sector, Joint sector–Objectives, Growth of Public sector in India.

Unit 5:Legal and Technological Environment

Legal and Technological Environment: Industrial Licensing Policy 1991 – FEMA –SEBI – TRIP's – WTO – GATT – Impact of technological changes in business.

Text Books:

1. Aswathappa K, Essentials of Business Environment, Himalaya Publishing House, 2017

Reference Books:

1. Francis Cherunilam, Business Environment, Himalaya Publishing House, 2017
2. Dr .S. Sankaran, MargamBusiness Environment, Himalaya Publishing House, 2013
3. NamithGopal, Business Environment, Tata McGraw Hill Education , 2010
4. Ghosh P.K, Business Environment, S. Chand & Sons, 2010
5. Rosy Joshi, Business Environment, Kalyani Publication, 2019

Note: Question Paper shall cover 100% Theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level** (According to Bloom's Taxonomy)
CO1	develop an understanding of the business environment	K2
CO2	explain the Government and political environment	K2
CO3	understand the relations of society and culture to the business	K3
CO4	comprehend the economical environmental factors that are conducive to the businesses	K4
CO5	have a simple and basic comprehension of the international scenario about the borderless business world due to technological changes	K2

K2 - Understand; K3 - Apply; K4 - Analyze;

Mapping of COs with POS & PSOs

CO/ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	S	M	S	S	S	S	M	S	S	S
CO2	M	S	S	S	S	M	S	S	S	S
CO3	S	S	S	M	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	S	S	S	S	M	S	S	S	S	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21BAA22	COMPUTER APPLICATIONS-TALLY (PRACTICALS)	L	T	P	C
ALLIED –II			-	-	5	4
Cognitive Level	**K2: Understand** **K3: Apply** **K4: Analyse** **K5: Evaluate**					
Course Objectives	The course aims to 1. help the students to know the fundamental concepts of Tally . 2. help them to understand how to use Tally software in day to day applications. 3. familiarize the students to use this package for business. 4. introduce the students to some basic tools like creation of voucher, purchase order etc. 5. familiarize the students in the preparation of tax related sales vouchers.					

UNIT 1: Introduction to Tally

Introduction to Tally – Selecting a Company- Shutting a Company – Altering a company – Accounting Information – Groups – Managing Groups – Single & Group - Ledgers.

UNIT 2 : Creation of Vouchers

Vouchers - Creating Vouchers - Displaying and Altering Vouchers - Control Vouchers -Purchase Vouchers - Sales Vouchers - Payment – Receipt and Journal Vouchers – Bank Reconciliation Statement.

UNIT 3 : Inventory Management

Inventory Management - Stock Groups - Stock Categories - Stock Items - Types of Inventory Vouchers - Receipt Note Vouchers.

UNIT 4: Purchase and Sales order

Purchase Orders – Creation of a Purchase Order – Altering a Purchase Order – Deleting a Purchase Order-Sales Orders- Deleting a Sales Order- Invoices Reports- Trial Balance - Profit and Loss A/C Balance Sheet.

UNIT 5: Financial Statements

Pay Roll in Tally – Collected at Source – Tax Deducted at Sources – various financial statements – Budget - GST.

Note**: Question Paper shall cover 100% practical work**

Practical work:

1. Program for Creation of company
2. Program for purchase voucher and sales voucher creation
3. Program for payment voucher and Receipt voucher creation
4. Program for Contra voucher creation
5. Program for journal voucher creation
6. Program for preparation of Debit note and credit note
7. Program for working for a calculator
8. Program for Single-ledger and multiple ledger creation
9. Program for single ledger and Multiple ledger
10. Program for preparation of Trial balance
11. Program for preparation of final accounts of a sole-trader
12. Program for preparation of final accounts of a partnership firm
13. Program for preparation of final accounts of a company
14. Program for single stock and multiple stock creation
15. Program for simple and compound unit
16. Program for display on inventory transaction
17. Program for cash flow and fund statement preparation
18. Program for display of ratio Analysis
19. Program for monthly wise chart preparation of sales and purchase
20. Program for Comparative analysis statements

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level** (According to Bloom's Taxonomy)
CO1	use Tally to create personal business documents following current professional and/or industry standards.	K2
CO2	create scientific and technical documents incorporating the billing procedures	K2
CO3	develop entries for creation of vouchers.	K3
CO4	Design bills for implementation of taxation aspects.	K4
CO5	design and construct financial statements after considering taxes and GST.	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	S	S	S	S	M
CO2	S	M	S	S	S	S	M	S	S	S
CO3	S	S	S	M	S	S	S	S	M	S
CO4	S	S	M	S	S	S	S	M	S	S
CO5	M	S	S	S	S	M	S	S	S	S

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

SEMESTER- III

COURSE CODE	U21BAT31	ORGANISATIONAL BEHAVIOUR	L	T	P	C
CORE -V			5	-	-	4
Cognitive Level	**K2: Understand** **K4: Analyse** **K5: Evaluate**					
Course Objectives	The Course aims to 1. gain a solid understanding of human behaviour in the workplace from an individual, group, and organizational perspective and frameworks and tools to effectively analyze and approach various organizational situations. 2. familiarize students with contemporary organizational behaviour theories and help them to understand predict and manage people better. 3. acquaint the students with the fundamentals of managing a business. 4. understand individual and group behaviour at work place to improve the effectiveness of an organization.					

Unit 1: Introduction
Meaning- Objectives, Nature and Scope of organizational behavior – Importance of OB - Disciplines contribution to organizational behavior –Theories of organization behavior –Classical – Neo classical and Modern theories.

Unit 2:Foundations of Individual Behavior
Nature of Individual behavior –Personality – Definition -Factors/Determinants of Personality– Types of Personality –Attitude and Values.

Unit 3:Leadership Concept–Qualities **Conflict** of effective Leadership–Leadership Styles– Definition and concepts of Learning.

Unit 4:Motivation
Theories and Process of Motivation – Basic Theories of Motivation. Groups- Types of groups – formation of Group - Group dynamics – Group cohesiveness – Group decision making

Unit 5:Conflict
Nature, Types of Conflict. Organizational Change – Meaning, nature – Causes of change – Resistanceto change –overcoming the resistance.

Text Books:

1. L M. Prasad, Organisational Behaviour - Sultan Chand &Sons, New Delhi, 2014

Reference Books:

1. Stephen P.Robins, Organizational Behavior,- Pearsons Education, 2014
2. Aswathappa, Organizational Behavior- Himalaya Publishing House, 2012
3. Dr.C.D.Balaji, OrganisationalBehaviour, Margham Publication, 2016
4. Uma Samkar, OrganisationalBehaviour, Tata McGraw Hill Publication, 2013
5. J. Jayasankar, OrganisationalBehaviour, Margham Publication, 2015

Note: Question Paper shall cover 100% Theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level (According to Bloom's Taxonomy)**
CO1	understand the implications of organizational behaviour on the process of management	K2
CO2	analyze the individual behaviour and Identify the Determinants of Personality	K4
CO3	know about the qualities of leadership	K2
CO4	understand the theories of motivation	K2
CO5	evaluatethe organizational change.	K5

K2 - Understand; K4 - Analyze; K5 - Evaluate;

Mapping of COs with POs& PSOs

CO/ PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	M	M	S	S	S	S	S	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	M	S	M	M	M	S	S	S	S	S
CO4	M	M	M	M	M	M	M	M	M	M
CO5	M	M	S	M	S	S	M	S	S	S

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAA33	BUSINESS STATISTICS	L	T	P	C
ALLIED-III			5	-	-	4

Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyse** **K5: Evaluate**
Course Objectives	The Course aims to 1. understand the concept of population and sample. 2. usea frequency distribution to make a decision. 3. understand and to calculate various types of averages and variations. 4. use regression analysis to estimate the relationship between two variables.

Unit 1:Business Statistics

Introduction to statistics, Nature, Scope, Importance, Types and limitations of statistics.

Unit 2:Statistical Tabulation

Classification and tabulationofstatisticaldata–Diagrammaticandgraphicalrepresentation of data.Frequency distribution–Simple–Average.

Unit 3:Mean, Median, Mode

Calculation of Mean, Median, Mode – Standard Deviation (Individual only)

Unit4 :Sampling

Types of Samples– use of sampling in Business– Probability– Addition and Multiplication laws.

Unit 5:Correlation

Karl Pearson's Rank and Correlation co-efficient

Note: Question Paper shall cover 40% Theory and 60 % Problems

Text Book:

1. R.S.N.Pillai and Bagavathi, Statistical Methods –S.Chand& Sons, 2017

Reference Books:

1. S.P.Gupta, Statistical Methods,S.Chand& Sons, 2017
2. J.K.Sharma, Business Statistics, Vikas Publishing House, 2014
3. Dr.K.L. Gupta, Business Statistics, SahityaBhawan Publications, 2020

Expected Course Outcomes:

On the successful completion of the course, student will be able to

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	know the basic concepts of statistics	K1
CO2	apply the data presentation tools of statistics	K3
CO3	evaluate the measures of statistics	K5
CO4	understand and compute the sampling distributions	K2
CO5	summarize methods of correlation analysis	K4

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	M	M	S	M	S	M	M
CO2	S	S	S	M	M	M	S	S	S	M
CO3	M	M	M	M	M	S	S	M	M	S
CO4	M	S	S	M	M	S	S	M	S	M
CO5	M	M	S	M	M	S	S	S	S	S

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAE31	COST ACCOUNTING	L	T	P	C
ELECTIVE - I			4	-	-	3

Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyse** **K5: Evaluate**
Course Objectives	The Course aims to 1. impart the knowledge of basic cost concepts, elements of cost & preparation of cost sheet. 2. provide basic knowledge of important methods & techniques of cost. 3. introduce the basics of cost accounting and enabling the student to correlate the two branches namely financial and cost accounting. 4. build a base for learning management accounting.

Unit 1:Cost Accounting

Meaning, Nature and Scope of Cost Accounting – Concept and Classification of Cost–Elements and Methods of Cost – Advantages–limitations –Relationship of Cost Accounting and Financial Accounting–Preparation of Cost Sheet.

Unit 2:Materials Control

Meaning – Objectives – Advantages - Methods of Stock Control –EOQ - Levels of Stock–Receipts and Issues of materials–ABC Analysis –Stores Ledger–FIFO,LIFO, Simple Average and Weighted Average Method.

Unit 3:Labor cost

Methods of Remuneration and Incentive Schemes – Methods of wage payment –Time rate and Piece rate system – Labor Turnover Causes, Types and Measurement.

Unit 4:Overhead Cost

Collection, Classification, Allocation, Apportionment and Absorption – Recovery Rates – Over and Under Absorption-Machine Hour Rate

Unit 5:Process Costing

Normal Loss, Abnormal Loss and Abnormal Gains (excluding Equivalent Production and Inter process). Preparation of cost sheets (Simple problem only)

Text Books:

1. R.S.N. Pillai and V. Baghavathi, CostAccounting, S. Chand & Company Ltd., 2010

Reference Books:

1. S.N .Maheshwari, Cost Accounting, Sultan Chand & Sons, 2015
2. S.P. Jain and K.L. Narang, Cost Accounting Principles and Practice, Kalyani Publishers, 2019
3. M.N. Arora, Cost Accounting, Vikas Publication, 2013
4. Dr. Ramachandran and Dr. Srinivasan, Cost Accounting, Sriram Publication, 2019

Note: Question Paper shall cover 40% Theory and 60% Problems

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	understand the concept of cost accounting, Recognize the relationship of cost and management accounting along with the elements of cost concepts.	K2
CO2	describe the cost sheets for store control through economic order quantity, pricing and material issues.	K5
CO3	describe the methods of Remuneration and Incentive Schemes to labours	K5
CO4	understand the Collection, Classification, Allocation, Apportionment and Absorption of overheads.	K2
CO5	apply the process costing and preparation of cost sheet	K3

K2 - Understand; K3 - Apply; K5 - Evaluate;

Mapping of COs with POs& PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	M	M	M	M	S	S	S
CO2	M	S	S	S	M	S	M	M	M	M
CO3	S	M	M	M	M	S	S	S	M	S
CO4	M	M	M	M	M	M	M	M	M	M
CO5	M	S	S	M	M	M	M	S	M	M

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURS ECODE	TALENT AND KNOWLEDGE MANAGEMENT	L	T	P	C
ELECTIVE		4	-	-	3
Cognitive Level	K2-Understand; K3-Apply; K4-Analyse K5-Evaluate;				
Course Objectives	The Course aims to 1. offer knowledge on various approaches to talent and knowledge management 2. understand institutional strategies and models for dealing with talent and knowledge management. 3. evaluate mechanism and systems knowledge infrastructure. 4. apply organizational performance knowledge discovery systems				

UNIT –1 : INTRODUCTION TO TALENT MANAGEMENT :

Talent Management – Meaning, Importance, Evolution, Talent Management System, Talent Reservoir – Components . Institutional Strategies for dealing with Talent Management.

UNIT –2 : SUCCESSION AND CAREER PLANNING :

Succession Planning, Talent Acquisition, Talent Identification, Talent Development, Training Coaching, Talent management Strategies. Role of leaders in Talent Management.

UNIT – 3 : KNOWLEDGE MANAGEMENT :

Concepts, Forces driving knowledge management, knowledge systems, knowledge strategies, technologies for knowledge management, factories influencing knowledge management

UNIT –4: NATURE OF KNOWLEDGE :

Data information knowledge Wisdom, use of knowledge, types of knowledge, knowledge management solutions , mechanism and systems knowledge infrastructure.

UNIT – 5 : KNOWLEDGE FRAME MANAGEMENT :

Knowledge management frame Handsnon – earl's sever schools of knowledge management. Alvesson & Karreman's knowledge management approaches, knowledge management approaches. Knowledge management infrastructure organizational. Impact of knowledge management on people process, products on organizational performance knowledge discovery systems.

SUGGESTED BOOKS :

1. Ed by Lance A. Berger and Dorothy R Berger. –The Talent Management Handbook‖, Tata McGraw Hill edition, 2011.
2. Sajjad M Jasmuddin, –Knowledge Management‖,Cambridge,1st ed, 2009
3. Stuart Barnes, ―Knowledge Management Systems‖, Ed, Cengage Learning, 2012.
4. Irma Becerra-Fernandez, Avelino Gonzalez and Rajiv Sabherwal ―Knowledge Management‖, Pearson Education Inc. 2009
5. Donald Hislop, ―Knowledge management in Organizations‖, , Oxford University Press, Second edition. 2010.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

Number	Course outcome	Knowledge Level(According to Bloom's Taxonomy)
CO1	understand the concept Branding & Brand Awareness, Equity	K2
CO2	help the students acquire knowledge on Brand Advertisement	K5
CO3	know pros and cons of brand extension	K5
CO4	Analyse Brand personality and equity	K4
CO5	Develop the critical and analytical skills of students in brand	K3

K2-Understand; K3 -Apply; K4: Analyse K5 -Evaluate;

Mapping of Cos with Pos & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	M	S	M	M	S	S	S
CO2	M	S	S	S	S	S	M	S	S	S
CO3	S	M	M	S	M	S	S	S	M	S
CO4	M	S	S	S	S	M	S	M	S	M
CO5	S	S	S	M	M	S	M	S	S	M

Strongly Correlating (S)	-	3marks
Moderately Correlating (M)	-	2marks
Weakly Correlating(W)	-	1mark
No Correlation (N)	-	0mark

IV SEMESTER

COURSE CODE	U21BAT41	RESEARCH METHODOLOGY	L	T	P	C
CORE -VI			4	-	-	4

Cognitive Level	**K2: Understand** **K3: Apply** **K4: Analyse**
Course Objectives	The course aims to 1. educate the students about the basic research methodologies, design and applications. 2. make them identify and prepare a research proposal or problems through review of the literature. 3. familiarize students in the area of sampling, data collection and application of statistical tools in business research. 4. cultivate the skills needed to prepare and present research reports.

Unit 1:Introduction to Research

Introduction to Research: Definition - Importance - Advantages and Limitations – Types: Basic and Applied, exploratory, descriptive and causal - Phases of business research - The research process – problem identification

Unit 2:Research Design

Research Design: Types of Design - Sampling process and selection - sample types –Sample size and sampling errors

Unit 3:Methods of Data Collection

Methods of Data Collection :methods - tools - Questionnaire – Interview Schedule - Kinds of Data –Primary data, Secondary data - Attitude measurement of scaling technique - Editing, Coding, Tabulation, Analysis Interpretation of data

Unit 4:Statistical Data Analysis

Statistical Data Analysis: Tools and Techniques of data analysis – Hypothesis – its sources –formulation and testing of Hypothesis

Unit 5:Interpretation and Report writing

Interpretation and Report writing: Drafting of reports – Contents of a report - steps in writing reports - layout of report, types, and principles of report writing – Graphical representation ofresults.

Text Books

1. C.R. Kothari, Research Methodology, New Age International Publishers, 2014

Reference Books:

1. R. Cauvery, Research Methodology, S. Chand& Co, 2013
2. Shraddha M. Bhome, Research Methodology, Himalaya Publishing House, 2015
3. Peer Mohamed, Research Methodology -, Pass Publications, 2011.
4. Dr. P. C. Tripathi, Research Methodology in Social Sciences, S. Chand& Co, 2012

Note: Question Paper shall cover 80% Theory and 20 % Problems

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	Understand the fundamental concepts of research, types and research process.	K2
CO2	summarize the sampling design and scaling techniques.	K2
CO3	construct a method for data collection and able to edit, code, classify and tabulate the collected data.	K3
CO4	analyze the collected data to prove or disprove the hypothesis.	K4
CO5	interpret the data and prepare a research report.	K3

K2 - Understand; K3 - Apply; K4 - Analyze;

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	M	M	S	M	S	S	M
CO2	M	M	S	M	M	M	M	S	S	M
CO3	S	M	S	M	M	M	M	S	S	M
CO4	S	M	S	M	M	M	M	S	S	M
CO5	S	S	S	S	M	M	M	S	S	S

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAT42	PERSONALITY DEVELOPMENT	L	T	P	C
CORE -VII			4	-	-	4
Cognitive Level	**K2: Understand** **K3: Apply** **K5: Evaluate** **K6: Create**					
Course Objectives	The Course aims to 1. encourage students to develop balanced self-determined behaviour 2. help students in enhancing self, increasing life satisfaction and improving the relationship with others. 3. develop problem-solving skills in a group and use these skills in personal life. 4. encourage students to develop their personality by understanding the influence of environmental, educational and situational factors and how to modify the behaviour					

Unit 1: Introduction Definition of Personality – Determinants of personality – biological, psychological and socio- cultural factors– Misconceptions and clarifications, need for personality development.

Unit2: Self Awareness and Self Motivation

Self- analysis through SWOT and Johari Window, elements of motivation – Seven rules of motivation – Techniques and strategies for self-motivation–goal setting based on principles of SMART –self-esteem.

Unit 3: Interpersonal Skills

Concept of team in work situation–promotion of team spirit–characteristics of team player – awareness of one's own leadership style and performance – nurturing leadership qualities– Emotional intelligence and its components –Empathy and social skills .

Unit 4: Memory and Study Skills

Definition and Importance of memory – causes of forgetting –how to forget? (Thought stopping), how to remember? (Techniques for improving Memory) – Techniques of passing Exams – Management of Examination fear.

Unit 5: Power of Positive Thinking

Nurturing creativity–decision making and problem solving– thinking power–seven steps for dealing with doubt –Traits of positive thinkers and high achievers, goals and techniques for positive thinking– enhancement of concentration through positive thinking–practicing positive lifestyle.

Note: Question Paper shall cover 100 % theory

Text Books:

1. Schafer, W, Stress Management for Wellness , Thomson & Wadswoth, 2011.

Reference Books:

2. Johnson, D.W., Boston, Reaching out - Interpersonal Effectiveness and Self Actualization, Allyn and Bacon, 2010.
3. Robbins, S. P. and Hunsaker, Phillip, L., Training in Interpersonal skills. Tips for managing people at work, PHI Learning, 2014.
4. Barun K .Mithra, Personality Development and Soft Skills, Oxford University Press, 2016

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	understand the determinants of personality	K2
CO2	apply the basic Theories of Motivation	K3
CO3	understand the Career Planning	K2
CO4	evaluate the memory skills	K5
CO5	create a positive thinking	K6

K2 - Understand; K3 - Apply; K5 - Evaluate; K6 – Create

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	S	M	S	S	M	S	S	S
CO2	M	M	M	S	S	S	S	S	S	M
CO3	M	M	S	S	M	S	M	M	M	S
CO4	M	M	S	S	M	M	S	S	S	M
CO5	S	M	S	M	M	S	S	M	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (W) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	U21BAA44	GST REGISTRATION AND FILING (PRACTICAL)	L	T	P	C
ALLIED -IV			-	-	4	4
Cognitive Level	**K2: Understand** **K3: Apply** **K5: Evaluate**					
Course Objectives	The Course aims to 1. provide students with a working knowledge of principles of GST 2. assist the students to understand the provisions of GST 3. make the students understand the relevance of GST in the present Indian Tax Scenario 4. educate the students to aware of the contribution of GST for economic development.					

Unit 1: Indirect Tax

Indirect Tax :Meaning, Features, difference between direct & Indirect Tax Types of indirect tax before GST, Shortcoming of Indirect Tax system during pre GST Era. **GST:** Meaning, advantages, disadvantages, Evolution of GST, Structure of GST: CGST/IGST/SGST/UTGST, Important definition under GST Act. **Machinery under GST:** GST council, GST network, GST Authority.

Unit 2: Concept of Supply

Concept of Supply: Meaning, Features, Types:, Inter -state, intra- state, mixed composite, exempt supply. **Time of supply (TOS)**: Meaning, TOS of Goods & Services, TOS under Reverse Charge Mechanism, Invoicing provisions, provisions related with changes in GST rate. **Place of Supply (POS):** Meaning, POS of goods & service, intra state & Inter State supply. **Value of Supply:** Meaning, provisions related with determination of value of supply of goods & services, determination of GST liability.

Unit 3: Input Tax credit (ITC):

Input Tax credit (ITC):Meaning**,** manner of utilization of ITC, Block credit, supply not eligible for ITC, Matching, reversal & Reclaim of ITC. **Payment under GST:** Manner of Payment of GST liability, concept of Electronic Cash, credit & liability ledger, refund of excess GST. **Return:** Meaning, purpose & Importance, different type of return, due date of filing return. **Assessment under GST:** Meaning, types-self assessment, provisional assessment, summary assessment, best judgment assessment.

Unit 4: Registration

Registration :Meaning, optional registration, compulsory registration, procedure for new registration, amendment & cancellation of registration. **Composition Scheme:** condition and restriction for composition scheme.

Unit 5: Accounts & Records

Accounts &Records :Manner of maintenance of accounts, period of retention of relevant records,
Invoice: format, types- debit & credit note, vouchers.
Audit: meaning, types-mandatory, departmental & special audit. Penalty under GST, E-way bill.

List of Exercises

1. Draw a chart showing tax structure in India.
2. Draw a chart and write a note on Pre – GST indirect tax structure in India.
3. Write any five limitations of Pre – GST Indirect taxes.
4. What was the significance of Introduction of VAT in Indirect Taxes prior to implementation of GST. Write a short note.
5. Need for GST in India.
6. What are the important stages in implementation of GST.
7. What were the taxes subsumed in GST.
8. Visit CBIC Website and make a note of important contents.
9. What is the major difference in incidence of tax during pre and post GST implementation with respect to inter- state transfer. Explain with example.
10. What are the exclusive products not included in the purview of GST. Why?
11. When GST council was notified and what is its composition.
12. What are different types of taxes levied under GST.
13. What are the laws supporting the levy of GST. Explain with examples or rules.
14. What is RNR?
15. What are the categories of Goods and Services for levying GST?
16. Briefly explain the important components of Supply.
17. What activities are included in supply?
18. Brief registration process of GST.
19. Ram Enterprises purchased goods from Shyam Enterprises. The goods were supplied on15/01/2018.Ram Enterprises paid an advance of Rs.1,00,000 for purchases on 10/01/2018. The invoice was raised on 30/01/2018. Explain with respect to supply.
20. Mr. Y was travelling from Hyderabad to Bengaluru on flight. During his journey he purchased some books. Determine the incidence of tax. Identify place of supply.
21. What is Composite supply and Mixed Supply. What is the rate of tax applied?
22. Write short note on the process of GST.
23. What are the types a dealer can opt at registration?
24. What is the threshold limit for composite dealers & Registered dealers.
25. List out five examples of B2C transactions.
26. Draw a specimen of Invoice, Tax Invoice and Bill of Supply.
27. What is Supplementary invoice.
28. What is the eligibility for availing Input Tax Credit?
29. With the help of diagram show Input Credit Mechanism.
30. List out masters to be created to effect GST initially.

31. Draw a table giving details of GST R-1, GST R-2, GSTR-3.

32. Write the steps for filing GSTR-1, GSTR-2, GSTR-3.

33. Who files GSTR-6A?

34. What type of GST Returns, e-commerce operators need to file.

35. What is Reverse Charge Mechanism?

36. What are the activities specified as Negative List according to Schedule-III?

37. Mr. Ankur purchased goods for Rs. 8,00,000 and paid tax @ 5% from a dealer in same locality. He sold Rs. 4,00,000 worth goods to Raj and collected tax from him. Record the following transaction with the help of accounting Software.

38. Mahesh Enterprises of Hyderabad purchased goods from Ashish Enterprises of Chennai, he paid GST @ 28%. Record the transaction in Accounting software.

39. Create 3 stock items named milk, bread and Ice creams. Opening balances of these 3 stock items would be milk –10 litres, Bread– 20 Pkts and Ice creams– 25 numbers. Create 1 sundry debtor and 1 sundry creditor within state. Record a purchase entry of 5 liters of milk at 5% GST rate for Rs. 80 per liter, 10 Pkts of Bread for Rs. 25 per pkt at 5% GST rate and 30 numbers of Ice creams for Rs. 30 per Ice cream at 18% GST rate. A sale entry 10 liter of milk Rs.90 per liter, 15 Pkts of Bread for Rs.40 per pkt and 35 numbers of Ice creams for Rs.50 per Ice cream.

40. What is the value in GST invoices when Rs. 10000 worth of goods are purchased, GST tax rate @ 5%. In second invoice two purchases of Rs 5000 worth goods GST rate @ 5% and another Rs 5000 GST @ 18%. Both the transactions are intra state and show the GST Tax ledger.

41. Mr. A sold goods to Mr. B for Rs .20,000. Mr. A is charging packing charges of Rs. 800. And also paying freight of Rs. 2800 from Mr. A's premises to Mr. B's premises. Mr. A also charged interest of Rs. 750 for delay in payment. Determine the taxable value for levy of GST. Whether packing charges or freight, Interstate required to include in the invoice to determine taxable value? Show Tax Invoice GST @ 12% (intrastate supply).

42. Mr. X sold 1000 units of goods to Mr. Y for Rs. 20,000 and total unit sold during the year to Mr. Y after including these units is 2500 unit. As per terms of the agreement if Mr. Y is purchasing more than 2000 unit of goods in a year then Mr. X is allowing 10% discount in all the supplies. Assuming IGST rate is 18%. How discount will be recorded?

43. Create 5 stock items with GST@ zero tax rate, @ 5%, @ 12%, @ 18%, record interstate purchase and sale transactions. Show the details of input tax credit.

44. What are the conditions for E-Way bill? What are the options available in Tally.

45. Mr. Ajay (Hyderabad) provides consultancy services to Mr. Vijay (unregistered, address on record shows Tamil Nadu) and charged Rs.10000, levied GST @ 18%. Even provided consultancy services to Mr. Anand (unregistered and address is not available) Rs. 15000, GST @ 12%. Show the transactions in Tally.

46. Mrs. Rani, resident of Hyderabad has a Bank account and withdraws money from ATM in Hyderabad. She went on tour and withdrawn Rs50000 from ATM in Kerala. Identify place of service, type of taxes levied in both the cases.

47. M/s. Pooja sold 250 laptops to M/s. Raj for Rs. 50,000 each. Tax Invoice was raised. They were given discount of Rs.5000. M/s. Raj returned 250 laptops. Assuming GST rate is 18%. Show discount and GST ledger.

Text Book

1. M.S. Mathuria, GST Law and Practice Manual, Current Law House, 2020

References:

1. Bansal, K.M; GST and Custom's Law, TAXMANN Publication(P)Ltd, University Edition, 2021
2. Chaudhary, Vashishtha ;Dalmia, Ashu; Girdharwal, ―GST- A Practical Approach‖, Taxman Publication, 2017
3. Datey V.S., ―GST Ready Reckoner‖, Taxman Publication, New Delhi, 2010
4. Jha R. K. & Singh, P. K. –A Bird's Eye view of GST‖, Asia Law House, 2017
5. Majumder, Sumit Dutt –GST in India‖ 2nd edn. Centex Publications Pvt. Ltd, 2016

Note: Question Paper shall cover 100% Practical

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	understand the basic concepts of GST	K2
CO2	apply GST rates in various transactions	K3
CO3	calculate GST calculations in accounting software Tally	K5
CO4	evaluate of Tax in put credit available to goods	K5
CO5	apply the practical knowledge dealings if interstate transactions of GST	K2

K2 - Understand; K3 - Apply; K5 - Evaluate;

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	M	S	M	M	S	S
CO2	M	S	S	S	S	M	S	S	S	M
CO3	M	S	S	S	S	S	S	M	S	M
CO4	M	S	S	S	S	S	S	M	S	M
CO5	M	S	S	S	S	S	S	M	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAE41	MANAGEMENT INFORMATION SYSTEM	L	T	P	C
ELECTIVE-II			3	-	-	3

Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyse**
Course Objectives	The Course aims to 1. enable the students to gain an understanding of how Information Systems are developed, implemented and assisted in decision making in an organization. 2. familiarize the students with the four components of an MIS and understand how it adds value to an organization. 3. design a system for an organization and identify privacy, security, and freedom of information issues in a business environment.

Unit 1:Management Information System

Definition - Meaning and objectives of MIS - Framework for MIS organization - Management triangle - Limitations.

Unit 2:Information Systems

Functional Areas – Marketing, Production, Finance, Personnel Management – Information System Levels – DSS, EIS, ES – Comparison, Managing Global Information System.

Unit 3:Application of Internet

Email – Search Engines – Business decision making using Online.

Unit 4:Computers and its effect on MIS

System Analysis and Design - Components of SAD - System Development Life Cycle (SDLC).

Unit 5:Business and Management Application Packages

Research Analysis Packages – SPSS etc. – Accounting Packages – Tally etc. – Marketing Packages – Production Packages – HR Packages

Note: Question Paper shall cover 100 % theory

Text Book:

1. Gorden B. Davis, Management Information System: Conceptual Foundation, Structure and Development – McGraw Hill.

Reference Books:

1. W.S. Jawadekar, Management Information System -, Tata McGraw Hill Publishing Company, 2013.

2. Kenneth C Laudon Management Information System, Tata McGraw Hill Publication, 2012.
3. Sadagopan. S, Management Information System -, Routledge Publication, 2014

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	apply modern tools, techniques and technology functionally and productively in Professional Activities	K3
CO2	analyze, Design, Construct, Implement and Maintain, Usable, Reliable and Cost-Effective Information Systems (IS) that support Operational, Managerial and Strategic activities of Organizations.	K4
CO3	Study and evaluate existing manual and automated business processes and identify opportunities for re-engineering and/or automation.	K3
CO4	Coordinate confidently and competently with the user community in IS requirements analysis/design activities, provide guidance and technical support to end-user computing activities.	K1
CO5	analyze the impact of computing on individuals, organizations and society with Business and Management Application Packages	K2

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze;

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	S	S	S	S
CO2	S	M	S	S	S	S	M	S	S	M
CO3	S	M	S	M	S	S	S	S	M	M
CO4	S	M	S	S	S	S	S	S	S	M
CO5	S	M	S	S	M	S	S	M	S	S

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAE42	BRAND MANAGMENT	L	T	P	C
ELECTIVE - II			4	-	-	3
Cognitive Level		K2-Understand; K3-Apply; K5-Evaluate;				
Course Objectives		The Course aims to 1. understand the concept Branding & Brand Awareness, Equity 2. help the students acquire knowledge on Brand Advertisement 3. know pros and cons of brand extension 4. develop the critical and analytical skills of students in analyzing the brand personality & equity				

UNIT -1 : INTRODUCTION TO BRAND MANAGEMENT :

Concept of Branding – Definition – Significance of Brand - Brand Types – Difference between Brand and Product – Braking – Brand Building – Brand Launching.

UNIT -2 : BRAND AWARENESS :

Branding and Advertisement – Creating Brand Awareness – AIDA Model – Branding Strategies – Brand Communication.

UNIT - 3 : BRAND EXTENSION :

Brand Line Extension – Horizontal Extension Pros and Cons of Brand Extension – Related Extension – Unrelated Extension – Brand Generic Branding.

UNIT - 4 :BRAND PERSONALITY :

Branding – Brand Personality – Brand Positioning – Re Positioning – Brand Positioning Strategies – Brand Positioning Variables.

UNIT -5 : BRAND EQUITY :

Concept of Brand Equity – Brand Awareness – Personality – Positioning – Enhancing Brand Equity – Brand Management – Planning – Sources Brand.

SUGGESTED BOOKS :

1. Gulnar sharma, Karan Singh Khundia,Brand Management, Himalaya Publishing House, 2011.
2. Kirti Dutta, Brand Management: Principles and Practices, Oxford University Press, 2012.
3. YLR Moorthi, Brand Management: The Indian Context, Vikas Publishing House, 2007.

4. Tapan K. Panda, Product and Brand Management, Oxford University Press, 2016.
5. Michael Beverland, Brand Management, University of Sussex, 2014.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

Number	Course outcome	Knowledge Level(According to Bloom's Taxonomy)
CO1	understand the concept Branding & Brand Awareness, Equity	K2
CO2	help the students acquire knowledge on Brand Advertisement	K5
CO3	know pros and cons of brand extension	K5
CO4	analyse Brand personality and equity	K2
CO5	Develop the critical and analytical skills of students in brand	K3

K2-Understand;K3 -Apply; K5 -Evaluate;

Mapping of Cos with Pos & PSOs

CO /PO	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	S	M	S	M	S	S	S	S
CO2	M	S	S	S	M	S	M	M	S	M
CO3	S	M	S	S	S	S	S	S	S	S
CO4	M	S	M	S	M	M	S	M	S	M
CO5	S	S	S	M	S	M	S	S	M	S

Strongly Correlating (S) - 3marks
Moderately Correlating (M) - 2marks
Weakly Correlating (W) - 1mark
No Correlation (N) - 0 mark

SEMESTER-V

COURSE CODE	U21BAT51	PRODUCTION MANAGEMENT	L	T	P	C
CORE -VIII			5	-	-	4

Cognitive Level	K1 - Remember K2 - Understand K4 - Analyze K5 - Evaluate
Course Objectives	The Course aims to 1. make the students understand the production function, process and plant design, planning functions, Material Planning and Layout and Scheduling. 2. enable students to choose appropriate statistical techniques for improving processes and write reports to management describing processes and recommending ways to improve them. 3. familiarize students with the design, planning and control of an organization's processes to create and deliver products & services to customers and improving process & supply chain performance

Unit 1:Production System

Production System: Introduction - Production – Productivity – Production Management– Objectives – Functions - Scope and Significance – Functions- Production System

Unit 2:Production planning and Control

Production planning and Control – Techniques - Principles - Maintenance - Types - Materials Handling - Importance - Principles - Criteria for selection of material handling equipment's - Breakdown - Preventive - Routine – Maintenance scheduling

Unit 3:Plant location

Plant location – Introduction need for selecting a suitable location – Plant location problems – Advantages of urban, semi-urban and rural locations – Systems view locations – Factors Influencing plant location – Plant layout: Plant layout problems – Objectives – Principles of plant layout – Factors influencing layout – Types of layout.

Unit 4:Work and method of study

Work and method of study – Importance of work study – Work study procedures – Time Study – Introduction to method study – Objectives of Method study – Steps involved – Work Measurement – Objectives – Techniques – Computation of Standard Time – Allowance – Comparison of various Techniques

Unit 5:Quality control

Quality control – Statistical Quality control – Inspection - Objectives and Significance - Types of Inspection - Centralized and Decentralized - Bench marking: Meaning - objectives – advantages

Text Book

1. K. Aswathappa, Production and Operations Management, Himalaya Publishing House, New Delhi, 2013

Reference Books:

1. Pannerselvam, Production and Operations Management, Prentice Hall India, 2012
2. Jay Heizer, Operations Management, Pearson Education, 2017
3. Goel, Production and Operation Management, Pragati Publication, 2012
4. Banga.T.R, Industrial Engineering and Management Science, Khanna Publishers, New Delhi, 2007.

Note: Question Paper shall cover 100 % theory

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	understand the production system	K2
CO2	enumerate the production processes and production planning and control	K5
CO3	describe the plant layout system	K2
CO4	outline management issues in work and method study	K1
CO5	discuss the quality control, Total Quality Management, Bench marking	K4

K1 - Remember; K2 - Understand; K4 - Analyze; K5 - Evaluate

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	S	M	M	M	M	M
CO2	M	M	M	M	M	M	M	S	S	M
CO3	M	M	M	S	M	M	S	M	M	M
CO4	S	M	S	M	M	M	M	M	M	M
CO5	M	M	M	M	M	S	S	S	M	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (H)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAT52	MANAGEMENT ACCOUNTING	L	T	P	C
CORE -IX			5	-	-	4
Cognitive Level		K2 - Understand; K3 - Apply; K5 - Evaluate;				
Course Objectives		The Course aims to 1. familiarize the students with the accounting statement analysis. 2. help the students acquire knowledge on ratio analysis by using accounting data and other related information for decisionmaking, planning and control 3. acquaint students with the budgetary preparation and cashflow and fund flow for business planning. 4. develop the critical and analytical skills of students in analyzing the product, project, divisional and organizational performance by using managerial accounting information				

Unit 1:Management Accounting

Management Accounting – Definition – Objectives – Nature and Scope – Merits and Limitations– Functions – Management Accounting Vs Financial Accounting Vs Cost Accounting.

Unit 2:Ratio Analysis

Ratio Analysis – Interpretation, Benefits, Limitations, Classification of ratios – Liquidity, Profitability and Solvency ratios – Construction of Balance sheet (simple problems).

Unit 3:Fund Flow Statement

Fund Flow Statement – Cash Flow Analysis – Uses and Construction – Distinction.

Unit 4:Budget and Budgetary Control

Budget and Budgetary Control – Meaning, Objectives - Characteristics and Limitations –Types of Budgets - Preparation of Sales, Production, Raw material Cost, Cash, Master Budgets and Flexible Budgets.

Unit 5:Marginal Costing

Marginal Costing – Objectives and Limitations – Cost Volume Profit (CVP) Analysis –Break Even Analysis– Merits and Demerits – Margin of Safety.

Text Books

1. S.N. Maheswari, Management Accounting, Sultan Chand &Sons, 2015

Reference:

1. R.S.N.Pillai&Bhagavathi, Management Accounting, S. Chand & Sons, 2010
2. Dr.V.R.Palanivelu, Accounting for management, USP Publishers, 2012
3. N.P.Srinivasan, Management Accounting, S.Chand& Sons, 2011
4. Dr.K.L.Gupta, Management Accounting, SahithyaBhawan Publications, 2019
5. Dr. Ramachandran&Dr.Srinivasan, Management Accounting, Sriram Publications, 2020.

Note: Question Paper shall cover 20 % theory and 80 % problems

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	understand the concept of management accounting	K2
CO2	measure the financial statements by using various financial ratios.	K5
CO3	produce various types of budgets	K3
CO4	simplify the fund flow and cash flow statements by calculating funds and cash from operations	K5
CO5	understand the marginal costing for cost volume profit	K2

K2 - Understand; K3 - Apply; K5 - Evaluate;

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	S	S	S	M	M	S	M
CO2	M	M	M	S	M	S	M	S	M	S
CO3	M	S	S	M	S	M	S	M	M	S
CO4	S	S	M	M	M	M	S	S	M	S
CO5	S	S	S	M	M	S	S	S	M	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (H)	-	1 mark
No Correlation (N)	-	0mark

COURSE CODE	U21BAT53	MARKETING MANAGEMENT	L	T	P	C
CORE -X			5	-	-	4
Cognitive Level		K1 - Remember; K2 - Understand; K3 - Apply;				
Course Objectives		The course aims to 1. familiarize the student with the concept in marketing and make their design and implement the best combination of marketing actions to carry out a firm's strategy in its target markets. 2. develop the skills in market analysis and design customer-driven strategies concerning the product, pricing, and promotion 3. inculcate the students' skills in applying the analytic perspectives, decision tools, and concepts of marketing. 4. enable to make decisions involving segmentation, targeting and positioning; product offering; pricing; distribution channels and marketing communications.				

Unit 1:Definition

Definition of Marketing: Marketing concepts – Meaning, Objectives – Importance – Distinction between marketing and selling – Types of market – Functions – Marketing management - Marketing Environment: Various factors affecting the marketing function

Unit 2:Market Segmentation

Market Segmentation - bases - Marketing strategy –Consumer Behavior-Factors influencing consumer behavior

Unit 3:The Product

The Product – Nature – Types – consumer goods – Industrial goods – New product development – Product life cycle (PLC) and strategies – Product mix – modification & Elimination – Packaging – Brand Image – Brand Identity – Brand positioning and leveraging the brands – Brand Equity

Unit 4:Pricing

Pricing: Pricing – Meaning – Influencing factors – Objectives – Pricing methods – Kinds of price determination – Procedure for price determination - Competitors action to price changes– multi product pricing

Unit 5:Place and Promotion

Place and Promotion: Definition and Types of Channel–Channel selection and problem–Levels of channels - Personal selling –Process - Advertising – Objectives – Types – Sales promotion–Objectives–Sales promotion methods, publicity and public relations.

Text Book

1. Philip Kotler, Marketing Management-, Prentice Hall of India Pvt. Ltd, 2011

Reference:

1. Rajan Nair, Marketing Management, S. Chand& Sons, 2016
2. M. Ramasamy & Namakumari, Marketing Management, McGraw Hill Education, 2017
3. Dr. Amit Rao and Dr. B. Jegadish Rao, Marketing Management, Sahotya Bhawan Publication, 2019.
4. R. S.N. Pillai and Bhagavathi, Marketing Management, S. Chand& Sons, 2012
5. Kathiresan and Radha, Marketing Management, Prasana Publishers, 2013

Note: Question Paper shall cover 100 % theory

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	recognize the significance of marketing and its role in economic development	K1
CO2	recognize how market strategy works, market segmentation and product mix have an impact on buying behaviour	K2
CO3	understand Product life cycle (PLC) and strategies	K3
CO4	apply marketing concepts, pricing for the development of marketing function.	K3
CO5	demonstrate the critical thinking skills and analyze the distribution channels	K3

K1 - Remember; K2 - Understand; K3 – Apply

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	S	M	M	S	M	M
CO2	S	M	M	S	M	S	S	M	M	M
CO3	S	S	M	S	S	M	S	M	M	M
CO4	S	S	S	M	M	M	S	S	S	S
CO5	M	M	S	S	M	M	S	M	M	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (H)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAT54	HUMAN RESOURCE MANAGEMENT	L	T	P	C
CORE -XI			5	-	-	4
Cognitive Level		K2 - Understand; K3 - Apply; K4 - Analyze;				
Course Objectives		The Course aims to 1. equip students with knowledge, skill and competencies to manage people in the organization 2. familiarize the students with the HRM practices, HR planning, Training Activities, Compensation and reward planning, Performance Appraisal system in an organization. 3. provide an insight into the importance of motivation, counselling to create a stress-free environment				

Unit 1:Human Resource

Human Resource - Definition – Characteristics and Objectives – Scope - Functions – Role of HR manager – Functions of Personnel Management–Personnel principles and policies – Managerial and Operative Functions.

Unit 2:HR Planning

HR Planning –meaning, nature and importance –Steps in HR Planning process– Job Analysis, Job Description and Job Specification - Recruitment and Selection – Factors affecting Recruitments, Sources of Recruitment – Definition and Importance of Selection, Stages involved in Selection Process .

Unit 3:Placement of Personnel and Induction

Placement of Personnel and Induction, Training and Development – Objectives – Training methods – Promotion - Transfer - Types - Demotions, Separation. Performance Appraisal: Meaning - Importance - Methods –360 degree appraisal.

Unit 4:Wage and Salary Administration

Wage and Salary Administration: Concept and structure Different methods of wage payments – factors principles, Compensation plan, individuals.

Unit 5:Meaning and Sources of Employee Grievance

Meaning and Sources of Employee Grievance – Grievance Handling Systems – Meaning & Process of Collective Bargaining.

Text Books

1. C.B.Gupta, Human Resource Management, Sultan Chand & Sons, 2014.

Reference Books:

1. S.S. Khanka, Human Resource Management, S. Chand Publication, 2015
2. P.S. Subborao, Human Resource Management, Himalaya Publishing House, 2011
3. K.Aswathappa, Human Resource Management, McGraw Hill Publication, 2017.
4. L.M. Prasad, Human Resource Management, Sultan Chand & Sons, 2014.
5. C.B. Gupta, Human Resource Management, Sultan Chand & Sons, 2014.

Note: Question Paper shall cover 100% Theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	analyze the process of Job and its importance as a foundation of human resource management practice.	K3
CO2	anderstand the Human resource planning	K4
CO3	apply the policies and practice of the primary areas of human resource management, including staffing, training and compensation.	K3
CO4	understand the wage and salary administration	K4
CO5	understand the employee grievance handling system	K2

K2 - Understand; K3 - Apply; K4 - Analyze

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	S	M	S	M	M	M	M
CO2	M	M	S	M	M	M	M	M	M	S
CO3	S	S	M	S	S	S	S	M	M	M
CO4	M	M	S	S	M	S	M	M	S	M
CO5	M	M	M	S	M	S	S	M	M	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (H)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAT55	BUSINESS LAW	L	T	P	C
CORE -XII			5	-	-	4
Cognitive Level		K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate;				
Course Objectives		The course aims to 1. impart in-depth knowledge of the Law of contracts which forms, the foundation of all day to day obligations in the business world. 2. instil in the students an awareness of legal framework in the sale of goods, consumer protection to understand the applications of these laws to practical commercial situations. 3. acquaint the students with the alternative forms of business organization available in the country as per partnership and new companies Act.				

Unit 1:Indian contract act 1872

Indian contract act 1872: Law of Contract – Definition, Classification – Essentials of a Contract– Types of contract - Agreements

Unit 2:Consideration

Consideration – Legal rules as to Consideration – Contract without consideration - Consent- Coercion - undue influence – misrepresentation - fraud - mistake of law and mistake of fact. Legality of Object – Unlawful and illegal agreements – Effects of illegality – Wagering Agreements.

Unit 3:Law of Agency

Law of Agency–Mode of creation – Agency by Ratification – Sub-Agent and Substituted Agent - Termination of Agency, Negotiable Instrument Act 1881; Parties to a Negotiable instrument – material alteration

Unit 4:Sale of Goods Act 1930

Sale of Goods Act 1930: Definition – Formation of contract of sale –Essentials: Duties of Buyers and Sellers; Sale and agreement to sell

Unit 5:Partnership

Partnership – Definition - Essentials - Rights, duties and Liabilities of partners -Types ofPartnership, Companies Act 1956; Definition of a Company, Characteristics, Kinds.

Text Book

1. N.D. Kapoor, Elements of Mercantile Law- S.Chand and company, 2014.

Reference Books:

1. S.P.Sharma, Business Law, International Publishing House Pvt., Ltd., 2012.
2. M.C.Kuchhal and VivekKuchhal, Business Law, S.Chand and company, 2018.
3. P.C.Tulsian& Bharat Tulsian, Business Law, McGraw Hill Education, 2017
4. Pillai&Bhagavathi, Business Law, S. Chand and company, 2011.
5. K.C. Carg and R.C. Chawla, Business Law, Kalyani Publishers, 2013.

Note: Question Paper shall cover 100 % theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	Develop an understanding of business law in the global context	K1
CO2	Know the relevant legal terms of the contract Act	K2
CO3	Construct the relationship of ethics and law in agency	K3
CO4	Apply basic principles of law to the sale of goods	K4
CO5	Understand the rules, and regulations related to partnership and company form of business	K5

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 – Evaluate

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	S	S	M	M	S	S
CO2	M	S	S	M	S	M	S	S	M	S
CO3	M	M	S	S	M	S	S	M	M	S
CO4	S	M	M	S	S	M	S	S	M	S
CO5	S	M	S	M	S	S	S	S	M	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (H)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAE53	STRATEGIC MANAGEMENT	L	T	P	C
ELECTIVE -III			3	-	-	3
Cognitive Level		K1 - Remember; K2 - Understand; K3 - Apply; K5 - Evaluate;				
Course Objectives		The course aims to 1. expose students to various perspectives and concepts in the field of Strategic Management 2. enable the students to understand the principles of strategy formulation, implementation and control in organizations. 3. help students develop skills for applying these concepts to the solution of business problems 4. help students master the analytical tools of strategic management				

Unit1:Strategic Management

Strategic Management: Concepts- Difference between strategy and tactics-Three levels of strategy, Strategic Management Process- Benefits, TQM and strategic management process, Social responsibility, Social audit.

Unit 2: Strategic Formulation

Strategic Formulation: Corporate Mission: Need –Formulation, Course Objectives Classification-Guidelines, Goals: Features- Types, Environmental Scanning- Need- Approaches- SWOT analysis-ETOP-Value chain analysis.

Unit 3: Choice of strategy

Choice of strategy: BCG matrix-The GE nine cell planning grid- Corporate level generic strategies: Stability, Expansion, Retrenchment, Combination strategies.

Unit 4: Strategic Implementation

Strategic Implementation: Role of top management-Process- Approaches, Resource allocation-Factors -Approaches, Mckinsey's 7's framework, Strategic Positioning- Four routes to competitive advantage.

Unit 5: Strategic Evaluation

Strategic Evaluation: Importance- Criteria- Quantitative and Qualitative factors, Strategic control: Process-Criteria-Types, Essential features of effective evaluation and control systems.

Text Book:

1. Strategic Management - Vijaya Kumar P, Cengage learning, New Delhi,2010

Reference Books:

1. Strategic Management - John A Pearce II, Amita Mital, TMH, New Delhi, 2012.
2. Cases Studies in Strategic Management - Sanjay Mohapatra, Pearson, New Delhi, 2012
3. Strategic Management – Adrian Haberberg& Alison, Oxford University Press, New Delhi, 2010
4. Strategic Management and Business Policy – Appa Rao, Parvatheshwar Rao, Shiva Rama Krishna, Excel Books, New Delhi, 2012

Note: Question Paper shall cover 100 % theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level (According to Bloom's Taxonomy)**
CO1	synthesize knowledge from other business courses into a comprehensive understanding	K1
CO2	provide a basic understanding of the nature and dynamics of the strategy formulation processes.	K2
CO3	encourage students to think critically and strategically	K3
CO4	develop the ability to identify strategic issues and design appropriate courses of action.	K3
CO5	enable to evaluate the strategies based on the business	K5

K1 - Remember; K2 - Understand; K3 - Apply; K5 - Evaluate

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO 3	P O4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	S	S	S	S	M	M	S
CO2	M	M	M	S	M	M	S	S	M	M
CO3	M	M	M	S	S	S	M	M	M	S
CO4	S	S	S	M	S	M	S	M	M	M
CO5	S	S	S	M	M	S	M	S	M	S

Strongly Correlating (S) - 3 marks
Moderately Correlating (M) - 2 marks
Weakly Correlating (H) - 1 mark
No Correlation (N) - 0 mark

COURSE CODE	**U21BAE52**	**INTERNATIONAL BUSINESS**	**L**	**T**	**P**	**C**
ELECTIVE - III			**4**	**-**	**-**	**3**
Cognitive Level		K2- Understand; K3-Apply; K4-Analyse K5-Evaluate;				
Course Objectives		The Course aims to 1. teach the students on the International Business 2. create awareness on trade and tariff policies 3. offer knowledge on the economic integration 4. familiarize the students on international trade and business				

UNIT –1 : Introduction To International Business :

Overview of International Business- Definition – Scope and functions – Globalization – Effects and Benefits of Globalization

UNIT –2 : Trade And Tariff Policies

Trade and Tariff Policies – Subsidies, Import Quotas, Export Policies, Policies in the international markets – Anti dumping Policy

UNIT – 3: Regional Economic Integration

Regional Economic Integration - introduction – levels of integration – regional economic integration in Asian region – ASEAN, BRIC, SAARC – Integration for Business

UNIT – 4: Foreign Exchange Determination

Foreign Exchange Determination Systems: Basic concepts – Various types of Exchange rate regimes – factors affecting exchange rates – Indian rupees and other exchange rates

UNIT – 5 : International Institutions

International institutions : UNCTAD – basic principles of UNCTAD – achievements of UNCTAD – International Monetary Fund – Role of IMF , IBRD – features of IBRD – WTO – role of WTO in International business.

SUGGESTED BOOKS :

1. Neeta Vaydande , . ‒Introduction to International Business ǁ, Sahitya Bhavan, 2019.
2. Sonia Gupta, ― International Businessǁ, McGraw Hill, 2017
3. C B Gupta, ‒International Businessǁ, S. Chand Publishing, 2014
4. V.K. Bhalla, ‒International Businessǁ, S. Chand Publishing, 2013
5. Francis Cherunillam, ― International Business – Text and Casesǁ, PHI Publications, 2010

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

Number	Course outcome	Knowledge Level(According to Bloom's Taxonomy)
CO1	understand the basic concept International trade	K2
CO2	Study and evaluate the trade and tariff policies	K5
CO3	know the nuances of international trade	K3
CO4	analyze the rolw of international institutions	K4
CO5	develop a strategy for international trade	K5

K2-Understand;K3 -Apply; K4: Analyse K5 -Evaluate;

<u>Mapping of Cos with Pos & PSOs</u>

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	S	M	M	S	M	M	S	M	S
CO2	M	S	S	M	S	S	M	S	S	S
CO3	S	M	M	S	M	M	S	S	M	S
CO4	M	M	M	S	S	M	S	M	S	M
CO5	S	S	S	M	M	S	M	S	M	M

Strongly Correlating (S)	-	3marks
Moderately Correlating (M)	-	2marks
Weakly Correlating (W)	-	1mark
No Correlation (N)	-	0mark

COURSE CODE	U21BAS53	ENTREPRENEURSHIP DEVELOPMENT (PRACTICALS)	L	T	P	C
SBE–III			-	-	2	2
Cognitive Level		K1 - Remember; K2 - Understand; K4 - Analyze; K5 - Evaluate;				
Course Objectives		The course aims to 1. provide knowledge of entrepreneurship and also provide necessary inputs for the creation of the new ventures. 2. enable them to meet out challenges of starting new ventures and introducing new product and service ideas. 3. familiarize the students with the different stages of project preparation for business. 4. build entrepreneurship development activities undertaken by Indian government. 5. get an idea about factors influencing Women Entrepreneurs.				

Unit 1:Entrepreneurship

Entrepreneurship: Concepts, types and functions of entrepreneurs – Entrepreneurial Development In India – Role of entrepreneurs in economic development.

Unit 2:Business Ideas

Business Ideas: Steps to start a business- Licensing, Registration and local laws- problem and prospectus to start a business. Feasibility analysis of Business Idea.

Unit 3:Developing entrepreneurs

Developing entrepreneurs–Role of DIC, MSME, DST, STARTUPS –activities, services and its functions

Unit 4:Promoting enterprises

Promoting enterprises – SSI – MSME – Role and growth of SSI – Regulations governing SSI – incentives and concessions for SSI units – sickness in SSI – causes and remedies

Unit 5:Women Entrepreneurs

Women Entrepreneurs - Concept of WomenEntrepreneurs – Factors Influencing the Women Entrepreneur – Types of Women Entrepreneur – Problems of Women Entrepreneur – Remedial Measures.

Text Book

1. Gupta,C. B. and Srinivasan N.P, Entrepreneurial Development-., S. Chand and Sons, 2013.

Reference Books:

1. Vasant Desai, Entrepreneurial Development Himalaya Publishing House, 2014
2. Dr. V.R. Palanivelu, Entrepreneurial Development-, Himalaya Publishing House, 2012
3. Saravanavel, P., Entrepreneurship Development- Margham Publication, 2020

Note: Question Paper shall cover 100 % practical

PRACTICALS :

Option I

1. Developing a Business Plan
2. Preparation of Business Proposal
3. Study of various cost involved in Business
4. Preparation of Budget
5. Preparation of Cash flow statement
6. Preparation of Balance sheet
7. Assessing Entrepreneurial Traits of a Successful Women Entrepreneur.

Students can opt any of the below ,not less than 3 activity from each option.

Option: II

1. Hand embroidery – 20 stiches – 10 samples
2. Smocking – 4 types
3. Bead work – 1 sample
4. Sequins work – 1 sample
5. Zardosi work – 1 sample
6. Mirror work - 3 samples

Option: III

1. Stained glass painting – 3 samples
2. Glass painting – 3 samples
3. Oil painting – 3 samples
4. Fabric Painting – 3 samples

5. Tiles painting – 3 samples
6. Pot painting – 3 samples

Option IV

Apparel Dress designing.
Any other skill development followed by small business Plan.

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level (According to Bloom's Taxonomy)**
CO1	define who is an Entrepreneur and what his or her characteristic features are, what skills made them successful	K1
CO2	foster the students in the areas of entrepreneurial growth and equip them with different entrepreneurial development programmes.	K2
CO3	identify the different institutions that supporting entrepreneurs	K4
CO4	discriminate the benefits Regulations governing SSI	K5
CO5	understand the concepts of Women Entrepreneurs	K2

K1 - Remember; K2 - Understand; K4 - Analyze; K5 - Evaluate

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	S	M	S	M	S	M
CO2	S	S	S	M	M	S	M	S	M	M
CO3	M	M	S	S	M	M	M	M	S	M
CO4	S	S	M	S	M	M	M	S	S	M
CO5	M	S	S	S	M	M	S	S	M	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (H)	-	1 mark
No Correlation (N)	-	0 mark

SEMESTER-VI

COURSE CODE	U21BAT61	FINANCIALMANAGEMENT	L	T	P	C
CORE XIII			5	-	-	4

Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyse**
Course Objectives	The course aims to 1. help the students understand the foundations of finance and financing decisions, Working Capital and Long term sources of finance. 2. acquaint the students with the theory and techniques of financial management, and developing their abilities in respect of investment and capital budgeting, financial planning, capital structure decisions, dividend policy and working capital management. 3. develop the analytical skills for interpretation business information and application of financial theory in financing related decisions and situations.

Unit 1: Financial Management(Theory Only)

Financial Management - Meaning and Scope - Finance Functions – Profit Maximization and Wealth Maximization – Objectives of Financial Management -Sources of Finance –Short term-Bank sources– Long term

Unit 2: Cost of Capital(Theory & Problem)

Cost of Capital–Concept, Importance – Classification – Calculation of Cost of Debt, Cost of Equity and Cost of Preference Shares - Cost of Retained Earnings –Weighted average cost of capital, Reserves.

Unit 3: Capital Structure(Theory & Problem)

Capital Structure – Meaning and Scope – Factors influencing capital structure - Approaches: Net Income Approach –Net Operating Income Approach – MM Approach –Traditional Approach – Dividend and dividend policy – meaning, classification – sources available for dividend –dividend policy – general determinants of dividend policy

Unit 4: Working Capital Management(Theory)

Working Capital Management: concepts – Importance – Determinants of working capital

Unit 5: Capital Budgeting(Theory &Problem)

Capital Budgeting – Concept and Importance – objectives – various techniques and methods: Pay Back Method – Discounted Cash Flow Method – NPV Method, Excess Present Value Index, IRR, ARR and ROI

Text Book

1. S.N. Maheshwari, Elements of Financial Management-, Sultan Chand & Sons, 2019

Reference Books:

1. I.M.Pandey, Financial Management, Vikash Publishing House Pvt.Ltd, 2016
2. Prasanna Chandra, Fundamentals of Financial Management,TataMcGrawHills, 2017
3. Dr. N.Srinivasan, Financial Management, Sriram Publication, 2019
4. R.K. Sharma,Shashi and K. Gupta, Financial Management-, Kalyani Publication 2016
5. C. Paramasivam and T. Subramanian, Financial Management, New Age International Publications, 2018.

Note: Question Paper shall cover Theory 60% and Problems 40 %

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	use business finance terms and concepts while communicating.	K3
CO2	explain the financial concepts used in making a financial management decision.	K4
CO3	use effective methods to promote respect and relationship for financial deals.	K3
CO4	utilize the information to maximize and manage finance.	K1
CO5	demonstrate a basic understanding of Budgeting.	K2

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	M	M	M	S	M	S	M	M
CO2	S	M	S	M	S	M	S	M	S	M
CO3	S	S	M	S	M	S	M	S	S	S
CO4	S	M	S	S	M	M	S	M	S	S
CO5	S	S	M	M	S	S	M	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (H)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAT62	TOTAL QUALITY MANAGEMENT	L	T	P	C
CORE - XIV			5	-	-	4

Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply** **K5: Evaluate**
Course Objectives	The course aims to 1. make them understand the philosophy and core values of Total Quality Management (TQM). 2. make them understand the voice of the customer and the impact of quality on economic performance and long-term business success of an organization; 3. educate them about the best practices for the attainment of total quality 4. help the students understand the relationship between business strategy, business performance and quality management.

Unit 1: Introduction

Introduction– Need for quality – Evolution of quality –Definition of quality–Dimensions of manufacturing and service quality – Basic concepts of TQM – Definition of TQM –TQM framework – Contributions of Deming, Juran and Crosby–Barriers to TQM

Unit 2: Leadership

Leadership– Strategic quality planning, Quality Statements - Customer focus, customer orientation, customer satisfaction, Customer complaints, Customer retention – PDSA cycle, 5s, Kaizen.

Unit 3: The seven traditional tools of quality

The seven traditional tools of quality–New management tools – Six Sigma: Concepts,Methodology, Applications to manufacturing, Service sector including IT – BenchmarkingReason to bench mark, Bench marking process.

Unit4: Quality circles

Quality circles – Quality Function Development (QFD) – Taguchi quality loss function –TPM – Concepts, improvement needs – Cost of Quality – Performance measures

Unit 5: Need for IMS

Need for IMS – elements, Documentation, Quality auditing IMS, Concepts, Requirements and benefits – Implementation in manufacturing and service sectors including IT.

Text Book

1. Suganthi L and Anand Samuel, Total Quality Management –, Prentice Hall of India, pvt, ltd., 2006.

Reference Books:

1. Janakiraman Band Gopal R K, Total Quality Management –, Prentice Hall of India, pvt, ltd. 2006
2. Dale H Besterfiled, Total Quality Management –, Pearson Education Asia, 2006.
3. Dr. K.C. Arora, Total Quality Management –, S.K. Katarian& Sons,2013
4. D.R.Kiran, Total Quality Management –, B.S. Publishers, 2016

Note: Question Paper shall cover 100 % theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level (According to Bloom's Taxonomy)**
CO1	understand the basic concepts of TQM	K2
CO2	know the Strategic quality planning	K1
CO3	evaluate the traditional tools and new management tools of quality	K5
CO4	apply the Quality Function Development	K3
CO5	understand the Quality auditing IMS	K2

K1 - Remember; K2 - Understand; K3 - Apply; K5 - Evaluate;

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	M	S	M	S	M	M
CO2	S	M	S	M	S	M	S	M	S	M
CO3	S	S	M	S	M	S	M	S	M	S
CO4	M	S	S	S	M	M	S	M	S	M
CO5	S	S	M	M	S	S	M	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (H)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	**U21BAT63**	**MARKETING RESEARCH**	**L**	**T**	**P**	**C**
CORE XV			**5**	**-**	**-**	**4**
Cognitive Level	**K1: Recall** **K2: Understand** **K4: Analyse** **K5: Evaluate**					
Course Objectives	The course aims to 1. provide basic knowledge about Market research 2. make the students understand the techniques of market research 3. enable the students to learn about tools available for research 4. inculcate the students the skill of understanding market research and the decision-making process					

Unit 1: Introduction

Marketing research- Definition- Nature and Scope- Problem Definition- Research Design- Exploratory, Descriptive, Experimental design.

Unit 2: : Data Collection

Data collection- Secondary Data- Primary data- Survey methods- Questionnaire Design- Measurement and Scaling- Observation method.

Unit 3: Sampling

Sampling- Types of Sampling- Sample Selection- Data Analysis- Classification, Tabulation and Interpretation of data- Report writing.

Unit 4: Techniques of research

Motivation Research Techniques- Sales analysis research- Methods of Sales Forecasting- Sales Potential.

Unit 5: Product research

Product research – New Product Development- Test Marketing- Advertising research - copy Testing- Pre t testing And Post-Testing - Media research.

Text Book

1. Boyd and west fall, Marketing Research-, Richard D. Irwin Inc.

Reference books:

1. Marketing Research- Luck, Wales and Taylor.
2. Marketing Research (principles, Application and Cases) – Dr.D.D.Sharma.

Course Outcomes

On successful completion of the course, the students will be able to,

K1	**CO1**	understand the introduction to market research
K2	**CO2**	be aware of tools and techniques of market research
K5	**CO3**	know how to conduct a research
K2	**CO4**	understand why companies need market research
K4	**CO5**	gain information about drawing a conclusion on market research

K1 - Remember; K2 - Understand; K4 - Analyze; K5 – Evaluate

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	S	M	S	M	M
CO2	S	M	S	M	S	M	S	M	S	M
CO3	S	S	M	S	M	S	S	S	M	S
CO4	S	M	S	S	M	M	S	M	S	S
CO5	S	S	S	M	S	S	M	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAT64	E-COMMERCE (PRACTICALS)	L	T	P	C
CORE XVI			-	-	4	5
Cognitive Level	**K2: Understand** **K4: Analyse** **K5: Evaluate**					
Course Objectives	The course aims to 1. familiarize the students with the technologies in e-commerce, e-business and their impact in business. 2. enable the students to identify and implement the right e-commerce model and understand the ethical and legal issues associated with it. 3. give an insight intothe electronic payment system and its security					

Unit 1: E-commerce

E-commerce: Key elements of e-commerce - E-banking - INFINET - VSAT - ATM'S - ATM Technology - Biometric ATM - ATM card - ATM usage - Internet Banking.

Unit 2: Electronic Payments

Electronic Payments: VISA Card - MASTER Card - Credit Card - Debit Card, e-Cheque Process between Consumer & Merchant.

Unit 3: On-line Business

On-line Business: e-payment - e-Ticketing - e-Dining - e-Ticketing in Railways - e-Brokerage - e-Bill - Online Marketing- Electronic Credit Cards - Smart Cards.

Unit 4: Computer Crimes

Computer Crimes: Money Thefting - Service Theft - Software Theft - Information Altering - Malicious Access - Viruses.

Unit 5: E-Commerce in India

E-Commerce in India: Business models of e-commerce - B2B (Business to Business) - B2C(Business to Consumer) - C2B(Consumer to Business) - C2C(Consumer to Consumer) - G2B(Government to Business)

Note: Question Paper shall cover 100 % practical

E COMMERCE Practical Exercises:

1. Pass port apply online
2. Train ticket booking
3. Flight ticket booking
4. Bus ticket booking
5. Fees payment
6. Money transfer
7. EB bill payment
8. Municipality bill payment
9. Traffic challan – fine payment
10. Voter id apply online
11. Pan card apply online
12. Driving license and LLR apply online
13. Police online complaint
14. Online shopping
15. Scholarship online apply
16. PF online apply (Data correction and claim)
17. Smart card apply and correction
18. Bank account opening online
19. Aadhar card correction

G pay and Phone

Text Book

1. Kenneth C. Laudon and Carlo GuercioTraver, E-Commerce –, Pearson Education, 2019

Reference Books:

1. David Whitely, E-commerce: Strategy, Technology and Applications -, McGraw Hill Education, 2017
2. VijayalakshmiSundaram, E-Commerce, SreeMeenakshi Publications, 2016.
3. M.M. Varma, Multimedia & website Address,Sultanchand& sons2013.
4. Bhaskar, E-Commerce in Banking -, Himalaya publications, 2017.
5. C.NellaiKannan, Internet & E-Commerce, Nels Publications, 2014.

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	Course outcome	Knowledge Level (According to Bloom's Taxonomy)
CO1	understand the introduction to e-commerce	K2
CO2	be aware of commercial e-payments	K2
CO3	know about online businesses	K5
CO4	understand the cybercrimes in business	K2
CO5	gain information about E-business models	K4

K2 - Understand; K4 - Analyze; K5 - Evaluate

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	S	M	S	M	M
CO2	S	M	S	M	S	M	S	M	S	M
CO3	S	S	M	S	M	S	S	S	M	S
CO4	S	M	S	S	M	M	S	M	S	S
CO5	S	S	S	M	S	S	M	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAT65	SKILL ENHANCEMENT & EMPLOYABILITY ORIENTATION	L	T	P	C
CORE XVII			4	-	-	5

Cognitive Level	**K2: Understand** **K3: Apply** **K4:Analyse** **K5:Evaluate**
Course Objectives	The Course aims to 5. developing and sustaining employability skills 6. improve effective communication skills 7. develop effective written communication skills 8. enable students to increase knowledge on self management 9. build a base for learning critical & creative thinking skills.

UNIT 1: Self Assessment

Self-Regulation and Improving Academic Performance -Personal SWOT analysis, empowering self by developing self-esteem, self-efficacy, self-control and self-monitoring, Basic understanding about EQ, IQ, SQ developing sound study habits, reading newspapers, reviewing a book, research article and it's headings, improving personal memory, understanding the nature of stress and manage stress, basic idea about mind mapping, developing the skills of observation, time managing and its methods

UNIT 2 : **Oral Communication**

Effective Oral Communication Skills - Communication basics and effectiveness in communication, interpersonal and intrapersonal communication, managing conversations, asking questions, working in teams, public speaking –planning , preparing and delivering speeches, effective self-introductions , debate, narrating incidents and events and expressing opinions, dynamics of group communication- taking active part in group discussions, managing meetings-Elements, Members, different types meeting arrangements

UNIT 3: **Written Communication**

Effective Written Communication Skills- Principles of effective writing ,writing an -informal letter, bio-sketch, formal letter writing, a letter to the editor, a report, a memo, routine letters, cover letters, thank you/ follow –up letters, acceptance letter, rejection letters, resignation letters

UNIT 4 : Communication Styles

Self Management and Standards of Conduct - Barriers to effective communication, managing conflicts, developing an assertive communication style, perspectives on relationships, understand the basics of etiquette, general etiquette to be followed by a student, mobile phone etiquette, telephone etiquette, e-mail etiquette, dressing etiquette, interview etiquette, people etiquette, office etiquette, dining etiquette, personal grooming

UNIT 5: **Self Motivation**

Self Motivation and Getting Hired-Develop thinking skills -critical and creative thinking, evaluation, decision making and problem solving, understanding the changing world of work, understand employer expectations, job searching, selection process, CV writing, Body Language, Dress Code, Concept about GD, Interview-Types of interview- preparing for the interview, interview process, Exit Interview

Books Recommended:

1. Harold R. Wallace, Personal development for life and work, Thomson publication pvt ltd, 2012.
2. Gopalaswamy Ramesh, The ACE of Soft Skills: Attitude, Communication and Etiquette for success, Pearson publication, 2010.
3. Meenakshi Raman and Prakash Singh, Business Communication, Oxford 2012.
4. Urmila Rai and SM Rai. Business Communication, Himalaya Publishing House, 2011.

Expected Course Outcomes:

On the successful completion of the course, student will be able to:

Number	Course outcome	Knowledge Level(According to Bloom's Taxonomy)
CO1	developing and sustaining employability skills	K2
CO2	improve effective communication skills	K5
CO3	develop effective written communication skills	K5
CO4	enable students to increase knowledge on self management	K2
CO5	build a base for learning critical & creative thinking skills	K3

K2-Understand;K3 -Apply; K5 -Evaluate;

Mapping of Cos with Pos & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	S	S	M	S	S	S
CO2	M	S	S	S	M	S	M	M	M	M
CO3	S	M	S	S	M	S	S	S	S	S
CO4	M	M	S	M	S	M	M	M	S	M
CO5	S	S	S	S	M	M	M	S	S	S

Strongly Correlating(S) - 3marks
Moderately Correlating(M) - 2marks
Weakly Correlating (W) - 1marks

No Correlation (N) - 0 marks

COURSE CODE	U21BAE61	SERVICES MARKETING	L	T	P	C
ELECTIVE IV			3	-	-	3

Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyse**
Course Objectives	The course aims to 1. enable the students to know about the various theories of service marketing. 2. familiarize the students to gain insights on the issues in operational and administrative aspects of service marketing. 3. help students to formulate strategies for identifying, organizing and establishing a retail format 4. inculcate the skills of merchandising, segmentation, pricing and promotion strategies in service marketing.

Unit 1: Evolution of Service Marketing

Evolution of Service Marketing: Stages - Reasons - impact of social environment on the growth of services marketing.

Unit 2: Concept of services

Concept of services: meaning - components of service - characteristics of services - difference between goods and services.

Unit 3: Service marketing mix

Service marketing mix: meaning - definition - characteristics of service marketing mix - 7p's of service marketing mix.

Unit 4: Pricing in services

Pricing in services: Meaning - objectives - characteristics - factors affecting pricing decisions.

Unit 5: Location of services and channels of distribution

Location of services and channels of distribution: factors in choosing a service location - classification of service by location - channels: meaning - methods of distribution services.

Text Book

1. Dr. L. Natarajan, Services Marketing, Margham Publications, 2016.

Reference Books:

1. K. Rama MohanaRao, Services Marketing, Pearson Publications, 2011.
2. Adrian Payne, Malcolm Mcdonald, Maketing Planning for Service, Routledge Publication,2012.
3. K. Rama MohanaRao, Services Marketing, Sultan Chand & Sons, 2014.
4. Adrian Payne, Services Marketing, Tata McGraw Hill Publication, 2013.

Note: Question Paper shall cover 100 % theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level (According to Bloom's Taxonomy)**
CO1	understand the basic concepts of service marketing	K3
CO2	examine the nature of services, and distinguish between products and services	K4
CO3	identify the major elements needed to improve the marketing of services	K3
CO4	understand the pricing in services	K1
CO5	develop an understanding of the roles of relationship marketing and customer service in adding value to the customer's perception of a service	K2

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	S	M	S	M	M
CO2	S	M	S	M	S	M	S	M	S	M
CO3	S	S	M	S	M	S	S	S	M	S
CO4	S	M	S	S	M	M	S	M	S	S
CO5	S	S	S	M	S	S	M	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAE62	CONSUMER BEHAVIOUR	L	T	P	C
ELECTIVE - IV			3	-	-	3

Cognitive Level	**K1: Recall** **K2: Understand** **K3: Apply** **K4: Analyse** **K6: Create**
Course Objectives	The course aims to 1. provide basic knowledge about consumer behaviour 2. make the students to understood consumer motivation and perception 3. enable the students to learn about consumer learning and attitude 4. inculcate the students the skill of understanding the consumer decision-making process

Unit 1:Introduction -Consumer Behaviour

Introduction - Consumer Behaviour- definition - scope of consumer behaviour — Discipline of consumer behaviour — Customer Value Satisfaction — Retention — Marketing ethics.

Unit 2:Consumer research

Consumer research- Paradigms — the process of consumer research - consumer motivation — dynamics — types — measurement of motives — consumer perception

Unit 3:Consumer Learning

Consumer Learning-Behavioural learning theories — Measures of consumer learning —Consumer attitude — formation — Strategies for attitude change

Unit 4:Social class Consumer Behaviour

Social class Consumer Behaviour- Life style Profiles of consumer classes — Cross Cultural Customers Behaviour Strategies.

Unit 5:Consumer Decision Making

Consumer Decision Making - Opinion Leadership — Dynamics — Types of consumer decision making — A Model of Consumer Decision Making

Text Book

1. Michael Solomon, Consumer Behaviour –, Pearson Publication, 2016

Reference books:

2. Jim Blythe, Consumer Behaviour, Sage Publication, 2013
3. RikPieters, Consumer Behaviour, South Western College Publishing, 2012
4. Paul Green Berg-Customer Relationship Management -Tata McGraw Hill , 2017
5. Barry Berman and Joel R Evans, Retail Management - A Strategic Approach, Pearson Publication, 2018.

Note: Question Paper shall cover 100 % theory

Expected Course Outcomes:

On the successful completion of the course, students will be able to:

Number	**Course outcome**	**Knowledge Level (According to Bloom's Taxonomy)**
CO1	understand the basic concepts of Consumer Behaviour	K1
CO2	identify the motives of consumer behaviour through consumer research	K2
CO3	frame strategies for the consumer by learning the attitudes of consumer	K4
CO4	apply strategic knowledge based on the lifestyle of consumer	K3
CO5	develop consumer decision-making model	K6

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K6 – Create

Mapping of COs with POS & PSOs

CO/ PO	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	S	M	S	M	M
CO2	S	M	S	M	S	M	S	M	S	M
CO3	S	S	M	S	M	S	S	S	M	S
CO4	S	M	S	S	M	M	S	M	S	S
CO5	S	S	S	M	S	S	M	S	S	M

Strongly Correlating (S)	-	3 marks
Moderately Correlating (M)	-	2 marks
Weakly Correlating (W)	-	1 mark
No Correlation (N)	-	0 mark

COURSE CODE	U21BAS64	MARKET SURVEY	L	T	P	C
SBE -IV			-	-	2	2

Student has to design a questionnaire for any issues on business, households, consumers, marketers in their locality and collect data from 30 to 50 samples. Market survey may be arranged weekly 2 hours during VI semester. The data has to be processed by using percentage analysis and presented in the form of an assignment. It should not exceed 20 pages. The report should be presented to the concern internal faculty. There is no External Viva for this report.

Evolution of the report: 25 marks (CIA)

Presentation of the report: 75 marks (ESE)