

| Mother Teresa Women's University, Kodaikanal |
| :---: |
| Department of Mathematics |
| Choice Based Credit System (CBCS) (2021-2022 onwards) |
| M.Sc. Mathematics |

## 1. Programme Outcomes (POs)

| PO1 | To carry out scientific investigation objectively without being biased with <br> preconceived notions. |
| :--- | :--- |
| PO2 | Analyze problems, formulate a hypothesis, evaluate and validate results, and <br> draw reasonable conclusions thereof. |
| PO3 | Pursue research in Mathematical Sciences and allied fields, or careers in <br> industry. |
| PO4 | Acquire relevant knowledge and skills appropriate to professional activities <br> and demonstrate highest standards of ethical issues in mathematical Sciences. |
| PO5 | To become an enlightened citizen with commitment to deliver one's <br> responsibilities within the scope of bestowed rights and privileges. |

## 2. Programme Specific Outcomes (PSOs)

| PSO1 | Understand the fundamental axioms in mathematics and capable of developing <br> 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 <br> degrees at reputed academic institutions. |
| PSO4 | Acquire skills in problem solving, thinking, creativity through assignments, <br> etc. |
| PSO5 | Compete in competitive exams e.g. NET, GATE, etc. |

## M.Sc. MATHEMATICS CURRICULUM

| $\begin{array}{\|l} \hline \mathbf{S} . \\ \mathbf{N} \\ \mathbf{O} \\ \hline \end{array}$ | 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)- <br> Computer Skills for Web <br> Designing and Video Editing | 2 | - | 4 | 25 | 75 | 100 |
|  |  | Total | 22 |  |  | - | - | 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 |  |  | - | - | 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 |  |  |  |  | 700 |
| Semester IV |  |  |  |  |  |  |  |  |
| 21 | P21MTE411/ 221MTE412/ 21MTE413/ 21MTE414/ | Elective-I* <br> Number Theory/Automata Theory/Probability Theory and Statistics/Astronomy / Any MOOC Course ${ }^{\$}$ | 4 | 4 | - | 25 | 75 | 100 |


| 22 | P21MTE421/ | Elective -II* <br> P21MTE422/ <br> P21MTE423/ <br> F21MTE424/ | Fuzzy sets and their Application/ <br> Stochastic Processes /Fluid <br> Dynamics/Tensor Analysis and <br> Special Theory of Relativity/ <br> Any MOOC Course | 4 | 4 | - | 25 | 75 |
| :--- | :--- | :--- | :---: | :---: | :---: | :---: | :---: | :---: |

## 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 <br> Python Lab | Value Added <br> Program- I | 2 |

## 2. Semester-II

| Course Code | Course Name | Credit |
| :--- | :--- | :--- |
| P21MTI21 | Internship/Industrial <br> Training | 2 |

## 3. Semester-III

| Course Code | Course Name | Credit |
| :--- | :--- | :--- |
| P21MTO31 | Online Courses - MOOC <br> Courses | 2 |

## 4. Semester-IV

| Course Code | Course Name | Category | Credit |
| :--- | :--- | :--- | :--- |
| P21MTV42 | Mathematical Modelling | Value Added <br> 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

## Course Outcomes

| CO | Course Outcomes | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO1 | Students will have a working knowledge of important mathematical <br> concepts in abstract algebra such as definition of a group, order of a <br> finite group and order of an element . | K2 |
| CO2 | Students will be introduced to and have knowledge of many <br> mathematical concepts studied in abstract mathematics such as <br> permutation groups, factor groups and abelian groups. | K3 |
| CO3 | Students will actively participate in the transition of important <br> concepts such homeomorphisms \& isomorphism's from discrete <br> mathematics to advanceed abstract mathematics. | K4 |
| CO4 | Students will gain experience and confidence in proving theorems. A <br> blended teaching method will be used requiring the students to prove <br> theorems sive the student the experience, knowledge, and confidence <br> 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

| $\mathrm{COs} / \mathrm{POs}$ | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | S | S | S | S | S | S | S |
| CO 3 | S | M | S | M | S | M | M | S | S | S |
| CO 4 | S | S | S | S | S | S | S | S | M | S |

S - Strong , M - Moderate , L- Low

## Course Outcome:

| CO | Course Outcomes | Knowledge <br> Level |
| :--- | :--- | :---: |
| CO 1 | Students will be able to demonstrate competence with elementary <br> properties of sets By proving identities involving union and <br> intersection and Cartesian Products of Sets . | K 2 |
| CO 2 | Students will be able to demonstrate competence with elementary <br> properties of Functions by proving results involving composite <br> functions and inverse functions . | K 3 |
| CO 3 | Students will be able to demonstrate competence with the algebraic <br> and order Properties of real numbers | K 4 |
| CO 4 | Students will be able to demonstrate competence with properties of <br> real numbers by finding supremum and infimum of sets and using the <br> completeness property of real numbers | K 5 |
| CO 5 | Students will be able to demonstrate ability to use Taylor Theorem, <br> the Mean value Theorem, and use L'Hospital'S Rule to compute limits <br> of functions. | K 6 |

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 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | M | S | S | S | M | S | S |
| CO 2 | S | S | S | S | S | S | S | S | S | S |
| CO 3 | S | S | M | S | M | S | M | S | M | S |
| CO 4 | S | M | S | S | M | S | S | S | S | S |
| CO 5 | S | S | M | S | S | S | S | S | S | S |

S - Strong, M - Moderate, L- Low

Course Outcomes:

| CO | Course Outcomes | Knowledge <br> Level |
| :--- | :--- | :--- |
| CO 1 | Recognize differential equations that can be solved by each of the <br> three methods - direct integration, separation of variables and <br> integrating factor method - and use the appropriate method to solve <br> them . | K 2 |
| CO 2 | Use an initial condition to find a particular solution of a differential <br> equation, given a general solution . | K 2 |
| CO 3 | Check a solution of a differential equation in explicit or implicit form, <br> by substituting it into the differential equation . | K 3 |
| CO 4 | Understand the terms " exponential growth/decay", <br> proportionate growth rate" and "doubling/halving time" <br> when applied to population models, and the terms,, exponential <br> decay, "decay constant" and "half- life"' when applied to <br> radioactivity. | K 5 |

K1- Remember, K2- Understand, K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

## Mapping with Programme Outcomes:

| $\mathrm{COs} / \mathrm{POs}$ | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1 | PSO 2 | PSO3 | PSO4 | PSO5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | M | S | S | S |
| CO 2 | S | M | S | S | S | M | M | M | M | S |
| CO 3 | S | S | M | S | S | S | S | S | S | S |
| CO 4 | S | S | S | M | S | S | S | S | S | S |

S - Strong, M - Moderate, L- Low

## Course Outcomes:

| CO | Course Outcomes | Knowledge <br> Level |
| :--- | :--- | :---: |
| CO 1 | State all of the technical definitions covered in the course (such as a <br> graph, tree, colouring, cut edges, cut vertices, connectivity"s, cycle <br> and tours, digraph, flows and cuts) | K2 |
| CO 2 | State all of the relevant theorems covered in the course | K 3 |
| CO 3 | Formulate graph theoretic models to solve real world problems <br> (THE MAX-FLOW MIN- CUT) | K 4 |
| CO 4 | Analyze combinatorial objects satisfying certain properties and <br> answer questions related to existence (proving the existence or non- <br> existence of such objects), construction (describing how to create <br> such objects in the case they exist), enumeration (computing the <br> number of such objects), and optimization (determining which objects <br> satisfy a certain external property) | K 4 |
| CO 5 | Decision/network will take existing/proposed network /social to avoid <br> ambiguity. | K 6 |

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 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | S | S | S | S | S | M | S |
| CO 3 | S | S | S | S | M | S | S | S | S | S |
| CO 4 | S | S | S | S | S | S | S | S | S | S |
| CO 5 | S | S | S | S | S | S | S | S | S | S |

S - Strong , M - Moderate , L- Low

## COURSE CODE : P21MTT15

## Course Outcomes :

| CO | Course Outcomes | Knowledge <br> Level |
| :--- | :--- | :---: |
| CO 1 | Apply numerical methods to find our solution of algebraic <br> equations using different methods under different conditions <br> and numerical solution of system of algebraic equations. | K 3 |
| CO 2 | Apply various interpolation methods and finite difference <br> concepts. | K 3 |
| CO 3 | Workout numerical differentiation and integration whenever <br> and wherever routine methods are not applicable. | K 3 |
| CO 4 | Work numerically on the ordinary differential equations using <br> different methods through the theory of finite differences. | K 3 |
| CO 5 | Work numerically on the partial differential equations using <br> different methods through the theory of finite differences. | K 3 |

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 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | M | S | S |
| CO 2 | S | S | S | S | M | S | S | S | S | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | S | M | S | S | S | S | S | S |
| CO 5 | 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

## Course Outcomes:

| CO | Course Outcomes | Knowledge <br> Level |
| :--- | :--- | :---: |
| CO 1 | Determine relationship between coefficient matrix inevertability and <br> solutions to a system of linear equations and the inverse matrices. | K 2 |
| CO 2 | Find a basis for the row space, column space and null space of a <br> matrix and find the rank and nullity of a matrix. | K 3 |
| CO 3 | Find the matrix representation of a linear transformation given <br> bases of the relevant relevant vector spaces. | K 4 |
| CO 4 | Use computational techniques and algebraic skills essential for the <br> study of systems of linear equations, matrix algebra, vector spaces, <br> Eigen values and Eigen vectors, orthogonality and diagonalization. <br> (Computational and Algebraic Skills). | K 5 |
| CO 5 | Work collaboratively with peers and instructors to acquire <br> mathematical and understanding and to formulate and solve <br> problems and present solutions. | K 6 |

K1- Remember, K2- Understand, K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

## Mapping with Programme Outcomes:

| COs/POs | PO1 | PO 2 | PO3 | PO 4 | PO 5 | PSO | PSO 2 | PSO3 | PSO4 | PSO5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | M | S |
| CO 2 | S | S | S | M | S | S | S | S | S | S |
| CO 3 | S | S | S | S | S | S | M | S | M | S |
| CO 4 | S | S | $M$ | S | S | S | S | S | S | S |
| CO 5 | S | S | S | S | M | S | S | S | S | S |

S-Strong $=3, \mathrm{M}-$ Medium $=2$, L-Low $=1$

## Course Outcomes:

| CO | Course Outcomes | Knowledge <br> Level |
| :--- | :--- | :---: |
| CO 1 | Investigate the ideas of continuity and inverse images of open and <br> closed sets, functions continuous on compact sets. | K 2 |
| CO 2 | Differentiate the concepts of connectedness and implement them on <br> various sets. | K 3 |
| CO 3 | Examine the derivatives of functions and apply few theorems based <br> on it. | K 4 |
| CO 4 | Investigate properties of monotonic functions. | K 5 |
| CO 5 | Learn the properties of Riemann- Stieltjes integral. | K 6 |

K1- Remember, K2- Understand, K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

## Mapping with Programme Outcomes :

| $\mathrm{COs} / \mathrm{POs}$ | PO 1 | PO 2 | PO 3 | PO 4 | PO | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | M | S | S | S | S | S | S |
| CO 2 | S | S | S | S | S | S | S | S | S | S |
| CO 3 | S | S | M | S | M | S | S | S | S | S |
| CO 4 | S | M | S | S | S | S | M | M | S | S |
| CO 5 | S | S | M | S | S | S | M | S | S | M |

S-Strong $=3, \mathrm{M}-$ Medium $=2$, L-Low $=1$

## Course Outcomes:

| CO | Course Outcomes | Knowledge <br> Level |
| :--- | :--- | :--- |
| CO 1 | Recognize differential equations that can be solved by each of the <br> three methods - direct integration, separation of variables and <br> integrating factor method - and use the appropriate method to solve <br> them. | K 2 |
| CO 2 | Use an initial condition to find a particular solution of a differential <br> equation, given a general solution. | K 3 |
| CO 3 | Check a solution of a differential equation in explicit or implicit form, <br> by substituting it into the differential equation. | K 4 |
|  | Understand the terms "exponential growth/decay",, <br> proportionate growth rate" and "doubling/halving time" when <br> applied to population models, and the terms "exponential <br> decay"", "decay constant" and "half- life" when applied to <br> radioactivity. | K 5 |

K1- Remember, K2- Understand, K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

## Mapping with Programme Outcomes:

| $\mathrm{COs} / \mathrm{POs}$ | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO 5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | M | S | S | S |
| CO 2 | S | M | S | S | S | M | M | M | M | S |
| CO 3 | S | S | M | S | S | S | S | S | S | S |
| CO 4 | S | S | S | M | S | S | S | S | S | S |

S-Strong $=3$, M-Medium $=2$, L-Low $=1$

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Know how the topology on a space is determined by the collection of <br> open sets, by the collection of closed sets, or by a basis of <br> neighbourhoods at each point. | K 2 |
| CO 2 | Know the definition and basic properties of connected spaces, path <br> connected spaces, compact paces, and locally compact spaces. | K 3 |
| CO 3 | Know what it means for a metric space to be complete, and you can <br> characterize compact metric spaces. | K 4 |
| CO 4 | Familiar with the Urysohn lemma and the Tietze extension theorem, <br> and you can characterize metrizable spaces. | K 5 |
| CO 5 | Familiar with the construction of the fundamental group of a topological <br> space and applications to covering spaces and homology theory. | K 5 |

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 |
| :---: | ---: | :---: | :---: | ---: | ---: | ---: | ---: | ---: | ---: | ---: |
| CO 1 | S | S | S | M | S | S | S | S | S | S |
| CO 2 | S | S | S | S | S | M | S | S | M | S |
| CO 3 | S | S | M | S | M | S | S | S | S | S |
| CO 4 | S | M | S | S | S | S | S | M | S | S |
| CO | S | S | M | S | S | S | S | S | S | S |

$$
\text { S-Strong }=3, \text { M-Medium }=2, \text { L-Low }=1
$$

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO1 | Analyze the real-life systems with limited constraints. | K 2 |
| CO 2 | Identify the mathematical nature of a given optimization problem. | K 3 |
| CO 3 | Analyze a range of classes of optimization problems. | K 4 |
| CO 4 | Identify solution methods for the optimization problems studied. | K 5 |
| CO 5 | Depict the systems in a mathematical model form. | K 6 |

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 |
| CO 2 | S | S | S | M | S | S | S | S | M | S |
| CO 3 | 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

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Explain and apply Cauchy's integral formula and some of its <br> consequences. | K 2 |
| CO 2 | Explain the convergence of power series and develop analytical <br> capabilities in Taylor or Laurent series in a given domain. | K 3 |
| CO 3 | Define the fundamental concepts of complex numbers and its <br> properties, Exponential, logarithmic, trigonometric and hyperbolic <br> complex functions. | K 4 |
| CO 4 | Describe Holomorphic and harmonic complex functions and list <br> different examples. | K 5 |
| CO 5 | State Complex integral on a path - Cauchy theorem and Cauchy <br> integral formula name zeros and singularities of a Complex <br> function and the residue theorem. | K 6 |

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 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | M | S | S | S | S | M | S |
| CO 2 | S | S | S | S | S | M | S | S | S | S |
| CO 3 | S | S | M | S | M | S | S | M | S | S |
| CO 4 | S | M | S | S | S | S | M | S | S | S |
| CO 5 | S | S | M | S | S | M | S | S | S | S |

S-Strong $=3$, M-Medium=2, L-Low $=1$

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Understanding the basic concepts of the definition of general <br> Lebesque integral. | K 2 |
| CO 2 | Derives the concepts of Borel sets, measurable functions, <br> differentiation of monotone functions | K 4 |
| CO 3 | Demonstrate statement of main results in fundamental integral <br> theorems, monotone convergence theorem, and its related <br> proves and results. | K 5 |
| CO 4 | Demonstrate the proof in integration in product spaces and <br> signed measures. | K 6 |
| CO 5 | Apply the theory of this course to solve real problems in difficult <br> situations. | K |

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 |
| CO 2 | S | S | S | M | S | S | S | M | S | S |
| CO 3 | S | S | S | S | S | S | S | S | S | S |
| CO 4 | 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 Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Understand planes, spaces curves, arc, nature of points, geodesic <br> concepts <br> Prove theorems planes, surfaces, Identification of important | K2 |
| CO 2 | types of curves in surfaces, including principal curves, <br> asymptotic curves and geodesics using fundamental existence <br> theorem for space curves | K3 |
| CO 3 | Enumerate some standard examples in geometry, such as <br> surfaces of constant Gaussian curvature, compact and non - <br> compact surfaces, and surfaces of revolution | K4 |
| CO 4 | Evaluate Gaussian and mean curvatures using variety of <br> methods including patch computations .Differential equations of <br> geodesics using normal property | K5 |
| CO 5 | 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 $=3, \mathrm{M}-$ Medium $=2$, L-Low $=1$

Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Solve the Lagrange's equations for simple configurations using <br> various Methods. | K 2 |
| CO 2 | Understand the concept of Hamilton Jacobi Theory. |  |
| CO 3 | Understand the concept canonical Transformations. <br> CO 4 | Develop skills in formulating and solving physics problems. |
| CO 5 | Get idea of dynamical systems are of relatively recent origin, the <br> concept of motion in phase- space and its geometrical depiction is <br> simple. | K 6 |

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 |
| CO 2 | S | S | S | M | S | S | S | S | M | S |
| CO 3 | S | S | M | S | S | S | M | M | S | S |
| CO 4 | S | M | S | S | S | S | S | S | S | S |
| CO 5 | 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

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Demonstrate to understand competence with the basic ideas of <br> TheMethod of Variations in Problems with fixed Boundaries, <br> and unknown functions are in integral equations. | K 2 |
| CO 2 | Develop and solve problems in integral equations, special <br> kind of equation for several independent variables. | $\mathrm{K} 3, \mathrm{~K} 4$ |
| CO 3 | Analyse Parametric forms with moving boundaries and other <br> problems and kernel for integral equations. | K 4 |
| CO 4 | Apply Euler's finite difference method, The Ritz method and <br> Kantorovich's method in Vibrational Problems, and in the field <br> of extremely | K 6 |
| CO 5 | Evaluate the extremals of functionals, solving applied <br> problems, Solve differential and integral equations Compose <br> clear and accurate proofs using the concepts of reduction to a <br> system of Algebraic equations. | $\mathrm{K} 4, \mathrm{~K} 5, \mathrm{~K} 6$ |

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 |
| CO 2 | S | S | S | S | S | S | S | S | S | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | S | S | S | S | S |
| CO 5 | S | S | S | S | S | S | S | S | S | M |

S- Strong =3, M-Medium = 2, L-Low = 1

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Describe properties of normed linear spaces and construct examples <br> of such spaces. | K 2 |
| CO 2 | Apply basic theoretical techniques to analyze linear functionals and <br> operators on Banach and Hilbert spaces. | K 3 |
| CO 3 | Apply Finite-Dimensional Spectral Theory survey of the situation. | K 4 |
| CO 4 | Apply theorems to do problems. | K 5 |

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 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | M | S |
| CO 2 | S | S | S | M | S | S | S | S | M | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | S | M | S | S | S |

S- Strong=3, M-Medium=2, L-Low $=1$

## SEMESTER -IV

## COURSE CODE : P21MTE411

## Course Outcomes:

| CO | CO Statement | Knowledge Level |
| :---: | :--- | :---: |
| CO 1 | Demonstrate factual knowledge including the mathematical <br> notation and terminology of number theory. | K 2 |
| CO 2 | Construct mathematical proofs of statements and find <br> counterexamples to false statements in Number Theory. | K 3 |
| CO 3 | Apply theoretical knowledge to problems of computer <br> Security. | K 4 |
| CO 4 | Analyze the logic and methods behind the major proofs in <br> number theory. | K 5 |

K1- Remember, K2- Understand, K3-Apply, K4- Analyse, K5- Evaluate, K6- Create
Mapping with Programme Outcomes:

| $\mathrm{COs} / \mathrm{POs}$ | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1 | PSO 2 | PSO3 | PSO4 | PSO5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | M | S | S | S | M | S | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | S | S | M | S | S |

S- Strong =3, M-Medium=2, L-Low =1

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Acquire a fundamental understanding of the core concepts in automata <br> theory and formal languages | K 2 |
| CO 2 | Design grammars and automata (recognizers) for different language <br> classes | K 3 |
| CO 3 | Identify formal language classes and prove language membership <br> properties | K 4 |
| CO 4 | Prove and disprove theorems establishing key properties of formal <br> languages and automata | K 5 |
| CO 5 | Solve the sums based on automata and grammar | K 5 |

K1- Remember, K2- Understand, K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

## Mapping with Programme Outcomes:

| $\mathrm{COs} / \mathrm{POs}$ | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | S | M |
| CO 2 | S | S | S | M | S | S | M | S | S | S |
| CO 3 | S | S | S | S | S | S | S | M | S | S |
| CO 4 | S | S | M | S | S | S | S | S | S | S |
| CO 5 | S | S | S | S | M | S | M | S | S | S |

$$
\text { S- Strong }=3, \text { M-Medium }=2, \text { L-Low }=1
$$

COURSE CODE : P21MTE413
PROBABILITY THEORY AND STATISTICS
Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO1 | Demonstrate the basic concepts of statistics, probability and <br> random variables | K2 |
| CO2 | Apply the concepts in finding the moments of the <br> distributions. | K 3 |
| CO3 | Identify the type of the distribution and estimation | K 4 |
| CO4 | Understand the basics of sampling distribution theory | K 5 |

K1- Remember,K2- Understand, K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

## Mapping With Programme Outcomes:

| $\mathrm{COs} / \mathrm{POs}$ | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | M | S | S | S | S | M | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | M | S | S | S | S |

S- Strong =3, M-Medium=2, L-Low = 1

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Defining about the observed properties of physical systems that <br> comprise the known universe. | K 1 |
| CO 2 | Demonstrate their ability to read, understand, and critically <br> analyze the astronomical/physical concepts. | K 2 |
| CO 3 | Applying their physics and mathematical skills to problems in <br> the areas of planetary science. | K 3 |
| CO 4 | Analyze to draw valid scientific conclusions and communicate <br> those conclusions in a clear and articulate manner. | K 4 |

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 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | M | S | S | S | S | M | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | M | S | S | S | S |

S- Strong =3, M-Medium=2, L-Low = 1

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Demonstrate the basic concepts of fuzzy sets and <br> membership functions, Know various AI search <br> algorithms. | K 2 |
| CO 2 | Ability to find examples for crisp equivalence relation. | K 3 |
| CO 3 | Applying the concept in Fuzzy Morphisms. | K 4 |
| CO 4 | Understand the basics of sampling distribution theory. | K 5 |

K1- Remember, K2- Understand, K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

## Mapping With Programme Outcome:

| COs/POs | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | M | S | M | S | M | S | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | S | S | S | S | S |

S-Strong $=3$, M-Medium=2, L-Low=1

## Course Outcomes:

| CO <br> Number | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| $\mathrm{CO1}$ | Demonstrate the basic concepts of Stochastic process, Markov <br> Chains. | K2 |
| CO 2 | Apply the concepts in Birth and Death Distribution Process. | K3 |
| CO 3 | Identify the type of the Differential Equations for A Wiener <br> Process -Kolmogorov Equation. | K 4 |
| CO 4 | 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 |
| CO 2 | S | S | S | M | S | S | S | M | S | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | S | M | M | S | M |

S-Strong =3, M-Medium = 2, L-Low=1

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Understand the fundamental knowledge of fluids and its <br> properties | K 2 |
| CO 2 | Describe the concepts and equations of fluid dynamics. | K 3 |
| CO 3 | Apply thermodynamic control volume concepts in fluid <br> dynamics for applications that include momentum, mass and <br> energy balances | K 4 |
| CO 4 | Analyze the approximate solutions of the Navier-Stokes <br> equation | K 5 |

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 |
| CO 2 | S | S | S | M | S | S | M | S | S | S |
| CO 3 | S | S | S | S | S | S | S | M | S | S |
| CO 4 | S | S | M | S | M | S | S | S | M | S |

S- Strong =3, M-Medium =2, L-Low=1

## COURSE CODE: P21MTE424 <br> TENSOR ANALYSIS AND SPECIAL THEORY OF RELATIVITY

## Course Outcomes:

| CO <br> Number | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Understand concept of tensor variables and difference from <br> scalar or vector variables. | K 2 |
| CO 2 | Derive base vectors, metric tensors and strain tensors in an <br> arbitrary coordinate system. | K 3 |
| CO 3 | Investigate the Christoffel symbols which provide a <br> concrete representation of the connection of (pseudo-) <br> Riemannian geometry in terms of coordinates on the <br> manifold. | K 4 |
| CO 4 | Apply Riemannan-Christoffel tensor to problems of <br> differential geometry, electrodynamics and relativity. | K 5 |

K1- Remember, K2- Understand, K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

## Mapping with Programme Outcomes:

| $\mathrm{COs} / \mathrm{POs}$ | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1 | PSO2 | PSO3 | PSO4 | PSO5 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | M | S | S | M | S | S | S |
| CO 3 | S | S | S | S | S | S | S | M | S | S |
| CO 4 | S | S | M | S | S | S | S | S | S | M |

S- Strong $=3, \mathrm{M}-\mathrm{Medium}=2, \mathrm{~L}-\mathrm{Low}=1$

## 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 $2^{\text {nd }}$ 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 $1^{\text {st }}$ week. Work done- $25 \%$ work ( 5 marks)
(iii). Third Meet -February $1^{\text {st }}$ week, Work done $-50 \%$ work ( 5 marks)
(iv). Fourth Meet - March $1^{\text {st }}$ 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

## Course Outcome:

| CO <br> Number | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Understand the equations using different methods under differ <br> conditions and numerical solutions of system algebraic equation. | K 1 |
| CO 2 | Apply various interpolation methods and finite different concepts | K 3 |
| CO 3 | Analyse differentiation and integration whenever and where ever <br> routine methods are not applicable. | K 4 |
| CO 4 | Evaluate the ordinary differential equations using different methods <br> through the theory of finite differences. | K 5 |
| CO 5 | Evaluate the partial differential equations using different methods <br> through the theory of finite differences. | K 5 |

K1 - Remember, K2 - Understand, K3 - Apply, K4 - Analyze, K5 - Evaluate, K6 - Create

## Course Outcome:

| CO <br> Number | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO1 | Understand the application of OR and frame a LP Problem with solution <br> -graphic and through solver add in excel. | K1 |
| CO 2 | Analyze and interpret results of transportation and problem using <br> appropriate method Solutions of assignment and problem using <br> appropriate method. | K 2 |
| CO 3 | Evaluate simple model of L.P.P. | K 3 |
| CO 4 | Understand and evaluate of CPM and PERT define basic components of <br> Network and find critical path. | K 3 |
| CO5 | Find the replacement period of equipment that failssuddenly/gradually. | $\mathrm{K} 4, \mathrm{~K} 5$ |

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create

## Course Outcome:

| CO <br> Number | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO1 | Understanding of some Logic truth tables | K 2 |
| CO2 | Prove / define basic normal forms | K 3 |
| CO3 | To analyses the concepts of free and bound variable formulas | K 4 |
| CO4 | Understanding the concepts of Grammars | K 4 |
| CO5 | Basic concepts of Languages and basic definitions of Automata | K 6 |

K1- Remember, K2- Understand , K3-Apply, K4- Analyse, K5- Evaluate; K6- create

## Course Outcome:

| CO <br> Number | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO 1 | Solve linear equations with variable coefficients. | K 2 |
| CO 2 | Understand the fundamental properties of the PDE | $\mathrm{K} 1 \& \mathrm{~K} 2$ |
| CO 3 | Apply the Differentation Of Higher Order Methods to <br> solve Practical life problems | K 3 |
| CO 4 | Aolve partial differential equations using Lagrange"s <br> method and Charpit`s method | $\mathrm{K} 3 \& \mathrm{~K} 4$ |
| CO 5 | Create real life problems into ordinary differential <br> equations. | $\mathrm{K} 4 \& \mathrm{~K} 5$ |

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate; K6 - Create


## Course Outcomes:

| CO Number | CO statement | Knowledge level |
| :---: | :--- | :--- |
| CO 1 | Integral equations of Fourier Transforms | K4 |
| CO 2 | Demonstrate the Fourier Transforms | K3 |
| CO 3 | Understand the fundamental properties of the <br> Laplace transforms | K1\&K2 |
| CO 4 | Apply the Laplace inverse transforms to solve <br> simultaneous equations | K 3 |

K1 - Remember; K2 - Understand; K3 - Apply; K4 - Analyze; K5 - Evaluate, K6 - Create


## Course Outcomes:

| CO Number | CO statement | Knowledge level |
| :---: | :--- | :--- |
| CO1 | Analyse -Primary data-Secondary data | K4 |
| CO2 | Measure of Central Tendency and Measure of <br> Variation | K3 |
| CO3 | Understand and apply Correlation and Regression | K1\&K2 |
| CO4 | Understand Theoretical distributions | K2 |
| CO5 | Sampling Theory and Testing of Significance: <br> 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 |

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 |

## Course Outcomes:

| CO | CO Statement | Knowledge <br> Level |
| :---: | :--- | :---: |
| CO1 | Demonstrate the basic concepts of types of mat lab mathematical <br> operators, Relational, binary and logical operators | K2 |
| CO2 | Apply the concepts in expanding and reducing size- reshaping, <br> 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 | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | M | S | S | S | S | M | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | S | S | M | S | S |
| CO 5 | S | S | S | S | M | S | S | S | M | S |

S-Strong $=3, \mathrm{M}-$ Medium $=2, \mathrm{~L}-$ Low $=1$

## Value Added Program



## Course Outcomes (CO)

| CO 1 | To implement basic concepts of operators and <br> functions. | K 1 |
| :---: | :--- | :---: |
| CO 2 | To Review various string, list, tuple and dictionaries. | K 2 |
| CO 3 | To evaluate the functionality of an exception <br> handling. | K 3 |
| CO 4 | To analyze the concept of classes and objects. | K 4 |

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 |
| CO 2 | S | S | S | M | S | S | S | S | M | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | S | S | M | S | S |
| CO 5 | 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 <br> Program- I |  |  | - | - | - | 2 |

## Course Outcomes (CO)

| CO1 | To implement basic operators and function <br> concepts. | K3 |
| :---: | :---: | :---: |
| CO 2 | To Review various string and list methods. | K4 |
| CO 3 | To execute exception handling. | K5 |

Mapping with Programme Outcomes:

| COs/POs | PO1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO 5 |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | M | S | S | S | S | M | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |

S- Strong $=3, \mathrm{M}-$ Medium $=2, \mathrm{~L}-$ Low $=1$

| COURSE CODE | P21MTV42 | Mathematical Modelling | L | T | P | C |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| SEMESTER - IV |  |  | - | - | - | 2 |

## COURSE OUTCOME:

| CO1 | Develop Mathematical Models For Trigonometry <br> 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 <br> problems. | K5 |

K1- Remember: K2- Understand: K3-Apply, K4- Analyse, K5- Evaluate, K6- Create

## Mapping with Programme Outcomes:

| COs/POs | PO1 | PO 2 | PO 3 | PO 4 | PO 5 | PSO 1 | PSO 2 | PSO 3 | PSO 4 | PSO |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| CO 1 | S | S | S | S | S | S | S | S | S | S |
| CO 2 | S | S | S | M | S | S | S | S | M | S |
| CO 3 | S | S | S | S | S | S | M | S | S | S |
| CO 4 | S | S | M | S | S | S | S | M | S | S |

S-Strong $=3, \mathrm{M}-$ Medium $=2$, L-Low $=1$

