

Name of the faculty : Dr. Reena Garg

Class/Discipline : M.Sc. (Mathematics) III sem

Subject: Partial Differential Equations

Lecture Plan Duration : 12 weeks (July 2025 - Dec.2025)

Work load Lecture: 04/week

| Week | Theory | |
|------|-------------|---|
| I | Lecture Day | Topic |
| | I | Method of Separation of variables to solve B.V.P. associated with one dimensional heat equation |
| | II | Continue..... |
| | III | Heat equation in semi-infinite regions. |
| | IV | Heat equation in infinite regions. |
| II | I | Continue..... |
| | II | Solution of three dimensional Laplace equation in Cartesian coordinates |
| | III | Solution of three dimensional Laplace equation in Cylindrical coordinates |
| | IV | Continue..... |
| III | I | Solution of three dimensional Laplace equation in Spherical coordinates |
| | II | Continue..... |
| | III | Solution of Wave equation in two dimensional |
| | IV | Continue..... |
| IV | I | Solution of wave equation in three dimensional (Cartesian , Cylindrical, Spherical) |
| | II | Continue..... |
| | III | PDE OF k th Order : Definition, examples and classifications |
| | IV | Continue..... |
| V | I | Initial value problems, Transport equations: definition |
| | II | Continue..... |
| | III | Solution of homogeneous transport equations |
| | IV | Solution of non-homogeneous transport equations |

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| VI | I | Continue..... |
| | II | Laplace Equation, Fundamental solution of Laplace equation |
| | III | Continue..... |
| | IV | Harmonic function , Mean Value formula for Harmonic function |
| VII | I | Continue..... |
| | II | Green's formula, Corrector function (definition only) |
| | III | Green's function and its derivation |
| | IV | Continue..... |
| VIII | I | Representation formula using Green's function, Symmetry of Green's function |
| | II | Continue..... |
| | III | Energy methods : uniqueness, Dirichlet Principle |
| | IV | Continue..... |
| IX | I | Heat Equations : Fundamental solution of Heat equation |
| | II | Continue..... |
| | III | Uniqueness of Heat equation :Energy methods |
| | IV | Continue..... |
| X | I | Wave equation – Physical interpretation |
| | II | Solution for one dimensional wave equation, Reflection method |
| | III | Continue..... |
| | IV | derivation of Euler-Poisson Darboux equation |
| XI | I | Continue..... |
| | II | Kirchhoff's and Poisson's formulas (for $n=2,3$ only) |
| | III | Continue..... |
| | IV | Continue..... |
| XII | I | Solution of non-homogeneous wave equation for $n=1,3$ |
| | II | Continue..... |
| | III | Energy method: Uniqueness of solution |
| | IV | Continue..... |

Two weeks are for sessionals.

Total 14 weeks.

Name of the Teacher: Dr. Reena Garg

Class/Discipline: B.Tech(ECE/ENC) 1st semester

Subject: Calculus and Linear Algebra(BSC-103D)

Lecture Plan Duration: 12 weeks(July,2025-Dec, 2025)

Work load :4L/week

| Week | Theory | |
|------|-------------|---|
| I | Lecture Day | Topic |
| | I | Evolutes and involutes |
| | II | Evaluation of definite and improper integrals |
| | III | Continue..... |
| | IV | Beta and Gamma functions and their properties; |
| II | I | Questions based on it |
| | II | Applications of definite integrals to evaluate surface areas and volumes of revolutions |
| | III | Continue..... |
| | IV | Rolle's Theorem |
| III | I | Mean value theorems |
| | II | Taylor's and Maclaurin theorems with remainders |
| | III | Continue..... |
| | IV | indeterminate forms and L'Hospital's rule |
| IV | I | Maxima and minima |
| | II | Questions based on it |
| | III | Continue..... |
| | IV | Convergence of sequence and series |
| V | I | tests for convergence |
| | II | Power series |
| | III | Taylor's series |
| | IV | series for exponential |
| VI | I | trigonometric and logarithm functions |
| | II | Fourier series: Half range sine and cosine series, |
| | III | Questions based on it |
| | IV | Parseval's theorem |
| VII | I | Limit, continuity and partial derivatives, |
| | II | Continue..... |
| | III | directional derivatives, total derivative |

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| | IV | Questions based on it |
| VIII | I | Tangent plane and normal line; |
| | II | Questions based on it |
| | III | Maxima, minima for two variables |
| | IV | Saddle points |
| IX | I | Method of Lagrange multipliers |
| | II | Continue..... |
| | III | Gradient, curl |
| | IV | Divergence |
| X | I | Inverse and rank of a matrix |
| | II | Continue..... |
| | III | rank-nullity theorem |
| | IV | Continue..... |
| XI | I | System of linear equations |
| | II | Symmetric, skew- symmetric |
| | III | Continue..... |
| | IV | orthogonal matrices |
| XII | I | Determinants ,Orthogonal transformation |
| | II | Eigenvalues and eigenvectors |
| | III | Diagonalization of matrices |
| | IV | Cayley-Hamilton Theorem |

Two weeks are for sessionals.

Total 14 weeks.