UG SEMESTER- III
(For students with Mathematics as a minor subject)

Applicable Mathematics– III

Credit: 4 T:04

Course Outcomes:

1. To know the basic concepts of complex analysis including Cauchy's integral formula, derivative of analytic functions, Taylor's and Laurent's series.
2. To understand various methods for numerical solutions of equations.
3. To know how to do numerical differentiation and integration.
4. To solve systems of linear equations by standard methods.

UNIT I

Functions of complex variables - analytic functions, Cauchy - Riemann equations, harmonic functions, Cauchy's integral theorem, Cauchy's integral formula, derivatives of analytic functions, formulae for first, second and nth derivatives, Taylor's and Laurent's series, singularities, zeroes and poles of order n.

UNIT II

Numerical solutions of equations - bisection method, secant method, regula -falsi method, Newton - Raphson method and interpolation with equispaced points.

UNIT III

Finite differences, Newton's forward and backward interpolation formula, Lagrange interpolation formula, divided differences and Newton's formula, numerical differentiations and integration - trapezoidal and Simpson's rules, Newton-Cotes integration formula, Ramberg integration, Gaussian quadrature.

UNIT IV

Systems of linear equations - Gauss elimination method, Gauss-Jordan method, LU decomposition, Jacobi method, Gauss - Seidel method, the algebraic eigenvalue problem - Jacobi's method and power method.

References:

Textbooks

1. J.W. Brown and R.V. Churchill : Complex Variables and Applications, Mc Graw Hill.

2. M.K. Jain, S.R.K. Iyengar and R.K. Jain : Numerical methods for scientific and engineering computations, New Age International, New Delhi.

Suggested Books:

1. S.S. Sastry : Introductory Methods of Numerical Analysis, Prentice Hall of India.
2. Complex Variables, Schaum's Outline Series

UG SEMESTER- IV
(For students with Mathematics as a minor subject)

Applicable Mathematics– IV

Credit: 4 T:04

Course Outcomes:

1. To understand application and techniques of solving various types of ordinary differential equations.
2. To understand the Laplace transforms and its applications in solving differential equations.
3. To understand Fourier series and Fourier transforms.
4. To understand standard techniques for finding numerical solution of ordinary differential equations.

UNIT I

Ordinary differential equations - Bernoulli's equation, exact differential equations and integrating factors, special integrating factors and transformations, differential equations of order one and degree more than one, Clairaut's equation, singular solutions and orthogonal trajectories, Linear differential equations with constant coefficients, homogeneous Linear differential equations, series solutions of Legendre's, Bessel's and hypergeometric equations and their basic properties.

UNIT II

Laplace transforms - existence theorem, Laplace transforms of derivatives and integrals, inverse Laplace transform, convolution theorem, applications to simple linear differential equations.

UNIT III

Periodic functions, Fourier series, Fourier expansion of piecewise monotonic functions, half and full range expansions, Fourier transforms (finite and infinite), Fourier integral.

UNIT IV

Numerical solution of ordinary differential equations - Taylor series method, Euler's method, Runge - Kutta method, Milne's method, Adam's method.

References:

Textbooks

1. G. F. Simmons : Differential Equations with Applications and Historical Notes, Tata McGraw Hill.

2. M.K. Jain, S.R.K. Iyengar and R.K. Jain : Numerical methods for scientific and engineering computations, New Age International, New Delhi.

3. T. M. Apostol : Mathematical Analysis.