

NUMERICAL METHODS SYLLABUS

UNIT-I

Numerical Differentiation and Integration

Introduction, Numerical Differentiation, Numerical Integration, Euler-Maclaurin Formula, Adaptive Quadrature Methods, Gaussian Integration, Singular Integrals, Fourier Integrals, Numerical Double Integration

UNIT-II

Numerical Solution of Ordinary Differential Equations

Introduction, Solution by Taylor's Picard's Method, Euler's Method, Runge-Kutta Methods, Predictor-Corrector Methods, the Cubic Spline Method, Simultaneous and Higher Order Equations, Boundary Value Problems: Finite-Difference Method, The Shooting Method,

UNIT-III

Numerical Solution of Partial Differential Equations

Introduction, Finite-Difference Approximations, Laplace's Equation: Jacobi's Method, Gauss-Seidel Method, SOR Method, ADI Method, Parabolic Equations, Iterative Methods, Hyperbolic Equations.

UNIT-IV

System of Linear Algebraic Equations

Introduction, Solution of Centro-symmetric Equations, Direct Methods, LU- Decomposition Methods, Iterative Methods, Ill-conditioned Linear Systems.

UNIT-V

The Finite Element Method: Functionals- Base Function Methods of Approximation- The Rayleigh –Ritz Method –The Galerkin Method, Application to two dimensional problems- Finite element Method for one and two dimensional problems.

Reference Books:

1. Niyogi, Pradip, "Numerical Analysis and Algorithms", Tata McGraw –Hill
2. Balagurusamy, E., "Numerical Methods", Tata McGraw –Hill
3. Sastry, S.S., "Introduction Methods of Numerical Analysis", PHI
4. Chapra, S.C. and Canale, R.P., "Numerical Methods for Engineers", Tata McGraw –Hill