

NUMERICAL ANALYSIS

Transcendental and Polynomial equations: Initial approximations, First Degree Equation, Iteration Methods Based on Second Degree equation, Multipoint iteration method, Rate of Convergence, Efficiency of a method.

System of Linear Algebraic Equations: Effects of Round-off Error, Operations Counts, Standard Methods of Solutions, Convergence analysis Eigen values and Eigenvectors
Interpolation: Lagrange Polynomial Interpolation, Cubic Spline Interpolation,

Numerical Differentiation - Finite Differences: Construction of Difference Formulae. Accuracy of Finite Differences, Pade Approximations, Non-Uniform Grids.

Numerical Integration: Trapezoidal and Simpson's Rules, Error Analysis, Integration and Extrapolation, Quadrature.

Numerical Solution Of Ordinary Differential Equations: Initial Value Problems, Numerical Stability, Stability Analysis, Implicit, Runge-Kutta Methods, Multi-Step Methods, System Of First-Order Ordinary Differential Equations, Boundary Value Problems.

Numerical Solution of Partial Differential Equations: Semi-Discretization, von Neumann Stability Analysis, Modified Wave number Analysis, Implicit Time Advancement, Accuracy, Implicit Methods in Higher Dimensions, Approximate Factorization, Stability of the Factored Scheme, Alternating Direction Implicit Methods, Mixed and Fractional Step Methods, Elliptic Partial Differential Equations

Discrete Transform Methods: Discrete Fourier series, Applications, Finite Differenced Elliptic Equations, Fourier Spectral Numerical Differentiation, Discrete Transform and Applications, Numerical Differentiation.

Text Books:

1. Numerical Methods for scientific & Engg Computation- M. K. Jain, S. R. K. Iyengar & Jain.
2. Numerical Methods for Engineers – S. C Chapra and R. P. Canale. Mc GrawHill.

Reference Books

1. Numerical Methods – S. S. Rao.
2. Numerical Methods in Science & Engg: A Practical Approach – S. Rajashekharan. Wheeler Pub.
3. Numerical Recipes – W. H. Press, S. A. Teukolosky, W. T. Vetterling and B. P. Flannery Cambridge University Press.