

PMT5H001 ADVANCED NUMERICAL METHODS

Module-I : (10 Hours)

Interpolation: Piecewise Linear Interpolation, Piecewise Quadratic Interpolation, Piecewise Cubic Hermite Interpolation, Piecewise Spline Interpolation.

Numerical Differentiation: First Derivative, Higher Derivatives, Partial Derivative, Richardson's Extrapolation. Romberg algorithm for numerical integration.

Module-II (10 Hours)

Eigen values and Eigen Vectors: Basic power method, Rayleigh Quotient, Shifted power method, Accelerating convergence, Inverse power method, Basic QR method, Better QR method, Finding Eigen vectors, Accelerating convergence

Fourier methods: Discrete Fourier Transforms, Fast Fourier Transforms, Matrix form of FFT, Algebraic form of FFT, Mixed-Radix FFT

Module-III (10 Hours)

Ordinary Differential Equations: Adams-Bashforth Methods, Adams-Moulton Methods, Adams Predictor-Corrector methods, Other Predictor-Corrector methods (Simpson's method and Milne's method)

Parabolic Partial Differential Equation: Explicit Method, Implicit method, Crank-Nicolson method

Hyperbolic Partial Differential Equation: Explicit Method, Implicit method. Elliptic Partial Differential Equation: Finite-Element method.

Text Book:

1. *L.V. Fausett," Applied Numerical Analysis Using MATLAB", Pearson Education*

Reference Books:

2. *1.W.Cheney and D. Kincaid,"Numerical Mathematics and Computing", Fifth Edition, Thomson/CENGAGE Learning*
3. *S.C.Chapra,"Applied numerical methods with MATLAB", second edition, Tata McGraw Hills*
4. *R.J. Schilling and S.L.Harris,"Applied Numerical Methods for Engineering", CENGAGE learning*