

4th Semester	RMM4G001	Advance Numerical Methods	L-T-P 3-0-0	3 CREDITS
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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 (12 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

Module-III (8 Hours)

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

Module-IV (8 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).

Module-V (7 Hours)

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.

Books:

- L.V. Fausett," Applied Numerical Analysis Using MATLAB", Pearson Education
- I.W.Cheney and D. Kincaid,"Numerical Mathematics and Computing", Fifth Edition, Thomson/CENGAGE Learning
- S.C.Chapra,"Applied numerical methods with MATLAB", second edition, Tata McGraw Hills
- R.J. Schilling and S.L.Harris,"Applied Numerical Methods for Engineering", CENGAGE learning