

Module Code: MATH-403
Module Title: **Numerical Analysis - I**
Module Rating: 3 Cr. Hours

Number Systems and Errors

- Round off errors and computer arithmetic
- Error estimation
- Floating point arithmetic

Solution of Non-Linear Equations

- Iterative methods and convergence: Bisection method, fixed point iterative method, Regula Falsi, Secant and Newton's method

Systems of Linear Equations


- Direct methods: Gaussian elimination method, Gauss-Jordan method, matrix inversion method, factorization (Doolittle, Crout and Cholesky) method and its various forms
- Iterative methods and convergence: Gauss-Jacobi method and Gauss-Seidel method
- Ill-condition system and condition number
- Eigen values and eigenvectors
- Power and Rayleigh quotient method

Interpolation and Polynomial Approximation

- Difference operators
- Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's divided difference formula, error in polynomial interpolation
- Interpolation with equal intervals: Gregory Newton forward/backward interpolation formula, error in polynomial interpolation
- Central difference interpolation formulae: Gauss's forward/backward interpolation formula, Stirling's formula, Laplace Everett's formula, Bessel's formula

Recommended Books

1. Curtis F. Gerald and Patrick O. Wheatley, *Applied Numerical Analysis*, 6th edition, (Addison-Wesley Pearson Education, 2003)
2. Richard L. Burden and J. Douglas Faires, *Numerical Analysis*, 6th edition, (Brooks/Cole Publishing Company, 1997)
3. John H. Mathews, *Numerical Methods for Mathematics*, 3rd edition (Prentice Hall International, 2003)
4. V. N. Vadamurthy and N. Ch. S. N. Iyenger, *Numerical Methods*, (Vikas Publishing House Pvt. Ltd, 2002)
5. Steven C. Chapra and Raymond P. Canale, *Numerical Methods for Engineers*, 3rd edition, (McGraw Hill International Edition, 1998)



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