

Second year of Five Years integrated M. Sc. (Physics)

M. Sc.- II, Semester III

MS 213 (Basic Sciences Electives) : Numerical Analysis

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- **INTRODUCTION TO COMPUTING** (08 Hours)  
Errors & approximation, finite differences, difference operators & relations between them. Interpolation: Newton's forward & backward, Lagrange, divided differences.
  - **NUMERICAL SOLUTIONS OF TRANSCENDENTAL EQUATIONS** (08 Hours)  
Bisection, Secant, Regular-Falsi, Newton-Raphson, Iteration method.
  - **NUMERICAL DIFFERENTIATION & INTEGRATION** (09 Hours)  
Trapezoidal & Simpson's rule, Gauss Legendre quadrature, Newton Cote's formula.
  - **NUMERICAL SOLUTION OF SYSTEM OF LINEAR EQUATIONS:** (09 Hours)  
Direct (Gauss elimination, LU decomposition), Iterative (Jacobi & Gauss-Seidel). Eigen values problem: Jacobi's and power method.
  - **NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATION** (08 Hours)  
Taylor series method, Picard's method, Euler's method, Modified Euler's method, Runga-Kutta method.

(Total Contact Time (Theory): 42 Hours)

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**BOOKS RECOMMENDED :**

1. Scarborough, J. B., *Numerical mathematical analysis*, Oxford & IBH Publishing Co. Pvt. Ltd., 1966.
2. Atkinson, K. E., *An introduction to Numerical Analysis*, Wiley, 1989.
3. Jain, M. K., Iyenger, S. R. K., Jain, R. K., *Numerical Methods for Scientific and Engineering Computation*, New Age International Pvt. Ltd., 1996.
4. Conte, S. D. and De Boor, C. *Elementary Numerical Analysis\_An Algorithmic Approach*, McGraw-Hill, 1981.
5. Golub. G. H. and Ortega. J. M., *Scientific Computing and differential equations: An introduction to Numerical Methods*, academic Press, 1992.