BS-401: Engineering Mathematics-IV

Credit **L** **T** **P**
3 **2** **1** **-**

UNIT-I
Newton-Gregory, Gauss, Stirling and Bessel Formulae, Aitken & cubic spline interpolation methods for equal intervals; Newton's divided difference and Lagrange's formulae for unequal intervals; Inverse interpolation using.Lagrange's formula, method of successive approximation and double interpolation.

UNIT-II
Numerical successive differentiation using Forward, Backward, Central difference interpolation formulae. Newton's divided difference formula. Review of Trapezoidal, Simpson's 1/3 and 3/8 rules, Numerical integration using Boole's rule, Weddle's rule, Gauss-Legendre, Lobatto, Radau and Gauss-Chebyshev rules. Errors in Quadrature formulae, Romberg integration and Numerical double integration.

Unit-III
Bisection, Regula-False position, Newton-Raphson&Graeffe's Root-Squaring method for the solution of non-linear algebraic & transcendental equations involving one variable, rate of Convergence and error analysis of the methods, Newton-Raphson method for the solution of a system of non-linear equations of two variables.

UNIT-IV
Gauss Elimination & Gauss-Jordan methods, III conditioned linear system, Gauss-Seidal and Crout methods for the solution of a system of linear equations in four unknowns; General curves (linear, quadratic, exponential and other non-linear functions) fitting using methods of least squares.

UNIT-V
Numerical approximate solutions of a system of simultaneous and higher order differential equation using Taylor's series method, Picard's method and Runge-Kutta fourth order method; Runge-Kutta, Fehlberg method, Modified Euler and Milne methods; Solution of boundary value problems using finite differences method and cubic spline method.

*NOTE*1: Programming of a computer oriented numerical methods using C/C++
NOTE 2: In a total of five questions to be set in final examination, 50% question would be on Numerical methods and remaining 50% would be on computer applications of Numerical methods using C/C++ Language.

TEXT/REFFERENCE BOOKS
1. M.K. Jain, S.R.K. Iyengar& R.K. Jain: "Numerical Methods for Scientific and Engineering Computation", 4th Edition, New Age International Publisher, Daryaganj, New Delhi-01
2. S.S.Sastry: "Introductory Methods of Numerical Analysis", 4th edition, Prentice Hall of India, Jhilmil House, Patparganj, New Delhi.
3. Steven C. Chapra& Raymond P. Canal "Numerical Methods for Engineers", Tata McGraw Hill Book Co.
4. V. Rajaraman, "Computer Oriented Numerical Methods", Prentice Hall of India Pvt. Ltd.
5. Madhumangal Pal, "Numerical Analysis for Scientists & Engineers, Theory & C Programs", Narosa Publishing House, Daryaganj, New Delhi -110002
6. Shanta Kumar M, "Computer Based Numerical Analysis", Khanna Publishers, Delhi-110002
7. B.S. Grewal, "Numerical Methods in Engineering & Science with Programming in C/C++", Khanna Publishers.