MMA-C411

NUMERICAL ANALYSIS

MM : 100 Sessional : 30
Time : 3 hrs ESE : 70
L T P Pass Marks : 40
5 2 0

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper

Errors in numerical calculations: Absolute, Relative and percentage errors, A general error formula, Error in a series approximation. Solutions of algebraic and transcendental equations: The Bisection method and order of convergence, The iteration method and order of convergence, Regula-Falsi method and convergence, Secant method and rate of convergence, Newton-Raphson method and order of convergence. Solution of system of non-linear equations: The method of iteration, Newton-Raphson method.

Interpolation: Finite differences: Forward, Backward and central differences, Symbolic relations, Difference of polynomial, Newton's formulae of interpolation. Central difference interpolation formulae: Gauss's formula (forward and backward), Stirling's and Bessel's formulae. Interpolation with unevenly spaced points: Lagrange's interpolation formula and its error, Divided differences and their properties, Newton's general interpolation formula, Inverse interpolation, Method of successive approximations.

Solution of linear simultaneous equations: Crout's method, LU decomposition method, Gaussian elimination method, Gauss-Jordon method, Jacobi's method, Gauss-Seidel method.

Numerical differentiation and integration: Newton's forward and backward difference formula for first and second order derivatives, Errors in numerical differentiation for Newton's forward and backward difference formula, Numerical integration, Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Boole's rule, Weddle's rule, Newton-Cotes integration formulae.

Numerical solution of ordinary differential equations: Taylor's series, Picard's successive approximations, Euler's, Modified Euler's, Runge-Kutta and Milne's Predictor-Corrector methods, Simultaneous and higher order equations: Taylor's series method and Runge-Kutta method, Boundary value problems: Finite differences method.

Text /Reference Books

1. S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India, Pvt. Ltd.
2. M.K. Jain, S.R.K Iyengar and R.K.Jain, Numerical methods of Scientific and Engineering Computation, New Age International Pub.