M.A./M.Sc. (Final) Mathematics

MAMT-08   Paper-III : Numerical Analysis

Unit 1 : Iterative methods : Theory of iteration method. Acceleration of the convergence. Newton-Raphson method for simultaneous equations. Convergence of iteration process in the case of several unknowns.

Unit 2 : Chebyshev method. Muler's method. Methods for multiple and complex roots.

Unit 3 : Solution of polynomial equations : Polynomial equation, Real and complex roots. Synthetic division, the Birge-Vieta, Bairstow and Graefe'sroot squaring method.

Unit 4 : System of simultaneous equations (Linear)-Direct method. Method of determinant. Gauss-Jordan, LU-Factorization-Doolitte's. Crout's and Cholesky's. Partition method. Method of successive approximate-conjugate gradient and relaxation methods.

Unit 5 : Eigen-value problems-Basic properties of eige-values and eigen-vector. Power methods. Method for finding all eigen-values of a matrix. Jacobi.

Unit 6 : Givens and Rutishauser method. Complex eigen-values.

Unit 7 : Curve Fitting and Function Approximations : Least square error criterion. Linear regression. Polynomial fitting and other curve fitting.

Unit 8 : Approximation of functions by Taylor series and Chebyshev polynomials.

Unit 9 : Numerical solution of Ordinary differential Equations : Taylor series Method, Picard method, Runge-Kutta methods upto fourth order.

Unit 10 : Multistep method (Predictor-corrector strategies), Stability analysis-Single and Multistep methods.

Unit 11 : BVP's of ordinary differential equation : Boundary value problems (BVP's), Shooting methods.

Unit 12 : Finite difference methods, Difference schemes for linear boundary value problems of the type $y'' = f(x, y), y'' = f(x, y, y')$ and $y^{iv} = f(x, y)$.