Paper -V(MCA-205) : Computer Oriented Numerical and statistical techniques

UNIT-1

Floating point Arithmetic: Basic Concepts of floating point number systems, implications of finite precision, Illustration of errors due to round off.

Solution of non-linear Equations: Bisection, Fixed point iteration, Newton's method, rates of Convergence.

UNIT- II

Direct Methods for Linear Systems of Equations: Gaussian elimination, Operational counts, Implementation including pivoting and scaling.

Iterative methods: Jacobi's method, Gauss Seidal method, Acceleration of iterative methods, Relaxation method.

UNIT- III

Computation of Eigen values and Eigen vectors: Basic theorems. Error estimates, the power method, Jacobi's method, House holder's method.

UNIT- IV

Solution of Ordinary differential equations: Taylor series method, Euler's methods with local and global error analysis, Runge-Kutta Methods, Predictor-Corrector methods: Automatic error monitoring, change of step size and order.

UNIT- V

Probability: Sample spaces, events as subsets, probability axioms, sample theorems, Binomial coefficients and counting techniques applied to probability problems, Conditional probability, Independent events, Baye's formula.

Random Variables and their distribution : Random variables (discrete and continuous), probability functions, density and distribution functions, special distributions (Binomial, Poisson, Exponential, etc.), mean and variance, independent random variables, functions of random variables and their distributions.

Text/Recommended books:

1. K. Sankara Rao: Numerical Methods for Scientists and Engineers
2. V. Rajaraman: Computer Oriented Numerical Methods
3. S.C. Gupta and V.K. Kapoor: Fundamentals of Mathematical Statistics