**BM-353**

**(Semester-V)**

**NUMERICAL ANALYSIS**

External Marks: 40/27

Internal Marks: 10/6

Time: 3 Hours

**Note:    Paper setter will set nine questions in all, selecting two questions from each section and one Compulsory question consisting of five parts distributed over all four sections. Candidates are required To attempt five questions, selecting at least one question from each section and the compulsory Question.**

### Section-I

Finite Differences operators and their relations. Finding the missing ter ms and effect of error in a difference tabular values, Interpolation with equal intervals: Newton's forward and Newton's backward interpolation formulae. Interpolation with unequal intervals: Newton's divided difference, Lagrange's Interpolation formulae, Hermite Formula.

### Section-II

Central Differences: Gauss forward and Gauss's backward interpolation formulae, Sterling, Bessel Formula. Probability distribution of random variables, Binomial distribution, Poisson's distribution, Normal distribution: Mean, Variance and Fitting.

### Section-III

Numerical Differentiation: Derivative of a function using interpolation formulae as studied in Sections –I & II. Eigen Value Problems: Power method, Jacobi's method, Given's method, HouseHolder's method, QR method, Lanczos method.

### Section-IV

Numerical Integration: Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's one- third and three-eighth rule, Chebychev formula, Gauss Quadrature formula. Numerical solution of ordinary differential equations: Single step methodsPicard's method. Taylor's series method, Euler's method, Runge-Kutta Methods. Multiple step methods; Predictor-corrector method, Modified Euler's method, Milne-Simpson's method.

### Part-B (Practical)

Implementation of numerical methods, studied in the theory paper, in 'C' Programming Language.

**REFERENCES**

- M.K. Jain, S.R.K.Lyengar, R.K. Jain : Numerical Method, Problems and Solutions, New Age International (P) Ltd., 1996

- M.K. Jain, S.R.K. Lyengar, R.K. Jain : Numerical Method for Scientific and Engineering Computation, New Age International (P) Ltd., 1999

- C.E. Froberg : Introduction to Numerical Analysis (2nd Edition).

- Melvin J. Maaron : Numer ical Analysis-A Practical Approach, Macmillan Publishing Co., Inc., New York

- R.Y. Rubnistein : Simulation and the Monte Carlo Methods, John Wiley, 1981

- Computer Oriented Numerical Methods, Practice Hall of India Pvt. Ltd.