



## MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Mathematics & Statistics

Course Hand – Out

**Numerical Methods | MA1422 | 4 Credits | 3 1 0 4**

Session: Jan 18 – May 18 | Faculty: Dr. Mahesh Kumar Dubey | Class: BCA IV Sem.

**COURSE OUTCOMES:** At the end of the course, students will be able to

- 1422.1 Understand the concept of finite difference techniques which enhance their numerical skills.
- 1422.2 Learn different methods of interpolation with different intervals.
- 1422.3 Develop the conceptual framework of central difference interpolation techniques.
- 1422.4 Solve the different data problem with help of numerical integration.
- 1422.5 Generate the solution of algebraic, transcendental and ordinary differential equations which enhance their analytical as well as numerical skills to make them employable.

### A. SYLLABUS:-

**Finite Differences:** Definition of operators and derivation of inter-relations among them, Properties of  $\Delta$  and  $E$  (without proof), Factorial notation for positive and negative exponent, Representation of polynomial in factorial notations. **Interpolation with equal intervals:** Newton's forward difference formula, Newton's backward difference formula. Interpolation with unequal intervals. **Central Difference Interpolation formula:** Gauss Forward, Gauss Backward, Stirling's formula. **Numerical Integration:** Trapezoidal rule and its geometrical significance, Simpson's one-third rule, Simpson's three-eighth rule. **Solution of algebraic and transcendental equations:** Secant, Regula-Falsi method, Newton-Raphson Method, Iterative method. **Solution of Ordinary differential equations:** Picard method, Taylor series method, Euler methods, Euler's modified method, Runge-Kutta methods

### B. TEXT BOOKS:-

1. Numerical Methods : R. K. Jain, S.R.K. Iyengar and M.K. Jain
2. Introductory Methods of Numerical Analysis: S. S. Sastri, Prentice Hall.
3. T. Veerarajan and T. Ramachandran, Numerical Methods: Its Programs in C, Tata McGraw Hill Pub. Co. Ltd, New Delhi, 2005.
4. Applied Numerical Analysis: Gerald and Whealtery.
5. Numerical Analysis: Scarbourogh.

