

## CT - COMPUTER ORIENTED NUMERICAL METHODS

### Teaching Scheme

Lectures : 3 hrs/week

### Examination Scheme

100 marks: Continuous evaluation-  
Assignment/Quizzes – 40 marks  
End Sem Exam - 60 marks

### Unit 1

(8 Hrs)

Finite Differences: Forward difference operator, Backward Difference operator, Central difference operator, Newton's Interpolation Formulae, Newton's Forward –backward-Central Interpolation Formulae, Sterling Formula, Bessel's Formula Interpolation with unequal intervals, Error Analysis, Absolute, Relatives, Truncation and Rounding Error

### Unit 2

(6 Hrs)

Solution of Algebraic and transcendental equation: Bisection method, Newton's method, Secant method, finding roots of polynomials

### Unit 3

(6 Hrs)

Solution of simultaneous linear equations: Gauss Elimination method, pivoting, Ill-conditioned equations, refinement of solution, Gauss-Seidal iterative method

### Unit 4

(6 Hrs)

Differentiation and Integration: Newton-Cortes Formula. Trapezoidal Rule. Simpson One – Third Rule, Simpson Three- Eighth Rule, Weddle's rule

### Unit 5

(8 Hrs)

Numerical Solution of ODE: Picards methods, Taylor series method, Euler's method, Modified Euler's method, Runge- Kutta method, Predictor –Corrector methods-Milne's method, Adams-Bash forth method, numerical methods for solving second –order ODE

### Unit 6

(6 Hrs)

Finite difference methods for solving PDEs

### Text Books:

1. Rajaraman V., "Computer Oriented Numerical Methods", Prentice Hall, India, thirrd Edition, 2006, ISBN: 978-81-203-0786-5
2. S.S. Sastry, "Introductory Methods of Numerical Analysis", Prentice Hall, India, fifth edition, ISBN : 978-8120345928

### Reference Books:

1. M.K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computation, sixth Edition, New Age International Publishers, 2012, ISBN-13: 978-8122433234
2. Samuel D.Conte and Carl de Boor, Elementary Numerical Analysis: An Algorithmic Approach, third Edition, McGraw Hill, 2005, ISBN-13: 978-0070607422

**Course Outcomes:**

After completion of the course, the student will be able to:

1. Explain concept of various numerical methods, in particular, with reference to numerical solution of non linear equations and system of linear equations, interpolation, numerical differentiation and integration and numerical solution of ordinary differential equations.
2. Apply important theorems.
3. Students will get an idea about the role of computers in using numerical methods
4. Use different formulae for various numerical methods to be covered with an aim of understand the fundamentals, concepts and practical use of these methods in the field of computer sciences and applications.