



**Paper Code : CON:302**

**Paper Name : Computer Oriented Numerical Methods**

Teaching Hours (Per Week)		Examination Scheme		
TH. (hours)	Pr. (hours)	Internal	External	Total
		Th. (marks)	Th. (marks)	
4		30	70	100 (marks)

**Lectures = 68 Hours**

**Objective :** This course attempts to familiarize students with much needed concepts from numerical analysis. The numerical techniques offer computational frameworks to solve real-life problems. A good grounding of these concepts is essential for better understanding of topics such as Mobile Communications, Performance Modeling of Computer Networks, Soft Computing, Pattern Recognition, Image Processing, Data Mining.

#### **UNIT 1**

**15 Hrs**

##### **Computer Arithmetic**

Number System, Conversion of Numbers, Representation of numbers, Floating point representation, Arithmetic operations with Normalized Floating point Numbers, consequences of normalization, pitfalls in computing.

##### **Approximation and Errors**

Significant digits, Types of errors, absolute and relative error.

#### **UNIT 2**

**15 Hrs**

##### **Roots of Nonlinear Equations**

Introduction, Methods of Solution, Iterative Methods, Bisection method, False position method, Newton-Raphson method, Secant method, Rate of convergence of iterative methods.

#### **UNIT 3**

**12 Hrs**

##### **Solution of simultaneous algebraic Equations**

Gauss elimination method, Pivoting, ill-conditioned systems, Gauss-Seidel iterative method, Convergence of Iteration methods.

#### **UNIT 4**

**12 Hrs**

##### **Polynomial Interpolation**

Introduction, Polynomial Forms, Linear interpolation, Lagrange interpolation, Newton interpolation, Difference table, Forward and backward difference table.

**UNIT 5****14 Hrs****Numerical Integration**

Trapezoidal Rule, Simpson's 1/3 rule, Simpson's 3/8 rule.

**Numerical Solution of Ordinary Differential Equations**

Taylor Series Method, Euler's method, Second and Fourth order Runge-Kutta methods.

**RECOMMENDED BOOK**

1. Balagurusamy, E., Numerical Methods, Tata McGraw Hill, 1999.
2. Rajaraman V., Computer Oriented Numerical Methods, 3<sup>rd</sup> Edition, Prentice Hall India, New Delhi, 1998.

**Reference:**

1. Stoor, Bullrich, Computer Oriented Numerical Methods, Springer-Verlag, 1998.
2. Krishnamurthy, E.V., Sen, S.K., Computer Based Numerical Algorithms, East West Press, 1998.
3. Jain, M.K., Iyengar, S.R.K., Jain R.K., Numerical Methods : Problems and Solutions, New Age Int.(P) Ltd., New Delhi, 1997.
4. Jain, M.K., Iyengar, S.R.K., Jain R.J., Numerical Methods for Scientific and Engineering Competition, New Age Int. (P)Ltd., New Delhi, 1997.
5. N Datta, Computer Oriented Numerical Methods, Vikas Publication House Pvt Ltd, 2004.
6. Timothy Sauer, Numerical Analysis, International Edition, Pearson, 2011
7. A. Wood, Introduction to Numerical Analysis, Pearson, 1999
8. Thangaraj, P., Computer Oriented Numerical Methods, PHI
9. Sastry, S.S, "Introductory Methods of Numerical Analysis", 4<sup>th</sup> ed. PHI, 2007.
10. Pal, S, "Numerical Methods- Principles, Analyses and Algorithms", Oxford University Press, 2009.