

Course Title	Discrete Mathematics & Computer Oriented Numerical methods
Course Code	MA402
Course Credit	Lectures : 03
	Practical : 00
	Tutorial : 01
	Total : 04

Course Learning Outcomes

After Successful completion of the above course, students will be able to:

- **CLO 1:** **Interpret** the foundations of Computer Science and appreciate some of its theoretical and applied uses. We will learn ways to represent graphs as data structures and develop graph algorithms for classical problems in graph theory.
- **CLO 2:** Students will **Formulate** a strong foundation in programming, software development and data manipulation and become familiar with theoretical aspects of computer science.
- **CLO 3:** **Recognize** and **Formulate** facility with mathematical structures. We will connect the different representations and properties of graphs and develop facility in their use in algorithms.
- **CLO 4:** To **Evaluate** numerical solution of equations.
- **CLO 5:** How various numerical problems can be **Classify** and understand analytically and Geometrically to aid in obtaining a solution method.

Detailed Syllabus

Sr. No.	Name of chapter & Details	Hours Allotted
Section – I		
1.	Graph Theory Basic Concept of Graph theory, path, reach – ability, Connectedness, Matrix representation of graph, tree, Application of graph	08
2.	Mathematical logic and Set Theory Introduction, Connectives, statement formulas, principle of substitution, validity of arguments, Quantifiers, Propositional Calculus : Tautology,	04

	contradiction, Predicates, Introduction to Fuzzy set theory, function and Relation and its applications.	
3.	Boolean Algebra And Lattices Lattices, Lattices as Poset, Direct product, Homomorphism, Complete Lattices , Bounds of Lattices , distributive Lattices , Boolean Algebra, sub Boolean Algebra, Direct product, Atoms, Anti- Atoms, Stone’s representation theorem (without proof), Boolean expression and their equivalence, minterms and maxterms, free Boolean algebra, Values of Boolean expression, Canonical forms, Boolean functions, representation of Boolean function.	10
4.	Group Theory Definition of group, Abelian group, Cyclic group, Permutation group, Sub group, Homomorphism. Applications of Group.	06
Section – II		
5.	Roots of Algebraic and Transcendental Equation: Solution of a nonlinear equation by the methods of Bisection, False position, Secant method, Newton-Raphson method, Successive Approximation, Birge Vieta method and their rate of convergence.	06
6.	Interpolation and Extrapolation Newton’s Forward, Newton’s Backward, Central differences interpolation formulae, Stirlig’s, Bessels’s, Laplace-Evertt’s, Lagrange’s, Newton’s divided difference interpolation formula and error of the interpolating polynomial.	10
6.	Numerical Integration Trapezoidal Rule and error estimation in Trapezoidal Rule, Simpson’s 1/3 Rule and error estimation in Simpson’s 1/3 Rule, Simpson’s 3/8 Rule and error estimation in Simpson’s 3/8 Rule, Gaussian integration.	06
7.	Solution Of System Of Linear Algebraic Equation Solution of a system of linear equations: Implementation of Gaussian elimination with partial pivoting, Gauss-jorden and Gauss-Seidel method	03
8.	Ordinary Differential Equations: Numerical solution of ordinary differential equations, Euler’s method, Improved Euler’s (Heun’s) method, Runge - kutta methods.	03
Instructional Method and Pedagogy:		

- Lectures will be conducted with the aid of multi-media projector & blackboard.
- Assignments based on course content will be given to the students attend of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/will be conducted.
- The course includes tutorials, where students have an opportunity to practice the examples for the concepts being taught in lectures.

Reference Books:

1. Higher Engineering Mathematics by Grewal B. S. and Grewal J. S., Khanna Book Publishing Co. (P) Ltd. Delhi (39th edition)
2. Graph Theory with Applications to Engineering and Computer Science by Deo Narsingh, Prentice-Hall of India Private Limited New Delhi (1st edition)
3. Discrete Mathematical Structures with Applications to Computer Science, Tremblay J. P. Manohar R., TATA Mc Graw-Hill Publishing Company Limited, New Delhi (1st edition)
4. Discrete Mathematics by Malik D.S., Cengage Learning India New Delhi
5. (1st edition)
6. Numerical Methods in Engineering and Science with Programs in Fortran 77, C and C++ by Grewal B. S. , Khanna Book Publishing Co. (P) Ltd. Delhi (7th edition)
7. Numerical Methods by Vedamurthy V. N.& Iyengar S. R. K. - Vikas publishing house pvt. Ltd., New Delhi (1st edition)
8. Computer Oriented Numerical Methods by Datta N., Vikas publishing house pvt ltd New Delhi (1st edition)
9. Numerical Methods for Engineers by Chapra Steven, C. Canale Raymond, P. - Tata Mc Graw-Hill Publishing Company Limited New Delhi (5th edition)