MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous &NAAC Accredited Institute Affiliated to RGPV, Bhopal

Department of Engineering Mathematics and Computing

Mathematical Foundations of Computer Science
(MCA- 680111)

Objective of Course
- To have knowledge of basic algebra and discrete numeric function.
- To describe function and its relation
- To familiarize propositional logic
- To know about the graph theory and its application in computer
- To familiarize the discrete numeric function and generating function

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UNIT 1:
Sets, Subsets, Power sets, Complement, Union and Intersection, Demorgan's law Cartesian products, Relations, relational matrices, properties of relations, equivalence relation, functions, Injection, Surjection and Bijective mapping, Composition of functions, Permutations, the characteristic functions and Mathematical induction.

UNIT 2:
Partial order set, Hasse diagrams, upper bounds, lower bounds, Maximal and minimal element, first and last element, Lattices, sub lattices, Isotonicity, distributive inequality, Lattice homomorphism, lattice isomorphism, complete lattice, complemented lattice distribution lattice.

UNIT 3:
Group axioms, permutation group, sub group, co-sets, normal subgroup, semi group, Lagrange theorem, fields, minimal polynomials, reducible polynomials, primitive polynomial, polynomial roots, applications.

UNIT 4:
Finite graphs, incidence and degree, isomorphism, sub graphs and union of graphs, connectedness, walk, paths and circuits, Eulerian and Hamiltonian graphs. Trees: properties of trees, pendant vertices in tree, center of tree, spanning trees and cut vertices, binary tree, matrix representation of graph, incidence and adjacency matrix and their properties, applications of graphs in computer science.

UNIT 5:
Introduction to discrete numeric functions and generating functions, introduction to recurrence relations and recursive algorithms, linear recurrence relations with constant coefficients, homogeneous solutions, particular solutions and total solutions

Course Outcomes
After completing this course, the students will be able to:

CO's	Description of CO's
CO1	Acquire Knowledge of set theory
CO2	Analyse the concept of Lattices
CO3	Identify the concept of Group Theory
CO4	Derive the Inferences from Graph theory
CO5	Illustrate the Discrete numeric function and recursive relation

Recommended Books:
1. J.P Tremblay and Manohar: Discrete Mathematical Structures with Application to Computer science, McGraw-Hill, 1st Edition 2017.
2. NarsinghDeo: Graph Theory, PHI Learning, 2014.
3. C.L Liu: Element of Discrete Mathematics, McGrawHill, 4th Edition 2016.
4. Rosen: Discrete Mathematics and its Applications, McGraw Higher Ed, 7th Edition 2008.
5. I.N. Herstein: Topics in Algebra, Wiley, 2nd Edition 2006.