22MT107 DISCRETE MATHEMATICAL STRUCTURES

Hours Per Week :

L	Т	Р	С
3	2	0	4

PREREQUISITE KNOWLEDGE: Basic of set theory, Algebra.

COURSE DESCRIPTION AND OBJECTIVES:

The course objective is to provide students with an overview of discrete mathematics. Students will learn about of group and expected to demonstrate analytical and combinatorial methods such as propositional logic, Mathematical Induction, Boolean functions, combinatorial, recurrence relation, generating function and graph theory

MODULE-1

UNIT-1

DISCRETE

MATHEMATICAL STRUCTURES

> Sixth Edition For Third Semester B.E. Classes (CSE and ISE Branches) As per Revised VTU Syllabus 2019-20

> > Source: https://www. amazon.in/Discrete-

Mathematical-Structures-

Dr-D-S-C/dp/9388478398

BOOLEAN ALGEBRA AND LOGIC

Group: Group, Subgroup, Lagrange's theorem, Introduction to rings and fields.

Boolean algebra: Boolean algebra, Truth table, Basic logic gates, Postulates of Boolean algebra, Principle of duality, Propositions, Connectives, Equivalence and Normal form.

UNIT-2

APPLICATIONS OF LOGIC & BOOLEAN ALGEBRA

Normal form: CNF, DNF, CDNF, CCNF, Conversion of CNF to DNF and vice versa. Minimization of Boolean function (Karnaugh Maps), Generalized Pigeonhole Principle.

PRACTICES:

- Determine order of an element of group.
- Determine the order of a subgroup of a finite group.
- Determine whether algebraic structure is a Ring or a Field.
- Construct Truth table of propositions.
- Check whether propositions are equivalence.
- Obtain CNF, DNF of expression.
- Draw 2 variables, 3-variables K-map.
- Minimize the Boolean function by K-map.
- Simplify the Boolean expression using Boolean algebra laws.
- Determine the homogeneous solution and particular solution for recurrence relation.
- Switching Circuit in Boolean algebra, Combination of two switches in a Circuit

MODULE-2

UNIT-1

COMBINATORICS AND GRAPHS

Combinatorics: The basics of counting, Permutations and combinations, Discrete Numeric Functions. Recurrence relations and Generating functions.

Graph theory: Graph terminology, Special types of graphs, Connected graph, Weighed graph, Graph Isomorphism, Euler and Hamiltonian paths and circuits, Planar graphs, Bipartite graph, Tree.

34

12L+8T+0P=20 Hours

12L+8T+0P=20 Hours

12L+8T+0P=20 Hours

UNIT-2

12L+8T+0P=20 Hours

APPLICATIONS OF COMBINATORICS AND GRAPHS

Graph Coloring, Chromatic number, Matrix representation of graph, DFS, BFS algorithms, Minimum spanning tree.

PRACTICES:

- Represent sequence by Generating function.
- Solve Generation function by recurrence relation.
- Find degree of digraph and undirected graph.
- Identify Isomorphic graph, Euler circuit, Hamiltonian circuit.
- Determine matrix representation of graph.
- Determine the regions of planer connected graph.
- Draw Kn, Km,n.
- Determine the chromatic number of graphs.
- Find the weight of minimum spanning tree.
- Find number of arrangements that are possible.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply the concepts of mathematical logic and Boolean algebra.	Apply	1	1, 2, 9, 10, 12
2	Apply Karnaugh map to minimize.	Apply	1	1, 2, 9, 10, 12
3	Solve generating function by recurrence relations.	Apply	2	1, 2, 9, 10, 12
4	Model and solve real world problems using graphs and trees.	Apply	2	1, 2, 9, 10, 12

TEXT BOOKS:

- 1. Tremblay, J.P. and Manohar. R, "Discrete Mathematical Structures with Applications to Computer Science", 30th Reprint, Tata McGraw Hill Pub. Co. Ltd, New Delhi, 2017.
- 2. Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2018.

REFERENCE BOOKS:

- 1. R.P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2017.
- 2. S. Lipschutz and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 2021.
- 3. T. Koshy, "Discrete Mathematics with Applications", Elsevier Publications, 2015.
- 4. S B Singh. "Discrete Structures", Khanna Book Publishers Co-Pvt. Ltd. 2019.

- Familiarity of concepts of statements, logic and truth tables.
- Analyze closed form of discrete numeric function.
- Know some basic properties of graphs, trees and related discrete structures.