COURSE INFORMATION SHEET

Course code: MA24205
Course title: Discrete Mathematics
Pre-requisite(s): --
Co- requisite(s): --
Credits: L:3 T:0 P:0 C: 3
Class schedule per week: 3 Lectures
Class: B. Tech
Semester / Level: III/2
Branch: CSE, AIML
Name of Teacher:
Course Objectives: This course enables the students to

1.	provide foundational understanding of mathematical logic, its principles, and its applications in mathematics and computer science to develop critical thinking, reasoning skills, and the ability to construct and analyze logical arguments.
2.	equip students with the knowledge and techniques to formulate, solve, and analyze recurrence relations
3.	understand and apply set theory in different mathematical and computational contexts
4.	develop an understanding of algebraic structures, including groups, semigroups, and permutation groups, and explore their role in coding, decoding, and error correction techniques.
5.	apply graph theory-based tools in solving practical problems.

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

CO1	model and analyze computational processes using analytic and combinatorial methods
CO2	solve the problems of recurrence relations
CO3	understand the concepts of set, relations, growth of function and their applications for computer science.
CO4	apply the knowledge of algebraic structures for coding and decoding of binary information.
CO5	apply graph theory in the areas of computer science and engineering

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MA24205 **Syllabus**
Discrete Mathematics **3-0-0-3**

Module I

Mathematical logic and Mathematical Reasoning, Compound Statements, Propositional Equivalences, Predicates and Quantifiers, Methods of Proof, Mathematical Induction. [8L]

Module II

Recurrence Relations, Classification of Recurrence Relations and their solutions by Characteristic Root method, Generating function and their various aspects, Utility of Generating function in solving Recurrence Relations. [8L]

Module III

Set, Operations on Set, Relations, Properties/Classification of Relations, Closure operations on Relations, Matrix representation of Relations, Digraphs, Partial Ordering, Poset, Warshall's algorithm, Growth of Functions, Big O, Big Omega, Big Theta. [8L]

Module IV

Binary Operations, Groups, Product of Groups, Semi group, Permutation Group, Composition of Permutation, Inverse Permutation, Cyclic Permutation, Transposition, Even and Odd Permutation, Coding of Binary Information and Error Correction, Decoding and Error Correction. [8L]

Module V

Introduction to Graph, Graph Terminologies and their Representation, Connected & Disconnected graphs, Isomorphic Graph, Euler & Hamilton graphs. Introduction to Trees, Spanning Trees, Minimum Spanning Tree. [8L]

Textbooks:

1. Mott, Joe L., Abraham Kandel, and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, PHI, 2nd edition, 2002.
2. Swapan Kumar Chakraborty and Bikash Kanti Sarkar: Discrete Mathematics, Oxford Univ. Publication, 2010.
3. Kolman, Bernard, Robert C. Busby, and Sharon Ross. Discrete mathematical Structures, Prentice-Hall, Inc., 2003.

Reference Books:

1. Bikash Kanti Sarkar and Swapan Kumar Chakraborty, Combinatorics and Graph Theory, PHI, 2016.
2. A. Tucker, Applied Combinatorics, Wiley, Sixth Edition
3. Leymour Lipschutz and Mark Lipson, Discrete Mathematics, Shaum's outlines, 2003.
4. Liu, Chung Laung, Elements of Discrete mathematics, Mcgraw Hill, 2nd edition, 2001.
5. Bondy and Murty, Graph Theory with Applications, American Elsevier,1979.
6. Robin J. Wilson, Introduction to Graph Theory, Pearson, 2010.