

23BS21T5 -DISCRETE MATHEMATICS & GRAPH THEORY

(Common to CSE, CSE (DS), CSE (AI&ML), AI&DS, and IT)

Course Category:	Basic Sciences	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisite:	Basic mathematical structures and identification of simple notations in Mathematics and designing in graph theory.	Sessional Evaluation: Univ. Exam Evaluation: Total Marks:	30 70 100
Objectives:	Students undergoing this course are expected: <ul style="list-style-type: none"> To understand the concepts of predicates and proofs. To get the basic view on mathematical structures. To provide generic view on counting techniques with proofs. To explore the fundamental concepts of graphs trees and algebraic systems 		

Course Outcomes	Upon successful completion of the course, the students will be able to:	
	CO1	Apply mathematical logic to solve problems
	CO2	Understand the concepts and perform the operations related to sets, relations and functions. Gain the conceptual background needed and identify structures of algebraic nature
	CO3	Apply basic counting techniques to solve combinatorial problems.
	CO4	Formulate problems and solve recurrence relations.
	CO5	Apply Graph Theory in solving computer science problems
Course Content	<p style="text-align: center;"><u>UNIT-I</u></p> <p>Mathematical Logic: Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.</p> <p style="text-align: center;"><u>UNIT-II</u></p> <p>Set theory: The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, subgroups, homomorphism, Isomorphism.</p> <p style="text-align: center;"><u>UNIT-III</u></p> <p>Elementary Combinatorics: Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.</p>	

	<p style="text-align: center;"><u>UNIT-IV</u></p> <p>Recurrence Relations: Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous, Recurrence Relations</p> <p style="text-align: center;"><u>UNIT-V</u></p> <p>Graphs: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs.</p>
Text Books & References Books	<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGrawHill,2002. 2. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7thEdition, McGraw Hill Education (India) Private Limited. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. JoeL. Mott, Abraham Kandel and Theodore P.Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education. 2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science
E-Resources	<ol style="list-style-type: none"> 1.http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf