PRASAD V. POTLURI SIDDHARTHA INSTITUTE OF TECHNOLOGY
(Autonomous)

Kanuru, Vijayawada-520007

DEPARTMENT OF CSE (AI & ML)
II B.Tech – I Semester CSE(AI & ML)
Discrete Mathematics and Graph Theory

Course Code	23BS1305	Year	II	Semester	I
Course Category	BS&H	Branch	CSE (AI & ML)	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Basic Mathematics
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the fundamental concepts of discrete mathematics and graph theory.	L2
CO2	Apply principles of mathematical logic and predicate calculus to solve problems and validity of logical arguments.	L3
CO3	Utilize the method of characteristic roots to solve recurrence relations.	L3
CO4	Analyze properties of relations, graphs, and trees, using graph algorithms to solve complex graph theory problems.	L4

Contribution of Course Outcomes towards achievement of Program Outcomes &Strength of correlations(3:Substantial,2:Moderate,1:Slight)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2	3													
CO3	3													
CO4		3							1	1				

SYLLABUS		
Unit No.	Contents	Mapped CO
I	**Mathematical Logic:** Introduction-Statements and notations-Connectives (Negation, Conjunction, Disjunction)-Statement formulas and Truth tables, Conditional and Bi-conditional, Well-Formed Formulas, Tautologies, Equivalence of formulas, Duality law, Tautological Implication, Functionally Complete sets of Connectives, Other Connectives.(NAND, NOR, XOR) **Normal Forms:** Disjunctive Normal Forms (DNF), Conjunctive Normal Forms (CNF), Principal of Disjunctive Normal Forms (PDNF), Principal of Conjunctive Normal Forms (PCNF).	CO1, CO2

II	**Theory of Inference for Statement Calculus:** Validity using truth tables-Rules of Inference – Consistency & Inconsistency of Premises and Indirect method proof. **Predicate calculus:** Introduction to Predicates - Statement functions, Variable and Quantifiers- Predicate formulas-Free and Bound Variables-Universe of Discourse.	**CO1, CO2**
III	**Recurrence Relations-** Recurrence relations-Solving recurrence relations by method of characteristic roots-Solution of Inhomogeneous Recurrence relations.	**CO1, CO3**
IV	**Relations and Directed Graphs**-Special Properties of Binary Relations- Equivalence Relations- Ordering Relations-Poset diagrams, Special elements in Posets-Lattices-Operations on Relations- Representation of relation. **Graphs-** Basic Concepts- Operations on Graph-Matrix representation of Graph-Adjacency Matrix, Incidence Matrix-Paths and Closures- Warshall's Algorithm-and Sub graphs –Isomorphic Graphs- Directed Graphs	**CO1, CO4**
V	**Planar Graphs**-Euler's Formula- Multi-graphs and Eulerian Graphs-Hamiltonian Graphs- Chromatic Number. **Trees and Their Properties -** Spanning Trees-Breadth First and Depth First Spanning Trees –BFS and DFS algorithms-Minimal Spanning tree-Prim's and Kruskal's algorithms.	**CO1, CO4**

Learning Resources
Text Books:
1. Discrete Mathematical Structures with Applications to Computer Science , J P Trembly and R Manohar, 1988, McGraw-Hill **(Unit-I,II)** **2.** Discrete Mathematics for Computer Scientists & Mathematicians, Joe L. Mott. Abraham Kandel and Theodore P.Baker, Second Edition, 2017, PHI**. (Unit-III,IV,V)**
Reference Books
1. Discrete Mathematics and its Applications, Kenneth H. Rosen, Seventh Edition, 2017, McGraw-Hill. 2. Discrete Mathematics, Swapna Kumar Chakraborty, BikashKanti Sarkar, First Edition, 2011, Oxford University Press
E-Resources: 1. https://www.geeksforgeeks.org/engineering-mathematics-tutorials/ 2. https://www.tutorialspoint.com/discrete_mathematics/index.htm 3. http://www.alas.matf.bg.ac.rs/~mi10164/Materijali/DS.pdf **4.** https://nptel.ac.in/courses/111107058/