II Year I Semester

L	T	P	C
3	0	0	3

DISCRETE MATHEMATICS AND GRAPH THEORY (23BS3T04)
(Common to CSE, CSE-AI&DS, AI&ML & IT branches)

Course Objectives:

- To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
- To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

Course Outcomes: At the end of the course students will be able to

1. Apply the principles of mathematical logic to statement calculus and predicate calculus(L3)
2. Determine the partial ordering, posets and lattices(L5)
3. Apply various methods to solve the recurrence relations (L3)
4. Determine Euler paths, Eulerian graphs and Hamiltonian graphs(L5)
5. Apply different algorithms for spanning trees(L3)

Mr. B Sesha Rao	Dr. GVSR Deekshitulu	Dr. G Venkata Rao	Dr. M Bala Prabhakar
Chairman	University Nominee	Subject Expert-I	Subject Expert-2

BoS Members	Dr. NVSRC Murty Gamini	Mr. B Simhadri Rao	Mr. V Seshu Kumar
	Mrs. SNPG Vani	Mrs. A Sravani	Mr. KVNVS Prasad

UNIT–I: Mathematical Logic:

Propositional Calculus: Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof.

Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus.

UNIT-II: Set Theory:

Sets: Operations on Sets, Principle of Inclusion – Exclusion.

Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams,

Functions: Bijective, Composite, Inverse and Recursive Functions, Lattice and its Properties.

UNIT-III: Combinatorics and Recurrence Relations:

Basics of Counting, Binomial and Multinomial Coefficients and Theorems(without proof). Pigeonhole principle statement (without proof).

Recurrence Relations:

Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic roots, Solving Inhomogeneous Recurrence Relations.

UNIT-IV: Graph Theory:

Basic Concepts, Graph Theory and its Applications, Sub graphs.

Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs.

Unit-V:Multi Graphs

Multi graphs, Bipartite and Planar Graphs, Euler's Theorem(without proof), Graph Colouring and Covering, Chromatic Number, Spanning Trees, Prim's and Kruskal's Algorithms, BFS and DFS Spanning Trees.

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TEXTBOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and P. Manohar, Tata McGraw Hill.
2. Discrete Mathematics for Computer Scientists and Mathematicians, J.L.Mott, A.Kandel and T. P. Baker, 2nd Edition, Prentice Hall of India.
3. Discrete Mathematics and its Applications with Combinatorics and GraphTheory, K.H.Rosen, 7th Edition, Tata Mc Graw Hill.

REFERENCEBOOKS:

1. Elements of Discrete Mathematics – A Computer Oriented Approach, C. L. Liuand D. P.Mohapatra, 3rd Edition, Tata Mc Graw Hill.
2. Discrete Mathematical Structures, Bernand Kolman,Robert C. Busby and Sharon Cutler Ross, PHI.
3. Discrete Mathematics, S.K.Chakraborthy and B.K.Sarkar, Oxford, 2011.
4. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, McGraw Hill.

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