II B.Tech II Sem

15ABS11-DISCRETE MATHEMATICS

L	T	P	C
3	1	0	3

Course Objective

- Apply logical reasoning to solve a variety of problems.
- Understand and apply methods of discrete mathematics such as proofs, counting principles, number theory, logic and set theory to mathematical problems in a creative way.
- To apply the abstract concepts of graph theory in modeling and solving non-trivial problems in different fields of study.
- To provide a prerequisite for the courses like Fundamentals of Computer Organization, RDBMS, Analysis of Algorithms, Theory of Computation, Cryptography, Artificial Intelligence…

UNIT - I :

The Language of Logic: Propositions, Logical Equivalences, Quantifiers, Arguments, Proof Methods.

The Language of Sets: The Concepts of a Set, Operations with Sets, Computer Operations with Sets, The Cardinality of a Set, Recursively Defined Sets.

Functions: The concept of Functions, Special Functions, Properties of Functions, The Pigeonhole principle, Composite Functions, Sequences and the Summation Notation.

UNIT – II:

Relations: Boolean Matrices, Relations and Digraphs, Computer Representations of Relations, Properties of Relations, Operations on Relations, Transitive Closure, Equivalence Relations, Partial and Total Ordering.

Lattices & Boolean Algebra: Lattices as Partially Ordered Sets, Properties of Lattices, Lattices as Algebraic Systems, Sublattices, Direct Product and Homomorphism, Boolean Algebra, Boolean Functions

UNIT – III :

Algebraic Structures: Algebraic Systems, Semigroups and Monoids, Groups, Subgroups and Homomorphisms, Normal Subgroups.

Combinatorics: The Fundamental Counting Principles, Permutations, Derangements, Combinations, Permutations and Combinations with Repetitions, The Binomial Theorem, The Generalized Inclusion- Exclusion Principle.

UNIT – IV :

Induction and Algorithms: The Division Algorithm, Divisibility Properties, Nondecimal Bases, Mathematical Induction, Algorithm Correctness, The Growth Functions, Complexity of Algorithms.

Recursion: Recursively Defined Functions, Solving Recurrence Relations, Generating Functions, Recursive Algorithms, Correctness of Recursive Algorithms, Complexities of Recursive Algorithms.

UNIT – V :

Graphs: Computer Representation of Graphs, Isomorphic Graphs, Paths, Cycles, and Circuits, Eulerian and Hamiltonial Graphs, Planar Graphs, Graph Coloring, Digraphs, Dags, Weighted Digraphs, DFS and BFS Algorithms,Cut vertices and Edges,Covering,Matching.

Trees: Trees, Spanning Trees, Minimal Spanning Trees, Kruskal's and Prim's Algorithm, Rooted Trees..

Text Books :

1. Discrete Mathematics with Applications, Thomas Koshy, Elsevier Academic Press.

Reference Books :

1. Discrete and Combinatorial Mathematics, Fifth Edition, R. P. Grimaldi, B.V. Ramana, Pearson

2. Discrete Mathematics Theory and Applications, D.S Malik and M.K. Sen, Cengage Learning

3. J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians,
second edition 1986, Prentice Hall of India

4. C.L.Liu, Elements of Discrete Mathematics, Second Edition 1985, McGraw-Hill Book Company.Reprinted 2000

5. Discrete Mathematics, Norman L. Biggs, Second Edition, OXFORD Indian Edition.

6. K.H.Rosen, Discrete Mathematics and applications, 5th Edition 2003, TataMcGraw Hillpublishing Company

7. Graph Theory with Applications to Engineering & Computer Science: Narsingh Deo, PHI (2004)

8. "Discrete Mathematical Structures" Jayant Ganguly, Sanguine

9. 2. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and R. Manohar,TMH

10.Digramatic Representation And Inference :"John.D.Lee".