OP 5

## Discrete Mathematics

(100 marks, 80 lectures)

(To answer five questions, choosing one out of two questions from each unit)

Unit-I : Mathematical induction, Principle of inclusion and exclusion, Pigeon hole principle, Finite combinatorics, Generating functions, Partitions, Recurrence relations and Recursive Algorithms, Linear Recurrence relations with constant coefficients, Homogeneous solutions, Total Solution, Solution by the method of generating functions.

Unit: II Definition, examples and basic properties of ordered sets, duality principle, lattices as ordered sets, lattices as algebraic structures, sublattices, products and homomorphisms.

Unit-III: Definition, examples and properties of modular and distributive lattices , Boolean algebras, Boolean polynomials, minimal forms of Boolean polynomials, Quinn – McCluskey method, Karnaugh diagrams, switching – circuits and application of switching circuits .

Unit- IV: Definition, examples and basic properties of graphs, complete graphs, bi-partite graphs, Paths and Circuits, Hamiltonian paths, Shortest paths, Eulerian paths, Traveling salesman problem.

Unit-V : Block, Cut Points, Bridges, Block graphs, Cut point graphs, Trees , Characterization of trees, Connectivity and Line Connectivity, Graphical variation of Menger's theorem .

### BOOKS

Text Books:
1. C.L. Liu, Elements of Discrete Mathematics, ( Second Edition ) , McGraw Hill, International Edition.
2. M. K. Sen, Introduction to Discrete Mathematics, Allied Publishers
3. B. A. Davey and H. A. Priestley, Introduction to Lattices and Order, Cambridge University Press, Cambridge
4. EdgarG. Goodaire and Michaer M. Parmenter, Discrete mathematics with Graph theory ( $2^{nd}$ Edition ), Pearson Education Pvt Ltd, Indian Reprint 2003 .
5. S.K. Sankar, A Text book of Discrete Mathematics, Published by S. Chand, 2008.
6. Harish Mittal and Vinay Kr. Goel , A Text Book of Discrete mathematics, , published by I.K. International, 2010. .

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**Reference Books:**

1. Michael Towusend, Discrete mathematics, Applied Mathematics and Graph theory
2. J.P. Tremblay and R. Manohar, Discrete Mathematics Structures with Applications to Computer Science, McGraw- Hill Book Co.
3. K.R. Parthasarathi, Basic Graph theory
4. S. Lipschutz, ;Marc Lipson Schaum's outlines of Discrete Mathematics , 2007.