

PROGRAMME NAME : B.Sc (H) Mathematics
COURSE NAME : Discrete Mathematics
SEMESTER DURATION: July to December

Week	Topic(s)	Teaching Methodology Adopted/ Continous Internal Evaluation
1	Definitions, Examples and basic properties of ordered sets, Order isomorphism, Hasse diagrams, dual of an ordered set, Duality principle, Maximal and minimal elements.	Assignments
2	Building new ordered sets, Maps between ordered sets. [1] Chapter 1 (Sections 1.1 to 1.5 and 1.14 to 1.26, and 1.34 to 1.36) [3] Chapter 1 [Section 1 (1.1 to 1.3)]	Examples/ Videos
3	Lattices as ordered sets, Lattices as algebraic structures, Sublattices	Lectures
4	Products and homomorphisms. [1] Chapter 2 (Sections 2.1 to 2.19) [3] Chapter 1 [Section 1 (1.5 to 1.20)]	Tutorials
5	Definitions, Examples and properties of Modular and Distributive lattices. Chapter 4 (Sections 4.1 to 4.9) [3] Chapter 1 [Section 2 (2.1 to 2.6)].	Discussion
6	$M_3 - N_5$ Theorem with applications, Complemented lattice, Relatively complemented lattice, sectionally complemented lattice. [1] Chapter 4 (Sections 4.10, and 4.11) [3] Chapter 1 [Section 2 (2.7 to 2.14)]	
7	Boolean Algebras, De Morgan's laws, Boolean homomorphism, representation theorem. Boolean polynomials.	Examples/ Videos
8	Boolean polynomial functions, Disjunctive normal form and conjunctive normal form. [3] Chapter 1 (Sections 3, and 4)	Lectures
9	Minimal forms of Boolean polynomial, Quinn-McCluskey method, Karnaugh diagrams. [3] Chapter 1 (Section 6)	Practicals
10	Switching circuits and applications of switching circuits. [3] Chapter 2 (Sections 7, and 8).	Tutorials
11	Introduction to graphs, Konigsberg Bridge problem, Instant insanity game. Definition, Examples and basic properties of graphs.	Assignments
12	Subgraphs, Pseudographs, Complete graphs, Bipartite graphs, Isomorphism of graphs. [2] Chapter 9 [Sections 9.1, 9.2 (9.2.1, 9.2.7), and 9.3]	Practicals
13	Paths and circuits, Eulerian circuits, Hamiltonian cycles, Adjacency matrix, Weighted graph, Travelling salesman problem, shortest path.	Lectures
14	Dijkstra's algorithm. [2] Chapter 10 [Sections 10.1 to 10.4 (10.4.1 to 10.4.3)]	Assignments

Course Objectives:

This course aims at introducing the concepts of lattices, Boolean algebras, switching circuits and graph theory. The course discusses some important applications of Boolean algebra and graph theory in real life situations through switching circuits and shortest path algorithms.

Course Learning outcomes:

After the course, the student will be able to understand the concepts of:

- i) Lattices and their types;
- ii) Boolean algebra, switching circuits and their applications;
- iii) Graphs, their types and its applications in study of shortest path algorithms.