Program Name: Integrated M. Sc. (IT)

Level: Post Graduate Program

Branch: Integrated M. Sc. (IT)

Course / Subject Code: 2BS202

Course / Subject Name: Discrete Mathematics

Course Content:

Unit No.	Content	CO	Concern Question	Marks Weightage
1.	**Graph Theory:** Introduction, Components of Graph(Types of nodes, Types of edges, Types of Graph), Degree of Graph: Directed & Undirected Graphs, Isomorphism of Graphs, Subgraphs, Converse (reversal or directional dual) of a digraph, Walk, Trail, Path, length of path, Types of path(Simple path, elementary path, Cycle (circuit), elementary cycle, Reachability: geodesic distance, Properties of reachability, the triangle inequality; Reachable set of a given node, Node base, Connectedness. Matrix representation of graph: Adjacency matrix, Determine number of paths of length *n* through Adjacency matrix, Path (Reachability) matrix of a graph, Warshall's algorithm to produce Path matrix. **Trees:** Definition, Types of nodes (branch nodes, leaf (terminal) nodes, root); Different representations of a tree, Binary tree, m-ary tree, Full (or complete) binary tree, Converting any m-ary tree to a binary tree, Representation of a binary tree; Tree traversal.	CO1	Q.3 (A), Q.3 (B), Q.3 (C)	14 Marks
2.	**Relations:** Definition, Types of Relation, Representation of Relation, Algebra of Relation Properties of Binary Relations, Partition and Covering of a Set, Composite Relation, Converse of a Relation, Closure of Relation.	CO2	Q.2 (A), Q.2 (B), Q.2 (C)	14 Marks
3.	**Counting:** The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations.	CO3	Q.1 (A), Q.2 (B)	7 Marks
4.	**Logic:** Definition, Statements & Notation, Truth Values, Connectives, Statement Formulas & Truth Tables, logical gate, Well-formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Examples.	CO4	Q.4 (A), Q.4 (B)	7 Marks
5.	**Partial Ordering:** Definition, Examples, Simple or Linear Ordering, Totally Ordered Set (Chain), Frequently Used Partially Ordered Relations, Representation of Partially	CO5	Q.5 (A), Q.5 (B),	14 Marks

	Ordered Sets, Hasse Diagrams, Least & Greatest Members, Minimal & Maximal Members, Least Upper Bound (Supremum), Greatest Lower Bound(infimum), Well ordered Partially Ordered Sets(Posets). Lattice as Posets, complete Lattice. **Recurrence Relation:** Introduction, Recursion, Recurrence Relation, Solving Recurrence Relation.		Q.5 (C)	
6.	**Algebraic Structures:** Algebraic structures with one binary operation- Semigroup, Monoid, Group, Subgroup, normal subgroup, group Permutations, Coset, homomorphic subgroups, Lagrange's theorem, Congruence relation and quotient structures. Algebraic structures (Definitions and simple examples only) with two binary operation- Ring, Integral domain and field.	CO6	Q.6 (A), Q.6 (B), Q.6 (C)	14 Marks

Suggested Specification Table with Marks (Theory):

Distribution of Marks (%)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
10	**25**	**35**	**0**	**0**	**0**

Course Outcome:

No	Course Outcomes
CO1	Understand the basic concept of Graph and tree.
CO2	Apply relations and to determine their properties.
CO3	Utilize the Pigeonhole Principle and Use binomial coefficients to solve related counting problems.
CO4	Simplify the basic logic statements using truth tables and their properties.
CO5	Be familiar with Partial ordering and recurrence relations.
CO6	Understand the properties of algebraic structures.

Instructions :

1. Kindly follow the course outcome distribution as mentioned in QP format while setting Question Paper.
2. While Setting Question Paper maintain Bloom's level consistency for options.

   Example : Que. 2 (A) OR Que. 2 (A), for both question 2 (A), Bloom's level must be same.
3. Question Paper difficulty should be set as follow :

   Easy – 30%

   Medium – 50%

   Difficult – 20%

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