Program	Bachelor of Technology (B.Tech)	**Semester - 3**
Type of Course	-	
Prerequisite		
Course Objective	-	
Effective From A.Y.	2025-26	

Teaching Scheme (Contact Hours)				Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
Lecture	Tutorial	Lab	Credit	SEE TH	IAT	SEE P	CCE	
3	1	-	4	70	-	-	-	120

***SEE** - Semester End Examination, **IAT** - Internal Assessment Test, **CCE** - Continues & Comprehensive Evaluation*

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Fundamentals of Logic** Basic Connectives and Truth Tables, Logic Equivalence – The Laws of Logic, Logical Implication –Rules of Inference. The Use of Quantifiers, Quantifiers, Definitions and the Proofs of Theorems.	7	15
2	**Fundamental Principles of Counting** Fundamental Principles of Counting: The Rules of Sum and Product, Permutations, Combinations The Binomial Theorem, Combinations with Repetition. **Functions:** Introduction & definition, Co-domain, range, image, value of a function; Examples, surjective, injective, bijective; examples; Composition of functions, examples; Inverse function, Identity map, condition of a function to be invertible, examples; Inverse of composite functions, Properties of Composition of functions;	7	15
3	**Relations** Relations: Definition, Binary Relation, Representation, Domain, Range, Universal Relation, Void Relation, Union, Intersection, and Complement Operations on Relations, Properties of Binary Relations in a Set: Reflexive, Symmetric, Transitive, Anti-symmetric Relations, Relation Matrix and Graph of a Relation; Partition and Covering of a Set, Equivalence Relation, Equivalence Classes, Compatibility Relation, Maximum Compatibility Block, Composite Relation, Converse of a elation, Transitive Closure of a Relation R in Set X, Partial Ordering: Definition, Examples, Simple or Linear Ordering, Totally Ordered Set (Chain), Frequently Used Partially Ordered Relations, Representation of Partially Ordered Sets, Hasse Diagrams, Introduction to Lattice. **Recurrence Relation:** Introduction, Recursion, Recurrence Relation, Solving, Recurrence Relation	10	20
4	**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.	8	20
5	**Graph Theory** Introduction, definition, examples; Nodes, edges, adjacent nodes, directed and undirected edge, Directed graph, undirected graph, examples; Initiating and terminating nodes, Loop (sling), Distinct edges, Parallel edges, Multi-graph, simple graph, weighted graphs, examples, Isolated nodes, Null graph; Isomorphic graphs, examples; Degree, In degree, out-degree, total degree of a node, examples; Sub graphs, Path, length of path, examples; Simple path (edge simple), elementary path (node simple), examples; Cycle (circuit), elementary cycle, examples; Matrix representation of graph, Adjacency matrix, Boolean (or bit) matrix, examples; Determine number of paths of length n through Adjacency matrix, examples; Path (Reachability) matrix of a graph, examples; Warshall's algorithm to produce Path matrix	7	15
6	**Trees**	6	15

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
	Definition, branch nodes, leaf (terminal) nodes, root, examples; Different representations of a tree, examples; Binary tree, m-ary tree, Full (or complete) binary tree, examples; Converting any m-ary tree to a binary tree, examples; Representation of a binary tree: Linked-list; Tree traversal: Pre-order, in-order, post-order traversal, examples, algorithms; Applications of List structures and graphs		
	Total	**45**	**100**

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	10	25	35	0	0	0

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:	
CO1	Apply concepts of logical reasoning and mathematical proof techniques in proving theorems and statements.
CO2	Apply counting principles to determine probabilities, domain and range of a function, identify one- to- one functions, perform the composition of functions and apply the properties of functions to application problems
CO3	Apply relations and to determine their properties. Be familiar with recurrence relations
CO4	Illustrate the fundamental principles of Algebraic structures with the problems related to computer science & engineering.
CO5	Interpret different traversal methods for graphs. Model problems in Computer Science using graphs.
CO6	Perceiving different traversal methods for trees. Illustration of problems in Computer Science based on trees.

CO PO Mapping

CO	CO - 1	CO - 2	CO - 3	CO - 4	CO - 5	CO - 6
PO - 1	1	1	1	1	1	1
PO - 2	1	1	1	1	1	1
PO - 3						
PO - 4	1	1	1	1	1	1
PO - 5	1	1	1	1	1	1
PO - 6	1	1	1	1	1	1
PO - 7						
PO - 8						
PO - 9	1	1	1	1	1	1
PO - 10						
PO - 11	1	1	1	1	1	1

CO PSO Mapping

CO	CO - 1	CO - 2	CO - 3	CO - 4	CO - 5	CO - 6
PSO - 1	-	-	-	-	-	-
PSO - 2	-	-	-	-	-	-
PSO - 3	-	-	-	-	-	-