

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Internal	Final Exam	Total
MCA-104	Discrete Mathematics	PCC	4	4	0	0	40	60	100

**Course Outcomes**

At the end of the course the student will be able to	
CO1	Explain problems using recurrence relations.
CO2	Analyze the role of Relations and Functions in computer science
CO3	Model problems in Computer Science using graphs and trees.
CO4	Describe basic terminology of mathematical logic to solve a variety of problems.
CO5	Model problems in Computer Science using, trees and Graph coloring

**Detailed Syllabus**  
**Section-A**

**Unit I Overview of Counting:** Basic principles of counting, pigeon-hole principle, generating functions, recurrence Relations, linear recurrence relations with constant coefficients, modelling various problems as recurrence relations ,Homogenous recurrence relations and their solutions, particular solutions and total solution. Problems of Fibonacci Numbers and tower of Hanoi and their solution using recurrence relation.

**(10 Hrs.)**

**Unit II: Relations and Functions:** Domain, range and inverse of Relation, Composition of relations, Types of elations, Closure of relations etc. Relation Vs Function, Types of functions, Sum and product of functions, functions used in Computer Science (Floor and Ceil function, Remainder, characteristic and hash function).

**(10 Hrs.)**

**Unit III: Theory of Graphs:** Basic terminology of graphs, multigraphs, directed and weighted graphs, paths and circuits, Types of graphs, Computer representation of graphs, Operations on Graphs, spanning trees using BFS, DFS and their applications, shortest path in weighted graphs and planar graphs, Detection of planarity. Eulerian paths and circuits, Hamiltonian paths and circuits.

**(10 Hrs.)****Section B**

**Unit-IV: Trees and Graph Coloring:** Tree and its properties, Center of a tree and rooted trees, tree traversals, minimal spanning trees, cut sets, etc. Coloring of graphs, dual graph; Vertex coloring, Chromatic number; Chromatic polynomial, The four color problem, edge coloring, Coloring algorithms. Applications of trees and graph coloring

**(10Hrs.)**

**Unit-V: Mathematical Logic:** Propositions, connectives, conditionals and biconditionals, well-formed formulas, tautologies, equivalence of formulas, duality law, normal forms, inference theory for propositional calculus; predicate ,calculus: predicates, free and bound variables, inference theory of predicate calculus. Introduction to algebraic structures, groups

**(10Hrs)**