GRAPH THEORY

IV B.Tech VII Semester18MA006

Lectures	:	4 Periods/Week Credits - 3	Continuous Assessment	:	50
Final Exam	:	3 hours	Final Exam Marks	:	50

Pre-Requisite: None

Course Objectives: Students will learn how to

➢	To apply the fundamental concepts of graph theory for determining Isomorphism of graphs and also solving the real life problems like Konigsberg Bridge Problem and travelling Salesman Problem.
➢	To analyze the concepts of Trees and Fundamental Circuits with their properties for finding Minimal Spanning Trees in weighted Graphs by using Kruskals and Prim's Algorithms.
➢	To acquire the ample knowledge of coloring of a graph and Planar graphs with their different representations for detecting the planarity of graphs by using Kurotowski's Theorem and also Computing the Chromatics number for a given graph including four color problem
➢	To get an idea of representation of graphs in matrices such as incidence matrix , Adjacency matrix etc and establishment of the correspondence between graph-theoretic properties and matrix properties.

Course Outcomes: After studying this course, the students will be able to

CO1	Discuss the basic concepts of graph theory and able to determine whether a graph is Eulerian and Hamiltonian.
CO2	Apply Kruskal's and Prim's algorithms in order to determine the minimum spanning tree in a connected weighted graph.
CO3	Determine the planarity of a graph using Kuratowski's algorithm and find the chromatic number of a given graph.
CO4	Analyse the properties of graphs through matrix representation and utilize these ideas in the application of switching network.

Mapping of Course Learning Outcomes with Program Outcomes & Program Specific Outcomes

	PO's												PSO's		
CO	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO1	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-

UNIT-1	(12 Hours)
PATHS AND CIRCUITS: **Introduction: Graphs**: Graph, Finite and infinite graphs, Incidence and degree, isolated vertex, pendent vertex and null graph; Isomorphism; Subgraphs; walks, paths and circuits; Connected graphs, Disconnected graphs and Components; Euler graphs(Konigsberg Bridge Problem); Hamiltonian Paths and circuits; Travelling salesman problem. [Sections: 1.1; 1.3; 1.4; 1.5; 2.1; 2.2; 2.4; 2.5; 2.6; 2.9; 2.10]	
UNIT-2	(12 Hours)
TREES AND FUNDAMENTAL CIRCUITS: Trees; Some Properties of Trees; Distance and centers in a Tree; Rooted and Binary Trees; Spanning Trees; Fundamental circuits; Spanning Trees in a Weighted graphs(Kruskal's Algorithm and Prim's Algorithm). [Sections:3.1; 3.2; 3.4; 3.5; 3.7; 3.8; 3.10	
UNIT-3	(12 Hours)
PLANAR AND DUAL GRAPHS: Planar graphs; Kuratowski's two graphs; Different Representations of a Planar graph: Euler's formula, Theorem-5.6 and Corollary; Detection of planarity(Kuratowski's theorem); Geometric Dual; Coloring of a Graph, Chromatic number, The four Color problem. [Sections: 5.2; 5.3; 5.4; 5.5; 5.6; 8.1, 8.6]	
UNIT-4	(12 Hours)
MATRIX REPRESENTATION OF GRAPHS: Incidence Matrix; Submatrices of A(G); Circuit Matrix; Fundamental Circuit Matrix and Rank of B; Application to a switching network; Cut-set Matrix; Relationship among A_f, B_f and C_f; Path Matrix; Adjacency Matrix. [Sections:7.1; 7.2; 7.3; 7.4; 7.5; 7.6; 7.7; 7.8; 7.9]	

Text Books :	NarsinghDeo, 'Graph Theory with Applications to Engineering and Computer Science' Prentice-Hall of India Private Limited, New Delhi.
References :	Douglas B. West "Introduction to graph Theory" Pearson Education Private limited, Delhi, 2002.