SRM Institute of Science and Technology
Faculty of Engineering and Technology

DEPARTMENT OF CSE

Vadapalani Campus, Chennai 600026, Tamilnadu

Academic Year: 2024-25 Semester: ODD

Mode of Exam
OFFLINE
SET-A

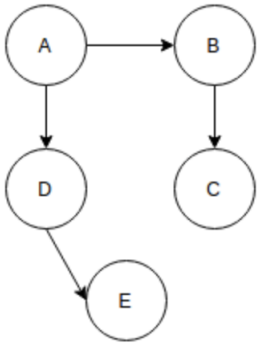
Test: CLAT-3 **Date:** 05.11.2024
Course Code & Title: 21CSC201J & Data Structures and Algorithms **Duration:**90 min.
Year &Sem: II/III **Max. Marks:**50

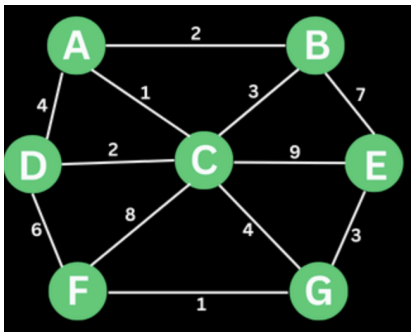
Course Articulation Matrix:

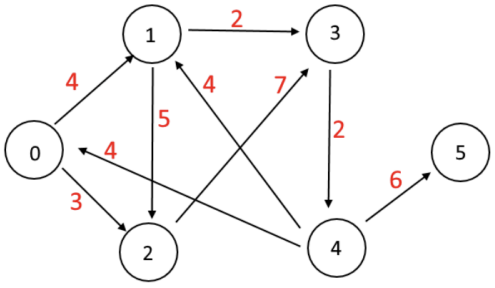
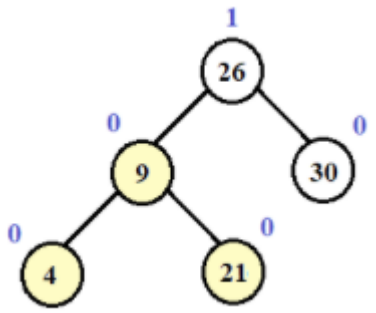
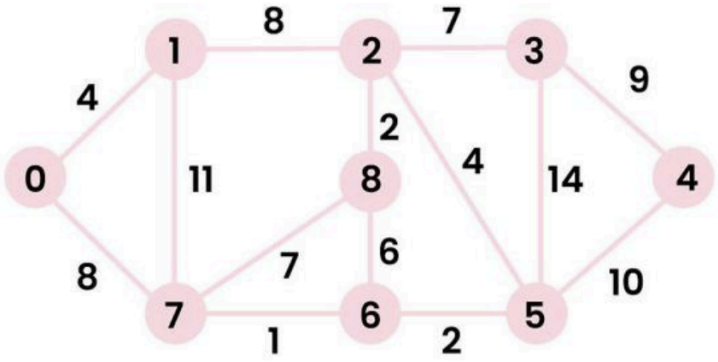
S. No.	Course Outcomes (CO)	Program Outcomes (PO)												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	Develop programs using data types like structures, pointers and arrays supported by C programming language	1	-	3	-	-	-	-	-	2	-	-	-	1	-	2
2	Analyze the complexity of algorithm and if needed, modify it to improve its efficiency	2	3	2	1	-	-	-	-	-	-	-	-	1	2	-
3	Identify and use appropriate data structure for devising solution	1	3	2	-	-	-	-	-	-	-	-	-	1	1	2
4	Describe and use tree structure while developing programs	2	-	3	2	-	-	-	-	-	-	-	-	1	-	2
5	Implement the Graph structure and use it whenever deemed university for provide better solution	3	2	3	-	-	-	-	-	-	-	-	-	1	1	2

Part – A
(11 x 01 = 11 Marks)
Instructions: Answer All the Questions

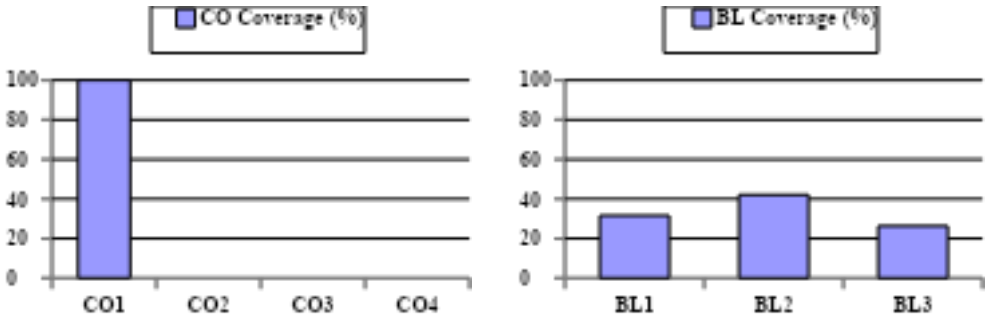
Q. No	Question	Marks	BL	CO	PO
1	What is the maximum number of children that a binary tree node can have? a) 1 b) n/2 c) 2 d) n	1	2	4	2
2	An array representation of the binary tree is the index number of a child node is 6 then the index number of its present node is a) 2 b)3 c) 4 d) 5	1	2	4	2
3	What is the speciality about the inorder traversal of a binary search tree? a) It traverses in a non increasing order b) It traverses in an increasing order c) It traverses in a random fashion d) It traverses based on priority of the node	1	1	4	2

4	The number of nodes in a complete binary tree of level 5 is a) 64 b) 63 c) 67 d) 32	1	2	4	1
5	Why do we need a binary tree which is height balanced? a) to avoid formation of skew trees b) to save memory c) to attain faster memory access d) to simplify storing	1	1	4	1
6	What is the maximum height of an AVL tree with p nodes? a) p b) log(p) c) log(p)/2 d) p/2	1	2	4	2
7	The time complexity to calculate the number of edges in a graph whose information is stored in form of an adjacency matrix is _____ (a) O(V) (b) $O(E^2)$ (c) O(E) (d) $O(V^2)$	1	1	5	1
8	What would be the DFS traversal of the given Graph?  a) ABCDE b) AEDCB c) EDCBA d) ADECB	1	3	5	2
9	Which of the following is false about Kruskal's algorithm? a) It is a greedy algorithm b) It constructs MST by selecting edges in increasing order of their weights c) It can accept cycles in the MST d) It uses union-find data structure	1	1	5	2
10	Which of the following ways can be used to represent a graph? (a) Adjacency List and Adjacency Matrix (b) Incidence Matrix (c) Adjacency List, Adjacency Matrix as well as Incidence Matrix (d) No way to represent	1	1	5	1

11	What is the time complexity of Dijikstra's algorithm? a) O(N) b) O(N3) c) O(N2) d) O(logN)	1	1	5	1
	Part – B **(3 * 8 =24 Marks)** **Instructions: Answer All the Questions**				
12.A	Design recursive algorithms for In-Order and Pre-Order tree traversal and explain.	8	3	4	1
	OR				
12.B	Construct a 3-way B-Tree by inserting the following data elements, 7, 8, 9, 10, 11, 16, 21, and 18.	8	3	4	1
13.A	Consider the hash table of size 7 using quadratic probing, insert the keys 72,27,36,24,63,81,91 and 101 into the table. Assume h1=k mod 7.	8	2	4	2
	OR				
13.B	 Use Prim's algorithm to find the Minimum spanning tree for the above graph and calculate its cost.	8	2	5	3
14.A	Illustrate how queues are employed for graph traversals.	8	2	5	3
	OR				

14.B	(i) Define Graph and name the different ways of representing a graph? (ii) What will be the adjacency matrix for the below directed weighted graph?`  	8	2	5	3
	Part –C **(1 * 15 =15 Marks)** **Instructions: Answer ANY ONE out of TWO**				
15.	 Consider the above balanced AVL tree. Insert 14, 28, 18, 15, 10, 2, 3 and 7 in the same order. Perform suitable rotations to balance the tree. Delete key 9 and show the resultant tree.	15	3	4	3
16.	 Given a weighted graph and a source vertex in the graph, find the shortest paths from the source to all the other vertices in the given graph. Source: 0.	15	3	4	3

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions


CO Coverage (%)
100
80
60
40
20
0
CO1
CO2
CO3
CO4
BL Coverage (%)
100
80
60
40
20
0
BL1
BL2
BL3