Q. Code:547672

Reg. No. | | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Second Semester

AD22201 – DATA STRUCTURES AND ALGORITHM ANALYSIS

(Artificial Intelligence and Data Science)

(Regulation 2022)

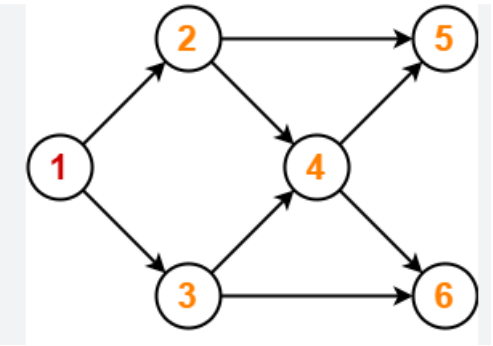
TIME: 3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Design and analyse time and space complexities of algorithms using different design techniques for various computing problems	**2**
CO 2	Solve problems using suitable linear data structures	**3**
CO 3	Solve problems using suitable nonlinear tree data structures	**3**
CO 4	Demonstrate the use of graph algorithms for solving problems	**3**
CO 5	Design algorithms using advanced algorithm design techniques	**3**

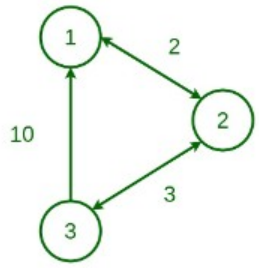
PART- A (20 x 2 = 40 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Describe about the best case, average case and worst case.	**1**	**2**
2.	What is called brute force approach?	**1**	**2**
3.	Define divide and conquer strategy.	**1**	**2**
4.	What is called recurrences?	**1**	**2**
5.	Draw a sample circular queue.	**2**	**2**
6.	Check the balancing symbol using stack for the following expression. (P+Q)*(R-S)	**2**	**3**
7.	Define open addressing in hashing.	**2**	**2**
8.	Justify doubly linked list more useful than a singly linked list and give its notation?	**2**	**3**
9.	How many nodes will a complete binary tree with 27 nodes have in the last level? What will be the height of the tree?	**3**	**3**
10.	Define B-Trees.	**3**	**2**
11.	What is splay tree?	**3**	**2**
12.	List down the advantages of priority queues.	**3**	**2**
13.	Give the topological sorting for the given graph.	**4**	**3**



14.	Draw the minimum spanning tree for the following graph.	**4**	**3**



15.	Differentiate BFS & DFS.	**4**	**2**
16.	Write the applications of graphs.	**4**	**2**
17.	State n-queens problem.	**5**	**2**
18.	Define optimal binary search tree.	**5**	**2**
19.	Define knapsack problem.	**5**	**2**
20.	Differentiate NP-Complete and NP-Hard problems.	**5**	**2**

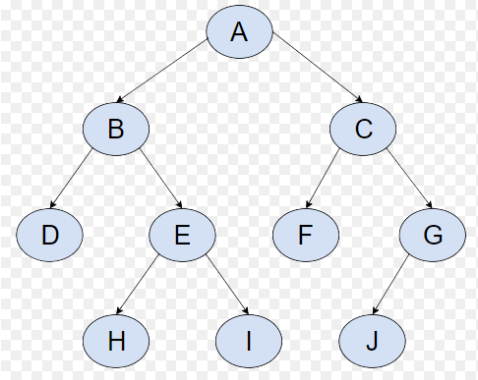
PART- B (5 x 10 = 50 Marks)

		Marks	CO	RBT LEVEL
21. (a)	Apply the quick sort on the below listed elements and provide the pseudo code neatly. In which way, you are going to pick the pivot element. Justify it. List = 10, 80, 30, 225, 90, 40, 50, 70, 121	**(10)**	**1**	**2**
	(OR)			
(b)	Explain the growth of functions in algorithm. Write about the asymptotic notations in detail.	**(10)**	**1**	**2**
22. (a)	Create a singly linked list with the Key elements 11, 22, 34, 44, 55, 66. Perform the following ADT operations and with the pseudo code (i)Insert a new node with element '25' at position 3. (ii)Delete Last node of the list. (iii)Search 34	**(10)**	**2**	**3**
	(OR)			

(b)	Convert the expression given below into its corresponding postfix expression and then evaluate it. Also write pseudo code to evaluate a postfix expression. 15 + ((8 – 4) + 10)/2.	**(10)**	**2**	**3**

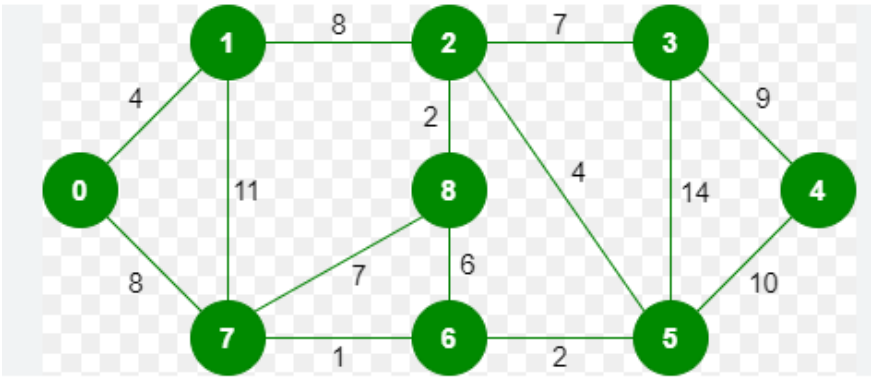
23. (a)	Consider the empty binary search tree. Now do the following operations: Insert 11, 22, 33, 44, 55, 66, and 77 in the tree. Find the result of in-order, pre-order, and post-order traversals. Show the deletion of the root node and 55.Write the pseudo code for the above operations.	**(10)**	**3**	**3**
	(OR)			
(b)	Create an AVL tree using the following sequence of data: 16, 27, 9, 11, 36, 54, 81, 63, 72. Write the rules and pseudo code for Single LL, RR rotations.	**(10)**	**3**	**3**

24. (a)	Explain in detail about Breadth First Search and Depth First Search. Write the BFS & DFS traversal for the following graph.	**(10)**	**4**	**3**



(OR)

(b)	**(i)**	Explain in detail about kruskal's algorithm with a proper pseudocode. Solve the following graph using kruskal's algorithm.	**(10)**	**4**	**3**



25. (a)	Write the algorithm for assignment problem. Solve the following assignment	**(10)**	**5**	**3**

problem.

	Job 1	Job 2	Job 3	Job 4
A	9	2	7	8
B	6	4	3	7
C	5	8	1	8
D	7	6	9	4

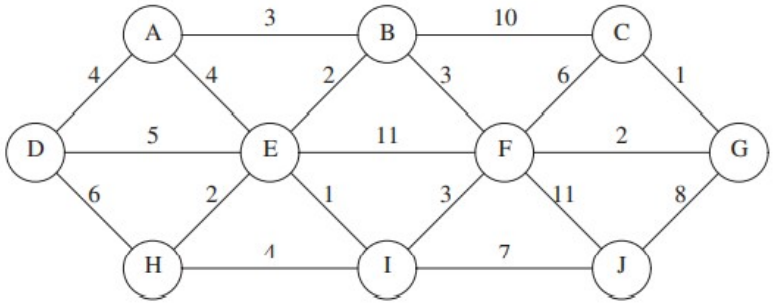
(OR)

(b)	1. Write an algorithm for Huffman code. Find an optimal Huffman Code for the following set of frequencies: a: 50 b: 25 c: 15 d: 40 e: 75	**(10)**	**5**	**3**

PART- C (1 x 10 = 10 Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Write the pseudocode for the prim's algorithm. Find a minimum spanning tree for the given graph by considering A as a starting node using Prim's algorithm.	**(10)**	**4**	**5**



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