Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – WINTER 2023

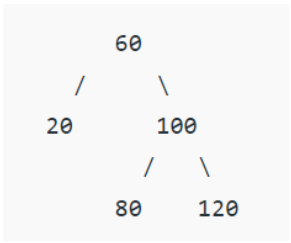
Subject Code:3134201 Date:16-01-2024

Subject Name:Data Structures and Algorithms

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

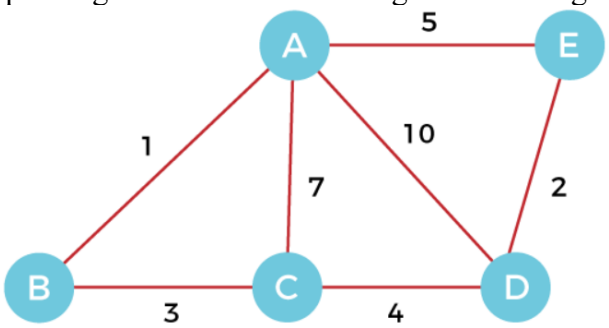
			Marks
Q.1	**(a)**	Differentiate Stack and Queue by working principle, pointers, and structure.	**03**
	(b)	Explain Bubble sort with an example.	**04**
	(c)	Explain all asymptotic notations used in algorithm analysis.	**07**
Q.2	**(a)**	 What will be the updated AVL tree after the insertion of 70?	**03**
	(b)	Explain the Breadth First Search (BFS) traversal method with an example.	**04**
	(c)	Write a program to perform insert and delete operations in a doubly linked list.	**07**
		OR	
	(c)	Convert the following infix expression into a postfix operation. Infix expression: (A + B * (C - D)) / E	**07**
Q.3	**(a)**	Explain in brief: Recurrence Relations with example.	**03**
	(b)	Discuss the advantages and disadvantages of a linked list over an array.	**04**
	(c)	Briefly explain multiplying large integer problem with a suitable example.	**07**
		OR	
Q.3	**(a)**	Why do we need to solve the recurrence relation?	**03**
	(b)	Apply a quick sort algorithm to sort the following data. Justify the steps. 42,29,74,11,65,58	**04**
	(c)	Explain the backtracking concept and apply the same to the 8-queen problem.	**07**

Q.4	**(a)**	What is the Principle of Optimality? Explain its use in Dynamic Programming Method.	**03**
	(b)	Explain the preorder traversal techniques of the binary tree with a suitable example.	**04**
	(c)	Explain the concept of a circular queue. Compare circular queue with a simple queue.	**07**

OR

Q.4	**(a)**	List out the general characteristics of Greedy Algorithms.	**03**
	(b)	Define the following terminologies with respect to tree: a) Degree of a node b) Level of a tree c) Height of the node d) Depth of the node	**04**
	(c)	Differentiate separate chaining and open addressing with examples.	**07**
Q.5	**(a)**	Define spanning tree and MST. How Krushkal's algorithm is different from Prim's algorithm.	**03**
	(b)	Describe the Depth-First-Search (DFS) algorithm briefly using an appropriate example.	**04**
	(c)	Create a binary search tree for the following data: 50, 25, 75, 22, 40, 60, 80, 90, 15, 30. And then, write c function to find the minimum node in the above created tree.	**07**

OR

Q.5	**(a)**	How to solve knapsack problem using dynamic programming?	**03**
	(b)	Consider the following undirected weighted graph. Find minimum spanning tree for the same using Kruskal's algorithm. 	**04**
	(c)	Solve Making change problem using dynamic technique. D1=1, d2=3, d3=5, d4=6. Calculate for making change of Rs. 8.	**07**

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