Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III EXAMINATION – SUMMER 2025

Subject Code:3134201 Date:29-05-2025

Subject Name:Data Structures and Algorithms

Time:02:30 PM TO 05:00 PM Total Marks:70

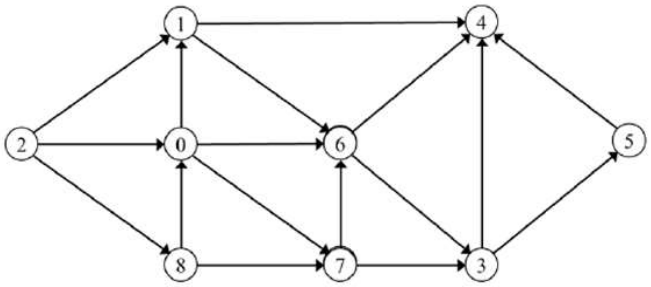
Instructions:

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)**	Compare Array and Linked List.	**03**
	(b)	Define algorithm. Discuss key characteristics of algorithms.	**04**
	(c)	Find the reasons doe's algorithm analysis become necessary? Also outline Asymptotic Notations.	**07**
Q.2	**(a)**	List out General Characteristics of Greedy algorithms.	**03**
	(b)	Make a C program for selection sort.	**04**
	(c)	Write an Algorithm to convert Infix expression into Postfix expression with suitable example.	**07**
		OR	
	(c)	Design a pseudocode for Insert and Delete an element from Circular queue.	**07**
Q.3	**(a)**	Write an algorithm to perform PEEP and CHANGE operation on stack.	**03**
	(b)	How multiplication of large integers can be done efficiently by using divide and conquer technique? Also, multiply 35 with 78 using the same approach.	**04**
	(c)	What is a binary search tree? Create a binary search tree for the following data. 38, 13, 51, 10, 12, 40, 84, 25, 89, 37, 66, 95 . Perform all Preorder, Postorder & Inorder traversal on resultant tree.	**07**
		OR	
Q.3	**(a)**	Solve the following recurrence with master method. $T(n)= 4\ T(n/2)+ n$	**03**
	(b)	Apply quick sort on following data: 42 23 74 11 65 58 94 36 99 87	**04**
	(c)	Write an algorithm to insert a node in Ordered Singly Linked List.	**07**
Q.4	**(a)**	What is graph? How it can be represented?	**03**
	(b)	Explain binary search technique with example. Also write worst case and average case time complexity of binary search.	**04**
	(c)	What is hashing? What are the qualities of a good hash function? Explain any two hash functions in detail.	**07**
		OR	
Q.4	**(a)**	Give difference between greedy approach and dynamic programming.	**03**

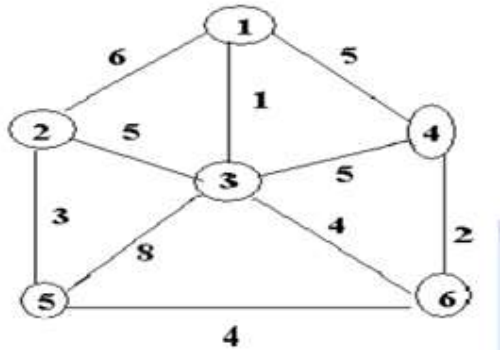
(b) Solve the following knapsack problem using greedy method. Number of items = 5, knapsack capacity W – 100, weight vector = {10, 20, 30, 40, 50} and profit vector = {20, 30, 66, 40, 60}. **04**

(c) Show the steps of BFS and DFS traversal for following graph starting from vertex 2. **07**



Q.5 **(a)** Explain Activity selection problem with example. **03**

(b) Define minimum spanning tree. Find minimum spanning tree using Krushkal's algorithm of the following graph: **04**



(c) Explain Matrix chain multiplication with suitable example **07**

OR

Q.5 **(a)** What is Travelling Salesman problem? **03**

(b) Find Longest Common Subsequence from given two Strings. **04**

S1 : abbacdcba

S2 : bcdbbcaac

(c) Solve a making change problem using Dynamic programming where coins={2,3,5,10} and Amount to pay W=15. **07**

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