Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER– III EXAMINATION – SUMMER 2026

Subject Code:3130702 Date:17-06-2026

Subject Name:Data Structures

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)**	Define data structure. What are the applications of data structures?	**03**
	(b)	Explain the concept of amortized time complexity with an example.	**04**
	(c)	Explain the bubble sort algorithm. How can you optimize bubble sort to reduce the number of swaps?	**07**
Q.2	**(a)**	How does a linked list differ from an array in terms of structure and memory allocation?	**03**
	(b)	Describe the concept of a double-ended queue and its uses.	**04**
	(c)	Write an algorithm to convert infix expression into postfix expression using stack.	**07**
		OR	
	(c)	Write an algorithm to insert an element after the given node in the singly linked list.	**07**
Q.3	**(a)**	Describe the basic operations that can be performed on linear data structures.	**03**
	(b)	Explain the tower of Hanoi problem.	**04**
	(c)	Write a short note on AVL tree.	**07**
		OR	
Q.3	**(a)**	What is multiple stack? How it is useful?	**03**
	(b)	Describe how insertion and deletion operations are applied to the priority queue.	**04**
	(c)	Write a short note on 2-3 tree.	**07**
Q.4	**(a)**	Define: 1. Sibling 2. Height of tree 3. Forest	**03**
	(b)	Describe a weighted graph and its applications.	**04**
	(c)	Explain breadth-first search (BFS) algorithm.	**07**
		OR	
Q.4	**(a)**	How new node can be inserted into a binary search tree?	**03**
	(b)	Describe a cyclic graph and an acyclic graph with examples.	**04**
	(c)	Discuss Dijkstra's algorithm for finding the shortest path.	**07**
Q.5	**(a)**	Describe the characteristics of a good hash function.	**03**
	(b)	Apply merge sort on the following array. A=[38, 27, 43, 10]	**04**
	(c)	Explain indexed sequential file and sequential file structure.	**07**
		OR	
Q.5	**(a)**	Explain random file organization.	**03**
	(b)	Sort the elements 77, 49, 25, 12, 9, 33, 56, 81 using selection sort.	**04**
	(c)	Describe any two collision resolution techniques.	**07**

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