Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–III(NEW) EXAMINATION – SUMMER 2023

Subject Code:3130702   **Date:26-07-2023**
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.

Q.1	**(a)**	What is DS? Explain data structure and its types.	**03**
	(b)	Explain Tower of Hanoi with example.	**04**
	(c)	Write algorithms to insert, and delete elements in queue	**07**
Q.2	**(a)**	Construct Binary Tree where the preorder traversal is 1,2,4,5,3,6,8,9,7 & postorder is 4,5,2,8,9,6,7,3,1.	**03**
	(b)	Construct an AVL Tree by inserting numbers from 1 to 8.	**04**
	(c)	What is stack? Explain operations on stack in detail.	**07**
		OR	
	(c)	Explain tree traversal in detail with example.	**07**
Q.3	**(a)**	Explain 2-3 Tree in brief.	**03**
	(b)	Explain any three hashing techniques with example.	**04**
	(c)	What is problem with simple queue? Explain its solution with example and algorithms.	**07**
		OR	
Q.3	**(a)**	Explain binary search technique.	**03**
	(b)	Explain fastest sorting technique with example.	**04**
	(c)	What is collision? Explain collision resolution techniques with example.	**07**
Q.4	**(a)**	List all asymptotic notations and explain any one of it.	**03**
	(b)	List and explain linked list applications.	**04**
	(c)	What is doubly linked list? Write Algorithm for insertion and deletion in doubly linked list.	**07**
		OR	
Q.4	**(a)**	What is file? Explain types of files.	**03**
	(b)	Convert the following infix expressions to their prefix. (A^B*C-D+E/F/(G+H))	**04**
	(c)	Explain Prim's & Kruskal's algorithm with suitable example	**07**
Q.5	**(a)**	Explain malloc and free functions in 'C'.	**03**
	(b)	Define the following: 1. Sibling 2. Forest 3. Complete Binary Tree 4. Complete Graph	**04**
	(c)	Explain following: (i) Recursion (ii) Nonprimitive data structures (iii) Hashing (iv) Non- linear data structures (v) sparse matrix (vi) Priority queue (vii) Collision	**07**
		OR	
Q.5	**(a)**	What is time complexity? Explain with example.	**03**
	(b)	Explain Binary Search with example.	**04**
	(c)	Write and explain algorithm for insertion in Singly Linked List	**07**

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