Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2020

Subject Code:2130702   **Date:10/03/2021**
Subject Name:Data Structure
Time:10:30 AM TO 12:30 PM   **Total Marks:56**
Instructions:
    1. **Attempt any FOUR questions out of EIGHT questions.**
    2. **Make suitable assumptions wherever necessary.**
    3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain time and space complexity of an algorithm.	**03**
	(b)	Explain primitive, non-primitive, linear and non-linear data structures.	**04**
	(c)	Define following terms: (i) data structures (ii) recursion (iii) sparse matrix (iv) degree of graph (v) minimum spanning tree (vi) complete binary tree (vii) double ended queue	**07**
Q.2	**(a)**	Evaluate following expression using stack. 6 2 3 + - 3 8 2 / + * 2 $ 3 +	**03**

	(b)	Convert the following expression into postfix form.
		    1. A ^ B * C - D + E / F / (G + H)
		    2. (A + B ^ C ^ D) * (E + F / D)
			04

	(c)	Write a C program to implement stack using array with push, pop and display functions.	**07**
Q.3	**(a)**	Explain with example: circular queue	**03**
	(b)	Write and discuss applications of stack and queue.	**04**
	(c)	Write user defined C function to insert and delete a node at/from end in doubly linked list.	**07**
Q.4	**(a)**	Explain with example: priority queue	**03**
	(b)	Differentiate between array and linked list.	**04**
	(c)	Write user defined C function to insert and delete a node at/from specific location in singly linked list.	**07**

Q.5	**(a)**	Construct a binary tree from the traversals given below:
		    Inorder: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90
		    Preorder: 50, 10, 0, 40, 30, 20, 90, 80, 60, 70
			03

	(b)	Write a short on height balanced and weight balance tree.	**04**
	(c)	Explain insertion operation in the 2-3 tree: (i) if the parent has 2 children and (ii) if the parent has 3 children.	**07**

Q.6	**(a)**	Construct a binary search tree from the traversals given below:
		    Inorder: 20, 30, 35, 40, 70, 80, 90, 100
		    Postorder: 20, 35, 30, 80, 70, 100, 90, 40
			03

	(b)	Write a short on breadth first search and depth first search in graph.	**04**
	(c)	Explain AVL tree with example.	**07**

Q.7	**(a)**	Explain binary search with example.	**03**
	(b)	Write a C program for bubble sort.	**04**
	(c)	Explain the techniques for collision-resolution in Hashing with example.	**07**
Q.8	**(a)**	Explain sequential search with example.	**03**
	(b)	Write an algorithm for quick sort.	**04**
	(c)	Explain sequential files and indexed sequential files structures.	**07**

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