Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3130702 Date:16-01-2024

Subject Name:Data Structures

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)**	Define data structure. Enlist and explain types of data structure.	**03**
	(b)	Differentiate static and dynamic memory allocation.	**04**
	(c)	Convert the following infix expression into postfix expression using stack. (A-B)/C*D^(E/F)^(G+H)	**07**
Q.2	**(a)**	Compare array and linked list.	**03**
	(b)	Differentiate primitive and non-primitive data structures.	**04**
	(c)	Define stack. Write algorithms for PUSH, POP and PEEP operations of stack.	**07**
		OR	
	(c)	Define queue. Write algorithms for INSERT, DELETE and DISPLAY operations of queue.	**07**
Q.3	**(a)**	Enlist and explain any 3 applications of linked list.	**03**
	(b)	Design an algorithm to insert an element in doubly linked list.	**04**
	(c)	Do as directed: i) Evaluate the postfix expression in tabular forms: 8 2 / 6 7 * + ii) Explain Tower Of Hanoi with example.	**03** **04**
		OR	
Q.3	**(a)**	Enlist and explain any 3 applications of stack in computer science.	**03**
	(b)	Design an algorithm to delete an element in doubly linked list.	**04**
	(c)	Do as directed: i) Evaluate the prefix expression in tabular forms: * / - 8 2 3 4 ii) Explain Sparse matrix with example.	**03** **04**
Q.4	**(a)**	Explain binary search tree with suitable example.	**03**
	(b)	Construct a binary tree from the traversals given below: In-order : D, B, A, E, G, C, H, F, I Pre-order : A, B, D, C, E, G, F, H, I	**04**
	(c)	Differentiate DFS and BFS in detail.	**07**
		OR	
Q.4	**(a)**	Explain AVL tree with suitable example.	**03**
	(b)	Construct a binary tree from the traversals given below: Pre-order : 1, 2, 4, 8, 9, 5, 3, 6, 7 Post-order : 8, 9, 4, 5, 2, 6, 7, 3, 1	**04**
	(c)	Explain prim's and krushkal's algorithm with suitable example.	**07**
Q.5	**(a)**	State the reason why hash function is used. Give one example of hash function.	**03**
	(b)	Write a C program for bubble sort.	**04**

	(c)	Enlist and explain collision resolution techniques in hashing.	**07**
		OR	
Q.5	**(a)**	Differentiate sequential search and binary search.	**03**
	(b)	Define file organization. Briefly summarize different file organizations.	**04**
	(c)	Do as directed below: i) Sort following elements using quick sort. 10 15 28 09 40 35 29 12 06 07 ii) State time and space complexity of quick sort.	**05** **02**

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