GUJARAT TECHNOLOGICAL UNIVERSITY
MSC - INTEGRATED– SEMESTER - II - EXAMINATION- SUMMER-2023

Subject Code: 1320503   **Date: 27/06/2023**
Subject Name: Data structure
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. Use of simple calculators and non-programmable scientific calculators are permitted.

Q.1	**(a)**	What is data structure? Discuss primitive and non-primitive data structure.	03
	(b)	Write a program to take string as an input from the user and convert it from lowercase to uppercase. Print appropriate message if it is already in uppercase.	04
	(c)	What is stack? Discuss PUSH and POP operations on stack.	07
Q.2	**(a)**	Differentiate between stack and queue.	03
	(b)	What is postfix notation? Convert the following infix expression into equivalent postfix expression. (i) A - B / (C * D ^ E) (ii) A + (B - C) * D	04
	(c)	What is an array? Discuss binary search operation on an array.	07

OR

	(c)	What is string? Discuss string concatenation, string reversal and string copy operation in detail.	07
Q.3	**(a)**	What is dynamic memory allocation? Discuss the concept of pointer to structure variable.	03
	(b)	Write an algorithm to insert a new node at the front of the single linked list.	04
	(c)	Discuss insert and delete operations on simple queue.	07

OR

Q.3	**(a)**	Differentiate between single lined list and circular linked list.	03
	(b)	Write a program to delete a node from given single linked list. If node is not found, display appropriate message.	04

	(c)	What is single linked list?
		Discuss following operations on single linked list.
		   I. Insert a node before a given node
		   II. Insert a node in sorted linked list
		   III. Delete the last node in given linked list
			07

Q.4	**(a)**	Define followings terms:
		   I. leaf node
		   II. directed edge
		   III. binary search tree
			03

	(b)	What is hashing? Discuss the concept of hash function.	04

(c) What is double linked list? Discuss following operations with respect to double lined list. **07**

    I.   Insertion of a new node at the beginning of the list

    II.   Insertion of a new node after a given node

<p align="center">OR</p>

Q.4 **(a)** Define following terms: **03**

    I.   path

    II.   in-degree of a node

    III.   binary tree

    (b) Discuss conversion of general tree to binary tree. **04**

    (c) What is tree traversal? Discuss in-order and pre-order tree traversal. **07**

Q.5 **(a)** Discuss search operation in binary search tree. **03**

    (b) What is collision in hashing? Discuss linear probing in detail with an example. **04**

    (c) Discuss merge sort algorithm with an example. **07**

<p align="center">OR</p>

Q.5 **(a)** Discuss middle square method in detail. **03**

    (b) Discuss new node insertion in binary search tree. **04**

    (c) What do you mean by pivot element? Discuss quick sort algorithm with an example. **07**

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