

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER– III (NEW) EXAMINATION – SUMMER 2022****Subject Code:3130702****Date:28-07-2022****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
<b>Q.1</b>	(a) Compare static memory allocation and dynamic memory allocation.	<b>03</b>
	(b) Differentiate: <ul style="list-style-type: none"> <li>(i) primitive and non-primitive data structures</li> <li>(ii) linear and non-linear data structures</li> </ul>	<b>04</b>
	(c) What is time and space complexity? Explain asymptotic notations in detail.	<b>07</b>
<b>Q.2</b>	(a) Convert following infix to prefix and postfix expression: (a + (b * c) / (d - e) )	<b>03</b>
	(b) Write a 'C' program to reverse the string using stack.	<b>04</b>
	(c) Enlist applications of stack. Write an algorithm to push and pop elements with respect to stack.	<b>07</b>
	<b>OR</b>	
	(c) Enlist applications of queue. Write an algorithm to insert and delete elements with respect to simple queue.	<b>07</b>
<b>Q.3</b>	(a) What is priority queue? Explain with example.	<b>03</b>
	(b) Write an algorithm to delete a node from doubly linked list.	<b>04</b>
	(c) Write a 'C' program to implement a circular queue using array with all necessary overflow and underflow checks.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Briefly discuss malloc( ) memory allocation function.	<b>03</b>
	(b) Write an algorithm to insert a node into doubly linked list.	<b>04</b>
	(c) Write a 'C' program to implement singly linked list with (1) insert (2) delete and (3) total_node_count functions.	<b>07</b>
<b>Q.4</b>	(a) Define complete binary tree and almost complete binary tree.	<b>03</b>
	(b) What is a graph? Explain various representations of graphs.	<b>04</b>
	(c) What is a binary search tree? Create a binary search tree for inserting the following data. 50, 35, 100, 25, 41, 120, 105, 46, 90, 95 Explain delete operation for above tree.	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) Discuss the properties of a B-Tree.	<b>03</b>
	(b) Construct a binary tree from the traversals given below: Inorder: 5, 8, 11, 12, 13, 16, 15, 19, 18, 21 Postorder: 5, 11, 12, 8, 16, 18, 21, 19, 15, 13	<b>04</b>

- (c) What is a minimum spanning tree? Explain Kruskal's algorithm for finding a minimum spanning tree. **07**

- Q.5** (a) Define topological sort? **03**  
(b) Explain indexed sequential file structure. **04**  
(c) Describe various collision resolution techniques in hashing. **07**

**OR**

- Q.5** (a) Differentiate: BFS and DFS. **03**  
(b) Compare sequential searching with binary searching in detail. **04**  
(c) What is hashing? What are the qualities of a good hash function? Explain any two hash functions in detail. **07**

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