

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-III(New) • EXAMINATION – WINTER 2016****Subject Code:2130702****Date:02/01/2017****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.

		<b>MARKS</b>
<b>Q.1</b>	<b>Explain the following terms in brief</b>	<b>14</b>
	1 Primitive data structure	
	2 Non-primitive data structure	
	3 Linear data structure	
	4 Non-linear data structure	
	5 Recursion	
	6 Time complexity of an algorithm	
	7 Double-ended queue	
	8 Priority queue	
	9 Circular linked list	
	10 Complete binary tree	
	11 2-3 tree	
	12 Minimum spanning tree	
	13 Degree of vertex	
	14 Hash collision	
<b>Q.2</b>	(a) Write a pseudo-code for PUSH and POP operations of stack.	<b>03</b>
	(b) What is prefix notation? Convert the following infix expression into prefix. $A + B - C * D * E \$ F \$ G$	<b>04</b>
	(c) Write an algorithm to perform various operations (insert, delete and display) for simple queue.	<b>07</b>
	<b>OR</b>	
	(c) Write differences between simple queue and circular queue. Write an algorithm for insert and delete operations for circular queue.	<b>07</b>
<b>Q.3</b>	(a) Convert the following infix expression into postfix. $A + B - C * D * E \$ F \$ G$	<b>03</b>
	(b) Write algorithm(s) to perform INSERT_FIRST (to insert a node at the first position) and REVERSE_TRAVERSE (to display the data in nodes in reverse order) operations in doubly linked list.	<b>04</b>
	(c) Write a 'C' program to implement stack using linked list.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Enlist and briefly explain various applications of stack.	<b>03</b>
	(b) Discuss various rehashing techniques.	<b>04</b>
	(c) Write 'C' functions to implement INSERT_FIRST (to insert a node at the first position), DELETE_FIRST (to delete a node from the first position), DELETE_LAST (delete a node from the last position) and TRAVERSE (to display the data in nodes) operations in circular linked list.	<b>07</b>

- Q.4** (a) Write an algorithm for Binary search method. **03**  
 (b) Write a 'C' program for Bubble sort. **04**  
 (c) Sort the following numbers using (i) Selection sort (ii) Quick sort: **07**

10 50 0 20 30 10

**OR**

- Q.4** (a) Write a 'C' function for Selection sort. **03**  
 (b) Write an algorithm for Quick sort. **04**  
 (c) Explain Depth First Search and Breadth First Search in graphs with an example. **07**

- Q.5** (a) Draw a binary expression tree for the following and perform preorder traversal for the same: **03**

$(A + B * C) + (D + E * F)$

- (b) Construct a binary search tree for the following and perform inorder and postorder traversals: **04**

5 9 4 8 2 1 3 7 6

- (c) Write 'C' functions for: inserting a node, postorder traversal and counting total number of nodes for binary search tree. **07**

**OR**

- Q.5** (a) Explain AVL trees. **03**  
 (b) Construct a binary search tree from the following traversals: **04**

Inorder: 3 4 5 6 7 9 17 20 22

Preorder: 9 4 3 6 5 7 17 22 20

- (c) Write Kruskal's algorithm for minimum spanning tree with an example. **07**

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