

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-III (New) EXAMINATION – WINTER 2015**

**Subject Code:2130702****Date:02/01/2016****Subject Name: Data Structures****Time: 2:30pm to 5:00pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
<b>Q.1</b>	<b>Short Questions</b>	<b>14</b>
	1 Define data structure.	1
	2 List operations performed on a stack.	1
	3 Mention variations of the queue data structure.	1
	4 What is the worst case time complexity of searching an element in a list? How?	1
	5 Mention one operation for which use of doubly linked list is preferred over the singly linked list.	1
	6 Write an algorithm/steps to traverse a singly linked list.	1
	7 Define: Height of a tree.	1
	8 What is the height of a complete binary with n nodes?	1
	9 Write two simple hash functions.	1
	10 What is a header node and what is its use?	1
	11 Is Queue a priority queue? Justify.	1
	12 What is the complexity of binary search algorithm?	1
	13 Name two divide and conquer algorithms for sorting.	1
	14 Give two applications of graphs.	1
<b>Q.2</b>	(a) Write an algorithm to check if an expression has balanced parenthesis using stack.	<b>03</b>
	(b) What is postfix notation? What are its advantages? Convert the following infix expression to postfix. A\$B-C*D+E\$F/G	<b>04</b>
	(c) Write a C program to implement a stack with all necessary overflow and underflow checks using array.	<b>07</b>
	<b>OR</b>	
	(c) Write a C program to implement a circular queue using array with all necessary overflow and underflow checks.	<b>07</b>
<b>Q.3</b>	(a) Evaluate the following postfix expression using a stack. Show the stack contents. AB*CD\$-EF/G/+ A=5, B=2, C=3, D=2, E=8, F=2, G=2	<b>03</b>
	(b) Perform following operations in a circular queue of length 4 and give the Front, Rear and Size of the queue after each operation. 1) Insert A, B 2) Insert C 3) Delete 4) Insert D	<b>04</b>

	5) Insert E	
	6) Insert F	
	7) Delete	
	(c) Write a program to insert and delete an element after a given node in a singly linked list.	07
	<b>OR</b>	
<b>Q.3</b>	(a) Explain various applications of queue.	03
	(b) Differentiate between arrays and linked list.	04
	(c) Create a doubly circularly linked list and write a function to traverse it.	07
<b>Q.4</b>	(a) Define complete binary tree and almost complete binary tree.	03
	(b) Explain deletion in an AVL tree with a suitable example.	04
	(c) What is binary tree traversal? What are the various traversal methods? Explain any two with suitable example.	07
	<b>OR</b>	
<b>Q.4</b>	(a) Mention the properties of a B-Tree.	03
	(b) Construct a binary tree from the traversals given below: Inorder: 1, 10, 11, 12, 13, 14, 15, 17, 18, 21 Postorder: 1, 11, 12, 10, 14, 18, 21, 17, 15, 13	04
	(c) What is a binary search tree? Create a binary search tree for inserting the following data. 50, 45, 100, 25, 49, 120, 105, 46, 90, 95 Explain deletion in the above tree.	07
<b>Q.5</b>	(a) Insert the following elements in a B-Tree. a, g, f, b, k, c, h, n, j	03
	(b) Apply quicksort algorithm to sort the following data. Justify the steps. 42, 29, 74, 11, 65, 58	04
	(c) What is hashing? What are the qualities of a good hash function? Explain any two hash functions in detail.	07
	<b>OR</b>	
<b>Q.5</b>	(a) List advantages and disadvantages of Breadth First Search and Depth First Search.	03
	(b) What is a minimum spanning tree? Explain Kruskal's algorithm for finding a minimum spanning tree.	04
	(c) Discuss various methods to resolve hash collision with suitable examples.	07

\*\*\*\*\*