Roll No. | | | | | | | | | | | |

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ECE) / (ETE) (2011 Onwards)

B.Tech.(Electronics) (2012 Batch)

(Sem.–5)

# DATA STRUCTURES

Subject Code : BTCS-304

Paper ID : [A2102]

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

## SECTION-A

**1. Write Briefly :**

a) What do you mean by the time complexities of an algorithm?

b) How do you represent a linear array in memory?

c) What is the significance of pointers in linked list?

d) What is the postfix form of the following prefix expression?

**+ab-cd*

e) Assume that a queue is available for pushing and popping elements. Given an input sequence a, b, c, (c be the first element), give the output sequence of elements if the rightmost element given above is the first to be popped from the queue.

f) What is AVL tree?

g) Suppose H is a complete binary tree with n elements then in what conditions, H is called a maxheap?

h) For an undirected graph with n vertices and e edges, what will be the sum of the degree of each vertex?

i) Define the criteria for selecting a hash function.

j) Calculate the number of interchanges required to sort 5, 1, 6, 2 4 in ascending order using Bubble Sort.



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## SECTION-B

2. Explain an efficient way of storing two symmetric matrices of the same order in memory.

3. Let there be a doubly linked list P, Q, R. How S can be added between P and Q?

4. What is a Binary Search Tree (BST)? Make a BST for the following sequence of numbers and Traverse the tree in Preorder.

   45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48

5. Discuss the application of heap in implementing priority queue with the help of suitable example.

6. What is Quick Sort? Sort the following array using quick sort method.

   24 56 47 35 10 90 82 31

## SECTION-C

7. Show the linked representation of the following two polynomials.

   $7x^{80} + 5x^{50} + 3x^{30} + 1 = 0$

   $9x^{90} + 6x^{60} + 2x^{20} - 1 = 0$

   Build a procedure for adding two polynomials stored in linked lists. Verify steps of your procedure for the above two polynomials.

8. What are Circular Queues? Write down routines for inserting and deleting elements from a circular queue implemented using arrays.

9. What are the two phases in heap sort algorithm? Sort the following data using heap sort and show all the intermediate steps.

   88, 12, 91, 23, 10, 36, 45, 55, 15, 39, 81

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