TCS-607        316      Printed Pages : 4

Paper Code & Roll No. to be filled in your Answer Book

Roll No. [　　　　　　　　　　　]

# B.Tech. (VI - Sem.)

## Even Semester Examination - 2016

## DATA STRUCTURES USING C++

[Time : 3 Hours]        [Maximum Marks :100]

Note: Attempt all questions.

Q1.    Attempt any four questions.        (5×4=20)

    (a)    What is a Data Structures? Explain linear and nonlinear data structure

    (b)    What is an algorithm? What do you mean by the space and time complexity of an algorithm.

    (c)    Differentiate between compile time and run time memory allocation? Explain with the help of example.

    (d)    Write an algorithm to reverse a singly linked list.

    (e)    What is doubly linked list? Write an algorithm for insertion of an element in a doubly linked list at the beginning.

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(f) What is skip list? Explain sparse table with suitable example.

Q2. Attempt **any four** questions:- (5×4=20)

(a) What is a stack? Implement PUSH operation in a stack using Linked list.

(b) What is recursion? Differentiate between recursion and iteration. Explain with the help of example.

(c) Convert the infix expression in to postfix expression:

$$A+(B*(C-D^\wedge E*F/(G-H)+I)/J+K)/F$$

(d) What are underflow and overflow conditions in data structure? What is the importance of garbage collection?

(e) What are the limitations of linear queue? How it is eliminated by circular queue. Write an algorithm for insertion of an element in circular queue.

(f) What do you mean by tower of Hanoi problem? Explain with the help of suitable example.

Q3. Attempt **any two**:- (10×2=20)

(a) What is hashing? What are different collision resolution techniques in hashing?

(b) Write an algorithm for binary search and discuss its complexity compared with linear search.

(c) Define:

(1) Collision

(2) Apen addressing technique.

Q4. Attempt **any two**:- (10×2=20)

(a) What is Binary Search Tree?What are its properties? Consider the following In order and Post order and generate binary tree.

POSTORDER: H,D,I,E,B,J,F,K,L,G,C,A

INORDER : H,D,B,I,E,A,F,J,C,K,G,L

(b) Write a pseudo code of Heap sort.Analise its running time.Perform heap sort on the following list of integers.

5,13,2,25,7,17,20,8,4

TCS-607/2360 (3) [P.T.O.]

(c)    (i)    Discuss Huffman algorithm.

| Symbol : | B | M | P | Q | R |
|---|---|---|---|---|---|
| Frequency : | 15 | 7 | 6 | 6 | 5 |

Construct the Huffman tree and generate the Huffman code of each symbol.

Q5.    Attempt **any two** :-            (10×2=20)

(a)    Differentiate BFS and DFS graph traversal algorithm with example.

(b)    Define the following terms: directed graph, undirectedgraph, weightedgraph, adjacency list, adjacency matrix with the help of suitable example.

(c)    What is minimum spanning tree? How many techniques are there in which minimum spanning tree are created? Explain with the help of suitable example.

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