2014

[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 6081 **D** **Your Roll No.....**

Unique Paper Code : 234201

Name of the Course : **B.Sc. (Hons.) Computer Science**

Name of the Paper : Data Structure (CSHT–203)

Semester : II

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Question 1 is compulsory
3. Attempt any **four** questions out of the remaining **Q2–Q7.**
4. Parts of a question must be answered together.

1. (a) Write a recursive function to compute the maximum element of an integer array. (5)

(b) Show step wise outcome of the following operations on an empty queue Q of size 4 :

```
Q.enqueue(4);
Q.enqueue(6);
Q.enqueue(23);
Q.dequeue();
Q.enqueue(12);
Q.enqueue(33);
Q.enqueue(11);
```

(5)

(c) Define a class for implementing singly linked list. Write a function to merge two ordered linked lists into a third linked list ensuring that elements which are common to both the lists occur only once in the third list. It is assumed that within a list all elements are unique. (5)

P.T.O.

(d) Consider a lower triangular matrix of n x n size. What will be total number of non zero enteries in this lower triangular matrix ? Give the mapping for storing and retrieving elements of lower triangular matrix in a one dimensional array. (5)

(e) Apply quick sort (ascending order) on the following list of numbers :

45, 23, 67, 28, 30, 42, 15, 25 (5)

(f) Show the working of the algorithm for adding two large numbers using stacks for adding two given numbers 45216 and 8249. Show the status of all the stacks for each step. (5)

(g) Design a class for a binary search tree and include a member function to insert a node in the tree. (5)

2. (a) Give the formula and calculate the address of the element A[4][5] of the 2D Array defined as follows :

int A[10][5]

(i) if the elements are stored in row major order and

(ii) if the elements are stored in column major order

The beginning address of the array is 100. Every element requires 2 bytes of storage. (5)

(b) Write equivalent iterative function for the given recursive function :

```
void f1(int i)
{
        if (i>0)
        {
                cout<<i*5<<endl;
                f1(i-1);
        }
}
```

(5)

3. (a) What is a circular linked list ? What are the advantages and disadvantages of circular linked list over singly linked list ? (5)

(b) Write a function to insert an element X at a given position *i* in a doubly linked lists. (5)

4. (a) Consider the following postfix expression :

3 4 2 6 3 / – * +

The above expression is evaluated using stack. Show the content of stack after each step. (5)

(b) Give an array implementation of a linear queue. What are its disadvantages ? How can it be improved ? (5)

5. (a) What is Hashing ? Using Division Method of Hashing in a table of size 8 slot, put the following data into the correct slot :

6, 36, 18, 72, 43 (5)

(b) What are self-organizing lists ? For a given sequence ABCDBBCADD, show the the list after each step using i) Move to Front and ii) Count method. (5)

6. (a) Write a function to count number of right children in a binary search tree. (5)

(b) Draw the binary tree, if the following traversals are given : (5)

Inorder : CBDAEF

Preorder : ABCDEF (5)

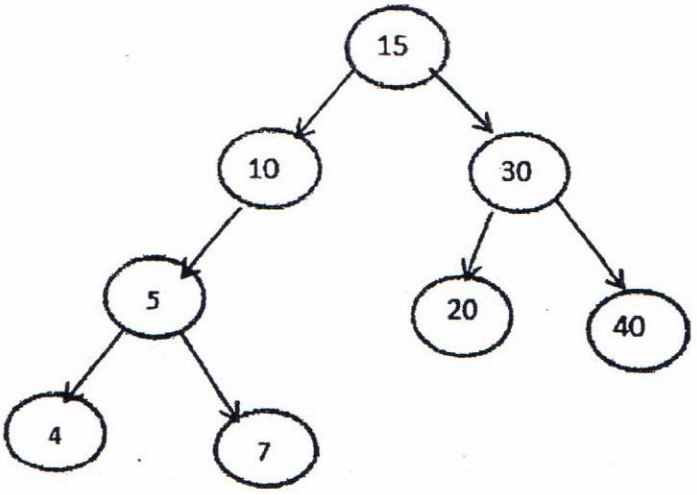
7. (a) Create a B Tree of order 4 for the following sequence :

12, 3, 1, 9, 17, 15, 25

Show the tree after every step. (5)

P.T.O.

(b) Consider the following tree : (5)

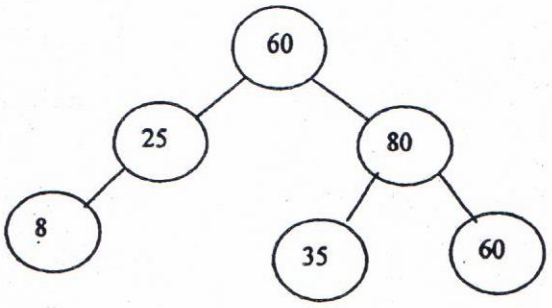


Show the tree after deletion of node 15 using

(i) deletion by copying

(ii) deletion by merging

Also traverse the tree using Breadth First Traversal scheme.



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