CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY

Third Semester of B. Tech. Examination (CE/IT)

November – December 2011

CE 201 Data Structure and Algorithm

Date: 29.11.2011, Tuesday **Time: 01:30 p.m. To 04:30 p.m.** **Maximum Marks: 70**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION - I

Q - 1 Answer the following. **[10]**

1. What is data structure?
2. Consider an array YEAR[1920 : 1970]. Find the total number of elements.
3. List out the areas in which data structures are applied.
4. Which data structure is used to perform recursion?
5. Which sorting method is the slowest?
6. When the preorder and postorder traversal of a binary tree generates same output.?
7. If the address of A[1][1] and A[2][1] are 1000 and 1010 respectively and each element occupies 2 bytes then the array has been stored in which order? Row-major or column major?
8. What is the minimum no of nodes in full binary tree with depth 3 ?
9. O(N) (linear time) is better than O(1) (constant time). True or False?
10. Which is the best data structure to check whether an arithmetic expression has balanced parenthesis or not ?

Q - 2 Answer the following. **[10]**

(a) Consider following stack, where size of the STACK is N=6. Initially stack contains following elements. **02**

AAA	DDD	EEE	FFF	GGG	

Describe the stack with figure as the following operations take place.
(i) push(KKK) (ii) pop (iii) push(LLL) (iv) push(SSS)

(b) Write a short note on Double ended Queue. **02**

(c) What is quick sort? Sort the following elements using quick sort method. Write down **06**

its worst case time complexity.
24 56 47 35 10 90 82 31

OR

Q - 2 Answer the following. **[10]**

(a) Show circular queue with front and rear value after each step. Size of queue=5 and initially front = rear =0 **04**
(I) Insert A, B, C. (II) Delete (III) Insert D, E, F, G

(b) Convert the following infix expressions into its equivalent postfix expressions using stack. **06**

(i) (m+ n)*(k + p)/(g / b)↑ (a ↑ b / c)

(ii) A*(B + D)/ E − F*(G + H/ K)

Q - 3 Answer the following. **[15]**

(a) Assume a stack with N=6.Find output of the following code: **03**

```
void main()
{
int i;
    for(i=1;i<=6;i++)
    {
       if(i%2==0)
       {
       push(i+1);
       }
       else
       {
       push(i-1);
       }
    }
   for(i=1;i<=6;i++)
   {
     pop();
   }
}
```

(b) Explain threaded binary with an example. **03**

(c) The five items : A , B ,C , D and E are pushed in a stack ,one after the another, starting from A. The stack is popped out 4 times and each element is inserted in a queue. Then two elements are deleted from the queue and pushed back on the stack. Now one item is popped out from the stack. Find out the popped item ,explain with diagram.(Take stack and queue size=5) **05**

(d) Write an algorithm for Insertion sort. **04**

OR

3 **Answer the following.** [15]

(a) Evaluate following postfix expression using stack 03

5 2 + 4 8 + * 20 6 - * 8 2 3 * - -

(b) Explain the insert, delete and update operations in a sequential file. 03

(b) Write a C program which reads the social security number SOC of a student and uses LINEAR SEARCH to find it. Print the student's detail with name and social security number.(Note: SOC as an integer, Name as a String) 05

(c) Write an algorithm for selection sort. 04

SECTION – II

Q - 4 **Answer the following.** [10]

(a) What is Tower of Hanoi problem? Trace its recursive solution for disk=3. 05

(b) Consider the following specifications of a graph G 05

V(G) = {1,2,3,4}

E(G) = {(1,2),(1,3),(3,3),(3,4),(4,1)}

(i) Draw an undirected graph.

(ii) Draw its adjacency matrix.

Q - 5 **Answer the following.** [15]

(a) The following values are to be stored in a hash table 06

25, 42, 96, 101, 102, 162, 197

Describe how the values are hashed by using division method of hashing with a table size of 7. Use chaining as the method of collision resolution.

(b) Give the difference between 06

1. Dynamic array v/s Linked list

2.Tree v/s Graph

3. Strictly binary tree v/s Complete binary tree

(c) **Define following terms.** 03

1.Connected Graph

2. Pendant Vertex.

3. Mutigraph

OR

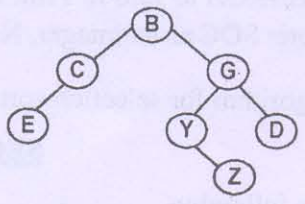
Q – 5 Answer the following. [15]

(a) What do you mean by hashing? Explain any three popular hash functions with example. 06

(b) What is a Binary Search Tree (BST)? Make a BST for the following sequence of numbers. 45,36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48 Traverse the tree in Preorder Inorder and postorder. 06

(c) For the binary tree shown in figure, Identify 03

i) Height of the binary tree
ii) Parent of D
iii) Siblings of Z
iv) Level of C
v) Ancestors of Y
vi) Leaf nodes



Q:6 Answer the following. [10]

(a) Start with an empty tree. Insert the following elements and make it height balanced 06

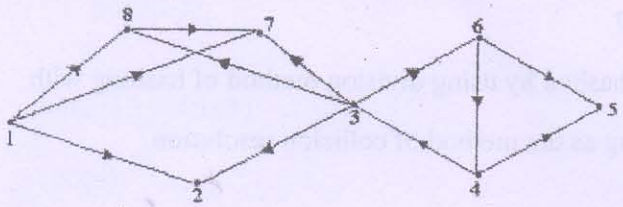
1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

(b) Write an algorithm to delete a node from doubly linked list. Explain with diagram. 04

OR

Q.- 6 Answer the following. [10]

(a) What do you mean by BFS and DFS. Show the result of running BFS and DFS on the directed graph given below using vertex 3 as source. 06



(b) Consider the following two traversals and construct a binary tree. 04

Preorder : G B Q A C K F P D E R H
Inorder : Q B K C F A G P E D H R

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