ROLL NO. _____

Code: DC54 Subject: DATA STRUCTURES

DipIETE – CS

Time: 3 Hours **DECEMBER 2013** **Max. Marks: 100**

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: **(2×10)**

a. The memory address of the first element of an array is called

(A) floor address **(B)** foundation address
(C) first address **(D)** base address

b. Which of the following data structures are indexed structures?

(A) linear arrays **(B)** linked lists
(C) both **(A)** & **(B)** **(D)** none of these

c. Which of the following is not the required condition for binary search algorithm?

(A) The list must be sorted
(B) There should be the direct access to the middle element in any sublist
(C) There must be mechanism to delete and/or insert elements in list
(D) None of these

d. Two dimensional arrays are also called

(A) tables arrays **(B)** matrix arrays
(C) both **(A)** & **(B)** **(D)** none of these

e. A variable P is called pointer if

(A) P contains the address of an element in DATA.
(B) P points to the address of first element in DATA
(C) P can store only memory addresses
(D) P contain the DATA and the address of DATA

f. Which of the following data structure can't store the non-homogeneous data elements?

(A) Arrays **(B)** Records
(C) Pointers **(D)** None of these

g. Each data item in a record may be a group item composed of sub-items; th items which are indecomposable are called

(A) elementary items **(B)** atoms
(C) scalars **(D)** all of these

h. To arrange a binary tree in ascending order we need

(A) Post order traversal **(B)** In order traversal
(C) Pre order traversal **(D)** None of these

i. The operation of processing each element in the list is known as

(A) Sorting **(B)** Merging
(C) Inserting **(D)** Traversal

j. Which of the following name does not relate to stacks?

(A) FIFO lists **(B)** LIFO lists
(C) Piles **(D)** Push-down lists

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Write a program to find the addition of n numbers by recursion. **(8)**

b. Differentiate between malloc and calloc. **(4)**

c. What are advantages and disadvantages of external storage class? **(4)**

Q.3 a. What is the main difference between STRUCTURE and UNION? **(8)**

b. Explain the four major operations carried out on the sequential files. **(4)**

c. With the help of an example, explain how is memory allocated to a structure. **(4)**

Q.4 a. What is meant by row major order and column major order? **(6)**

b. Write an algorithm of linear search. **(4)**

c. With the help of an example, describe the merge sort technique. **(6)**

Q.5 a. Describe the various applications of stack and queues. **(4)**

b. Write the algorithm for converting an infix expression to postfix, using a stack. **(8)**

c. What is the limitation of an array implementation of a queue? How is overcome? **(4)**

Q.6 a. Explain the singly linked list and write an algorithm to insert an element in the beginning of a singly linked list. **(10)**

b. With the help of an example, explain how a linked list can be sorted. **(6)**

Q.7 a. With the help of an example differentiate between singly and doubly linked list. **(8)**

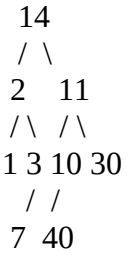
b. What is Circular Linked List? What are Advantages and Disadvantages of Circular Linked List? **(8)**

Q.8 a. Construct a binary tree for the given:

In-order trasversal = Q, A, Z, Y, P, C, X, B
Pre-order trasversal = Z, A, Q, P, Y, X, C, B

Write the post order traversal for the created binary tree. **(8)**

b. In the given binary tree:



Write the order of the nodes visited in:
(i) An in-order traversal
(ii) A pre-order traversal
(iii) A post-order traversal **(3)**

c. Explain the binary search tree. **(5)**

Q.9 a. Write the algorithm for a DFS traversal of a graph. **(8)**

b. How the graphs are represented in the memory? **(4)**

c. Explain the minimal cost spanning tree. **(4)**