Code: DC54/DC104   **Subject: DATA STRUCTURES**

DiplETE – CS *{Current & New Scheme}*

Time: 3 Hours   **JUNE 2016**   **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. _____ is the process of sending a copy of data to a program.
   - **(A)** Recursion
   - **(B)** Passing a value
   - **(C)** Passing a reference
   - **(D)** None of these

   b. The simplest data structure is_____.
   - **(A)** Linked List
   - **(B)** Array
   - **(C)** Graph
   - **(D)** Union

   c. Which is not a sorting technique?
   - **(A)** Radix sort
   - **(B)** Merge sort
   - **(C)** Poll sort
   - **(D)** Quick sort

   d. The Postfix form for the expression a*(b-c)/d is:
   - **(A)** a*(bc)d/-
   - **(B)** abcd*/-
   - **(C)** abc-*d/
   - **(D)** a(b-c)/d*

   e. Which is true for the Linked List?
   - **(A)** Quick Insertion
   - **(B)** Quick Deletion
   - **(C)** Fast Searching
   - **(D)** Both **(A)** and **(B)**

   f. A tree of depth k with n nodes in which these n nodes can be sequentially numbered from 1 to n is called_____.
   - **(A)** Complete Binary tree
   - **(B)** Full Binary Tree
   - **(C)** Partial Binary Tree
   - **(D)** None of these

   g. The complexity of Quick sort in average and worst case respectively is:
   - **(A)** $O(n^2)$ and $O(n^2)$
   - **(B)** $O(n\log n)$ and $O(n^2)$
   - **(C)** $O(n^2)$ and $O(n\log n)$
   - **(D)** $O(\log n)$ and $O(n)$

   h. A stack data structure exhibits the _____ property.
   - **(A)** Last In First Out
   - **(B)** First In First Out
   - **(C)** First In Last Out
   - **(D)** Last In Last Out

   i. Hashing is the direct technique that takes _____time to find a data.
   - **(A)** $O(n^2)$
   - **(B)** $n\log n$
   - **(C)** $O(1)$
   - **(D)** $\log n^2$

j. Time required for generating all the connected components of an undirected graph G with n vertices and e edges is:
    (A) O (en)   (B) O (e)
    (C) O (e+n)   (D) O (e^2)

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

Q.2 a. Explain the following terms. Use suitable examples to illustrate each   **(8)**
         (i) Static Storage   (ii) External References
         (iii) Automatic Storage   (iv) Recursion

     b. Write a programme in C to find the sum of n elements entered by user using dynamic memory allocation function calloc().   **(8)**

Q.3 a. With the help of an example, explain in detail how pointer is used with structures.   **(6)**

     b. Describe the major operations involved while Reading from or Writing to a file in C.   **(6)**

     c. Define structure? Explain how a structure can be dynamically allocated in C language?   **(4)**

Q.4 a. What is searching? Suppose an array contains 2048 elements, find the minimum and maximum number of comparisons required to locate an item using: **(2+3)**
         (i) Linear search   (ii) Binary search

     b. What is the minimum number of comparisons that Bubble Sort will do to sort an array containing n elements?   **(3)**

     c. Compare and contrast any four sorting techniques based on Memory Space and Computing time.   **(8)**

Q.5 a. Write the applications of Stacks and Queues.   **(3+3)**

     b. Write a program in C for the implementation of stack using.   **(5+5)**
         (i) Linked List   (ii) Array

Q.6 a. Write a programme in C for inserting a node after a specified node in a singly linked list.   **(8)**

     b. Explain in detail the concept of reversing a linked list   **(8)**

Q.7 a. Write short notes on the following: **(4+4)**
         (i) Circular linked lists   (ii) Doubly linked lists

     b. Write a program in C to merge two circular linked lists.   **(8)**

Q.8 a. Explain the following terms: **(8)**
         (i) Order of traversal of Binary Tree   (ii) Binary Search Tree (BST)

     b. Explain how a node having two children/one child/no child can be deleted from a Binary Search Tree?   **(8)**

Q.9 a. Explain the Depth first spanning tree and Breadth first spanning tree. Use examples to illustrate.   **(8)**

     b. Write short notes on the following: **(4+4)**
         (i) Traversing a graph   (ii) Minimum cost spanning tree (MST)