ROLL NO. _____

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

DipIETE – CS (Current & New Scheme)

Time: 3 Hours **December 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. Multiple data types can be combined and made as single entity by using data structure
(A) Pointers **(B)** Structure
(C) Arrays **(D)** Pointers to array

b. On a 32 bit computer , a long int is stored in
(A) 1 byte **(B)** 2 bytes
(C) 4 bytes **(D)** 6 bytes

c. A string character sequence terminated with a
(A) "\n" **(B)** '\n'
(C) '\0' **(D)** '\t'

d. In a singly linked list _____node contains no links
(A) First **(B)** Last
(C) Last but one **(D)** Middle

e. To represent hierarchical relationship between elements, which is the suitable data structure?
(A) Degree **(B)** priority
(C) Tree **(D)** All of these

f. The compilation time of bubble sort algorithm is
(A) On^10 **(B)** O(log n)
(C) O(n^2) **(D)** O(n log n)

g. A binary tree whose every node has either zero or two children is called
(A) Complete binary tree **(B)** Binary search tree
(C) Extended binary search tree **(D)** None of these

h. An adjacency matrix representation of a graph can not contain information of
(A) nodes **(B)** Edges
(C) direction of edges **(D)** parallel edges

i. Representation of data structure in memory is known as
(A) Recursive **(B)** Abstract Data Type
(C) Storage structure **(D)** file structure

j. Quick sort is also known as
(A) Merge sort **(B)** Heap sort
(C) Bubble sort **(D)** None of these

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

Q.2 a. Using a suitable example, explain the scope of variables. **(8)**

b. Write a recursive function to add two positive integers and explain. **(8)**

Q.3 a. Can any of the three initial expressions in the **for statement** be omitted? If so, what are the consequences of each omission? **(6)**

b. Write a program that will read a positive integer and determine and print its binary equivalent. **(4)**

c. What is the output of the following program? **(2)**

```
const int a=124;
void main()
{
      const int *sample();
      int *p;
      p=sample();
      printf("%d",*p);
}
const int *sample()
{
      return (&a);
}
```

d. Write a C program to reverse a given number. **(4)**

Q.4 a. Distinguish between the following **(6)**
(i) int (m*)[5]; and int *m[5]
(ii) int (*ptr)(); and int *ptr()

b. Write a program using bubble sort technique to sort an unsorted array of n elements in an ascending order. **(10)**

Q.5 a. Write a program to copy the contents of one file into another file using command line arguments. **(6)**

b. How is a string stored in memory? Is there any difference between string and character array? Write a C program to copy one string to another using pointers and without using library functions. **(6)**

c. What is a bit field? Why are bit fields used with structures? **(4)**

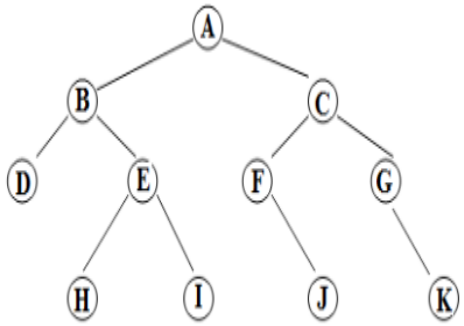
Q.6 a. What is a heap? Write a C program to sort an array of integers using the heap sort method.
Given: 6,5,3,1,8,7,2,4 are elements of an array, show the different stages of sorting. **(10)**

b. Write a C program to search for an element using binary search. **(6)**

Q.7 a. Write a C program to convert the given infix expression into its equivalent postfix form? **(10)**

b. Write a C function to insert an element after a given node in a singly linked list. **(6)**

Q.8 a. Give the order of visitation of the binary tree shown in the following figure. **(4)**



(i) Preorder traversal: A B D E H I C F J G K
(ii) Inorder traversal: D B H E I A F J C G K
(iii) Postorder traversal: D H I E B J F K G C A

b. Write a C function to insert an element into a binary search tree. **(6)**

c. Write a C function to search for an item in a binary search tree. **(6)**

Q.9 a. Write a C program for BFS traversal. Explain the same with the help of an example. **(10)**

b. Explain with the help of examples the following: **(6)**
(i) Adjacency Matrix
(ii) Linked Adjacency Lists