ROLL NO. _____

Code: AC104/AT104   **Subject: DATA STRUCTURES WITH C & C++**

AMIETE – CS/IT *{NEW SCHEME}*

Time: 3 Hours   **DECEMBER 2014**   **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. 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 contains the DATA and the address of DATA

c. Which of the following data structure store the non-homogeneous data elements?

   (A) records   **(B)** function
   (C) array   **(D)** pointers

d. Binary search algorithm cannot be applied to

   (A) sorted binary trees   **(B)** sorted linked list
   (C) sorted linear array   **(D)** pointer array

e. When new data are to be inserted into a data structure, but there is no available space; this situation is usually called

   (A) underflow   **(B)** houseful
   (C) overflow   **(D)** saturated

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

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

g. The term "push" and "pop" is related to the

(A) array   (B) lists
(C) stacks   (D) buffer

h. A data structure where elements can be added or removed at either end but not in the middle

(A) Linked lists   (B) Stacks
(C) Queues   (D) Deque

i. An algorithm that calls itself directly or indirectly is known as

(A) Sub algorithm   (B) Recursion
(C) Polish notation   (D) Traverse algorithm

j. If every node u in G is adjacent to every other node v in G, A graph is said to be

(A) isolated   (B) complete
(C) finite   (D) strongly connected

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

Q.2 a. Define generic data abstract types and its notations. **(6)**

b. How the initialization of pointer can be defined? **(6)**

c. How dynamic memory management can be done in data structure. **(4)**

Q.3 a. What is the difference between a queue and a stack? **(4)**

b. What is a pointer variable? Can we have multiple pointers to a variable? Explain Lvalue and Rvalue expression. **(6)**

c. What is the advantage of circular queue over ordinary queue? Mention applications of queue also. **(6)**

Q.4 a. List out any two applications of linked list and any two advantages of doubly linked list over singly linked list. **(6)**

   b. Give an algorithm to insert a node at a specified position for a given singly linked list. **(6)**

   c. Write a C program to copy one string to another, using pointers and without using library functions. **(4)**

Q.5 a. Write the algorithm for bucket sort and give the complexity of bucket sort. **(6)**

   b. Write a Sub Algorithm to Find the Smallest Element in the array. **(6)**

   c. Explain Dijkstra's algorithm and Give mode of operation in Dijkstra's algorithm. **(4)**

Q.6 a. What is Hashing? Explain any three hash functions. **(3+3)**

   b. Program to add a new node to the ascending order linked list. **(6)**

   c. Explain circularly linked lists and minimum spanning tree. **(4)**

Q.7 a. Write the process of selection sort. **(4)**

   b. Program that implements depth first search algorithm. **(6)**

   c. Program that creates random numbers in a given file. **(6)**

Q.8 a. What is a file pointer? Explain with syntax fopen(), fread() and fwrite() functions. **(6)**

   b. How do you define a data structure? How is stack a data structure? Give a C program to construct a stack of integers and perform all the necessary operations on it. **(6)**

   c. Discuss about representation of a graph into memory. **(4)**

Q.9 a. Explain the traversal of a binary tree **(6)**

   b. What is binary search tree? Explain the insertion and deletion of an element into binary search tree using suitable example. **(6)**

   c. Write advantages and disadvantages of tree data structures. **(4)**