

Time: 3 Hours

**JUNE 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. Running out of memory may occur due to:
- (A) non-recursive function call      (B) recursive function call  
(C) use of more global variables      (D) none of these
- b. Matrices in which the non-zero entries tend to cluster around the middle of each row are called \_\_\_\_\_ matrix.
- (A) adjacency matrix      (B) sparse matrix  
(C) dynamic matrix      (D) band matrix
- c. In \_\_\_\_\_ data structures insertion and deletions takes place at the same end.
- (A) Stack      (B) queue  
(C) Tree      (D) linked list
- d. Recursion often provides elegant solution to programming task but \_\_\_\_\_ function waste a lot of memory.
- (A) recursive function      (B) void function  
(C) call function      (D) return function
- e. A graph represents \_\_\_\_\_ relationship between nodes.
- (A) one to many      (B) many to many  
(C) many to one      (D) none of these
- f. For converting infix to postfix expression, the best data structure to use is
- (A) Queue      (B) Stack  
(C) Graph      (D) Tree

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- g. Number of all possible binary trees with 4 nodes is:
- (A) 14 (B) 34  
(C) 24 (D) None of these
- h. A characteristics of the data that binary search uses but the linear search ignores is that
- (A) order of the list (B) length of the list  
(C) maximum value in the list (D) mean of data value
- i. Which of the following is used for opening a file?
- (A) fscanf() (B) fopen()  
(C) fread() (D) None of these
- j. Related data items of different types are organized using \_\_\_\_\_
- (A) Tree (B) Binary Search Tree  
(C) Structure (D) Stack

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

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- Q.2** a. Write the preorder traversal algorithm of binary tree. Explain with the help of an example. (8)
- b. Explain the algorithm for searching a target key in a binary search tree. (8)
- Q.3** a. Write an algorithm in C language syntax to delete the ith node in a singly linked list. (8)
- b. How linked list can be used for representing polynomials? Explain using a suitable example. (8)
- Q.4** a. Represent stack using a single one dimensional array. Write and explain function for “push” and “pop” operation on stack. (8)
- b. Write a C program that shows implementation of priority queue. (8)
- Q.5** a. Write an algorithm that searches an element using binary search method. (8)
- b. Describe Merge sort using an example. (8)
- Q.6** a. What are different ways of representing a graph? Explain using suitable example. (8)

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- b. What is minimum cost spanning tree? Using a suitable example, derive Depth First spanning tree. (8)
- Q.7** a. Write a 'C' function to insert a node at the end of a doubly linked list. (8)
- b. Write an algorithm to merge two circular linked list. (8)
- Q.8** a. Using a suitable example program, explain stack overheads in recursion. (10)
- b. Explain with differences the following three functions used for dynamic memory allocation:  
malloc, realloc, calloc (6)
- Q.9** a. Differentiate between structures and unions using suitable example. (8)
- b. Write a C program that implements a direct access file. (8)