Subject: DATA STRUCTURES

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

JUNE 2011

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.**

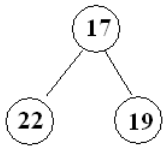
Q.1 Choose the correct or the best alternative in the following: (2×10)

a. Which of the following operation is performed more efficiently by doubly linked list than by linear linked list?

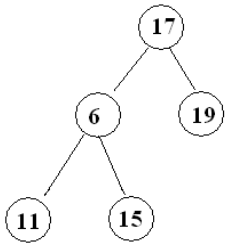
(A) deleting a node whose location is given
(B) searching an unsorted list for a given item
(C) inserting a node after the node with a given location
(D) none of these

b. Which of the following trees is a valid binary search tree?

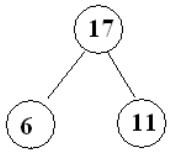
(A)



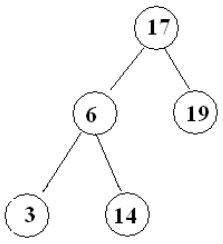
(B)



(C)



(D)



c. The C declaration int b[100] reserves .....successive memory locations, to contain single integer.

(A) 200 **(B)** 10,000
(C) 100 **(D)** 10

d. The Fibonacci sequence is the sequence of integers:

(A) 1,3,5,7,9,11,13.....
(B) 0,1,1,2,3,5,8,.....
(C) 1,3,4,7,11,18,29.....
(D) 0,1,3,7,15,22.....

e. A sort which compares adjacent elements in a list and swaps where necessary is a

(A) insertion sort
(B) heap sort
(C) quick sort
(D) bubble sort

f. A list of data items, usually, words or bytes with the accessing restriction that elements can be added or removed at one end of the list only, is known as:

(A) Stack
(B) memory
(C) linked list
(D) heap

g. In C, a pointer variable to an integer can be created by the declaration

(A) int p *;
(B) int *p;
(C) int –p;
(D) int $p;

h. This declaration :

```
struct{
char first[10];
char midinit;
char last[20];
}sname,ename;
```

creates ..... structure variables, each of which contains ..... member.

(A) 3,2
(B) 2,3
(C) 3,3
(D) 6,6

i. The prefix of (A+B)*(C–D) is:

(A) + - AB*CD
(B) * + - ABCD
(C) * + AB-CD
(D) * AB+CD

j. Recursive procedures are implemented by:

(A) Queues
(B) stacks
(C) linked lists
(D) strings

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

Q.2 a. Differentiate between Static and Dynamic memory allocation. Explain malloc( ) and calloc( ) function of C language. **(8)**

b. Define recursion. Write a C program that accept two positive numbers from and computes their GCD by using recursion.

Q.3 a. What are nested structures? Explain with an example. **(8)**

b. What is union? How is it different from structure? With a suitable example show how union is declared and used in C. **(8)**

Q.4 a. Write important points which must be considered while dealing with the initialization of two dimensional array elements. Write various methods to initialize two-dimensional array. Give examples. **(8)**

b. Write a C program that accept two matrices of the same order, find the sum of these matrices and print the sum matrix. **(8)**

Q.5 a. Write various checks which must be performed before inserting and deleting an item in stacks and queues. **(8)**

b. Perform the following operations on a queue, when it is circular with 5 memory cells:

(i) Initially empty (ii) A,B & then C inserted
(iii) A is deleted (iv) D and then E inserted **(8)**

Q.6 a. Write a C routine to delete a particular node in a singly linked list. **(8)**

b. For given polynomials

$$P(x) = x^3 + 3x^2 + 4x - 3$$
$$Q(x) = 4x^2 + 9$$

Write C function to add them. **(8)**

Q.7 a. Write a procedure for splitting a circular list with 2n nodes into two equal circular lists. **(8)**

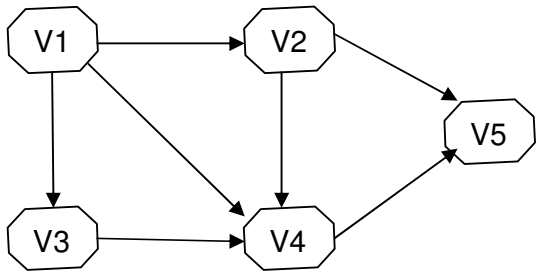
b. What is doubly linked list? Write C function to insert a node in a doubly linked list. **(8)**

Q.8 a. Explain binary search and write a function to search an element from a list of n elements. **(8)**

b. Draw a binary tree T:

Inorder: E A C K F H D B G
Preorder: F A E K C D H G B **(8)**

Q.9 a. How out-degree and in-degree of a vertex can be calculated for the followi graph. Also make adjacency list of the following graph.



b. Write various steps of Depth First Search algorithm for graph traversal. Explain with the help of an example. **(8)**