

NOTE: There are 9 Questions in all.

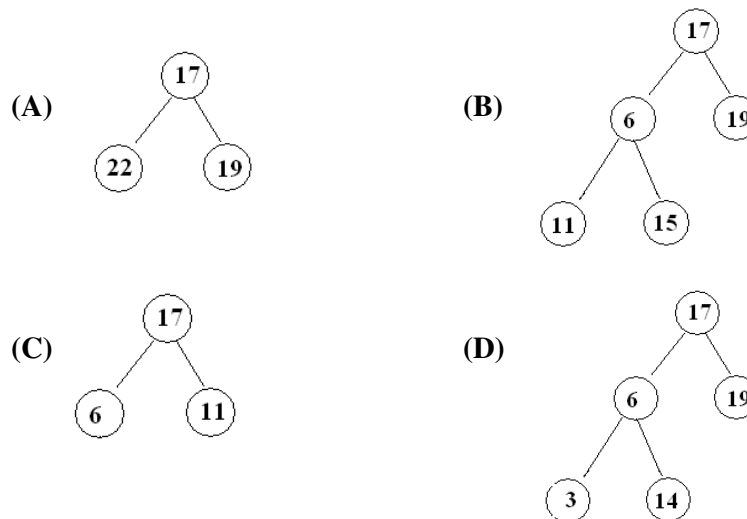
- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.
- Out of the remaining 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?



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

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

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- 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

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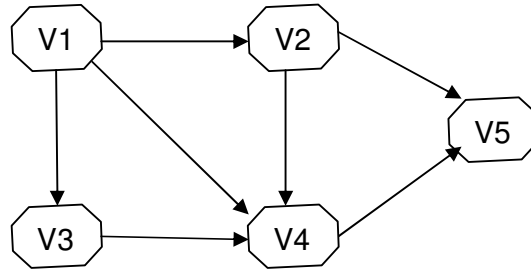
**Answer any FIVE Questions out of EIGHT Questions.  
Each question carries 16 marks.**

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

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- b. Define recursion. Write a C program that accept two positive numbers from keyboard and computes their GCD by using recursion. (8)
- 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) |

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- Q.9** a. How out-degree and in-degree of a vertex can be calculated for the following graph. Also make adjacency list of the following graph. **(8)**



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