Soleshri Sahni

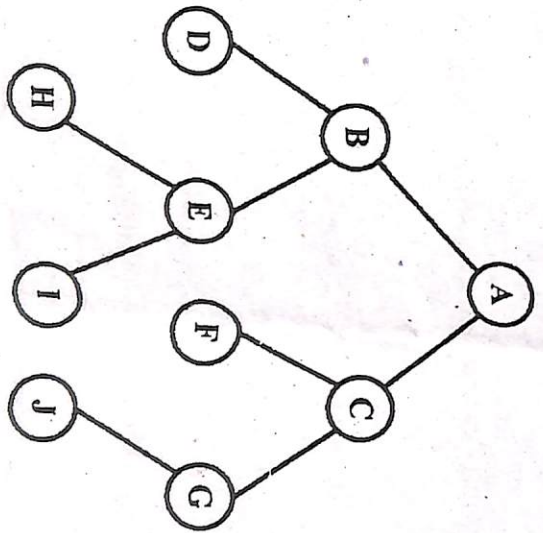This question paper contains **4+2** printed pages]

Roll No.

(Write your Roll No. on the top immediately on receipt of this question paper.)

Question No. **1** is compulsory.

Attempt any *Five* of question No. **2** to **8.**

Parts of a question must be answered together.

1.   (a)   Perform the preorder and Inorder traversal of the following binary tree :   4

P.T.O.

Consider the following circular queue which is capable of accommodating maximum

6 elements.

Front = 2   Rear = 4

Queue: —, —, L,M,N, —

Describe the status of the queue as the following operations take place :

(i)   Add O,P,Q

(ii) Delete Two elements

(iii) Add R

(iv) Delete one element.   4

(c)   Convert the following infix expression to postfix expression. Show the status of the stack at each step :   5

$$A \wedge B * C/(D * E - F).$$

(d)   Apply selection sort algorithm on the following list of numbers. Show the outcome after each iteration :   5

82, 42, 49, 8, 25, 52, 36, 93, 59.

(e)   Mention whether True/False :   5

(i)   Queue works on the principle of FIFO. T

(ii) Efficiency of Binary Search algorithm is log(n). T

(iii) Recurssion is a process in which a problem is defined in terms of itself. T

(iv) In a doubly linked list the two pointers in a node point to the first and last node of the linked list. F

(v)   In a tree, nodes are arranged in hierarchical order and so there is only one way in which these nodes can be tranversed. F

(f)   List two applications of stacks. Give reasons why stack would be preferable to array.   2

(a)   Write a program in C++ to sort a list of numbers using Bubble sort.   5

(b)   Compare the two implementations of stack i.e. the array implementation and linked implementation; giving advantages and disadvantages of linked lists.   5

(a)   What is a queue ? How do you represent it ?   2

(b)   Write a function to insert a node after a node 'P' in a singly linked list.   4

(c) (i) Which *one* of the trees given below is a valid Binary search tree and w... ch *one* is not.

1
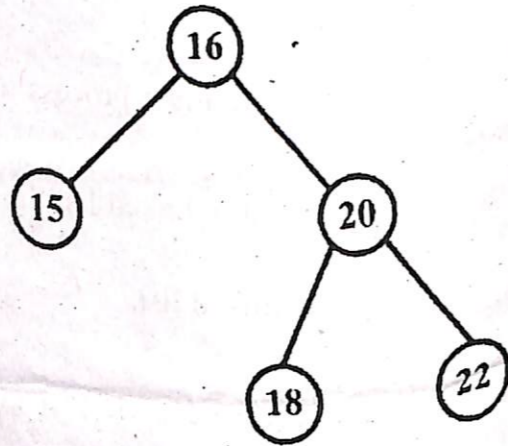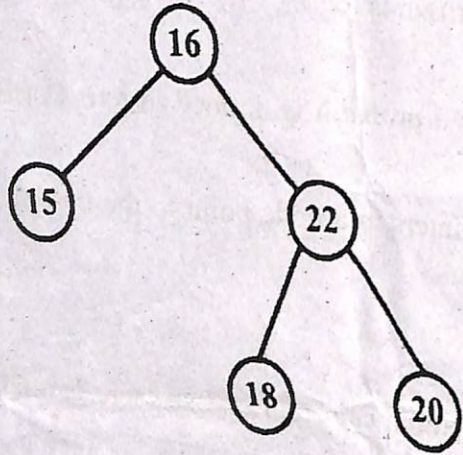
(ii) Compare an iterative process with a recursive process.

(iii) .... is a data structure which represents hierarchial relationship amo... its elements.

4. (a) Define the following terms :

(i) Tree

(ii) Stack

(iii) Data structure.

(b) Write a program to accomplish the following stack operations :

7

(i) PUSH

(ii) POP

(iii) Is empty

(iv) Is full.

5. (a) Show the states of the stack at each step while evaluating the given post fix expression :

5

$$7532 \; \wedge \; * \; 922 \; \wedge \; - \; / \; + \; 64 \; * \; +.$$

(b) Write a program to find the desired element in an array using binary search. Is it efficient than sequential search ?

5

6. (a) What is a priority queue ? Which data structure is more efficient for doing insertion and deletion in this queue ?

3

(b) Construct a binary search tree from the given inorder and preorder traversals :

Preorder : A B D G H E I C F J K

Inorder : G D H B E I A C J F K

What is the postorder traversal of the tree ?

5+2

7. (a) Write a function QUEDEL ( ) in C++ to display and delete an element from a dynami allocated queue containing nodes of the following given structure :

Struct NODE

{ int itemno;

Char itemname[10];

NODE * next;

};

(b) Consider the following code :

Fun1 (x)

{

If(x < 5)

return (3 * x)

Else

return (2 * fun 1 (x – 5) + 7)

}

What would be returned if fun 1 is called as fun 1(10) ?

8. (a) Write a function for deleting the node from a single linked list which has a value

(b) Write the algorithm to evaluate a postfix expression using a stack.