

This question paper contains 4+2 printed pages]

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S. No. of Question Paper : 5037

Unique Paper Code : 234261

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Name of the Paper : Data Structure [CSPT-202]

Name of the Course : B.Sc. Mathematical Sciences/B.Sc. Physical Sciences

Semester : II

Duration : 3 Hours

Maximum Marks : 75

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

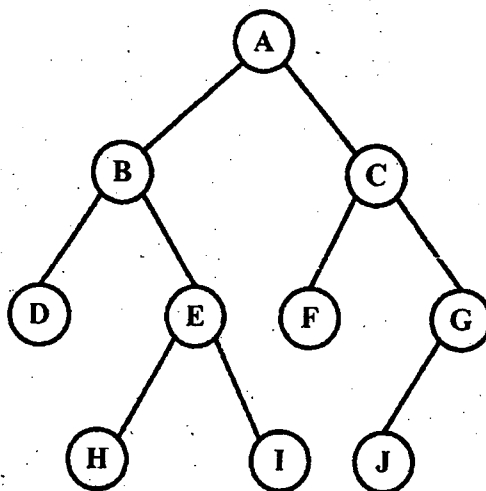
Question No. 1 is compulsory.

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.

- (b) 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

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

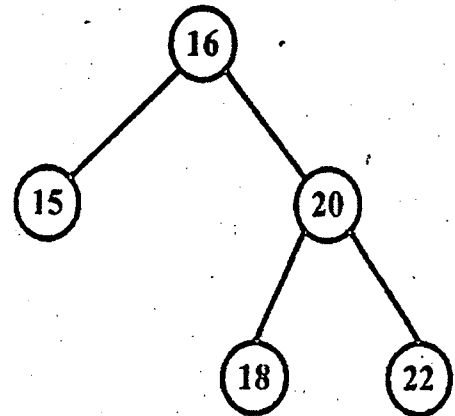
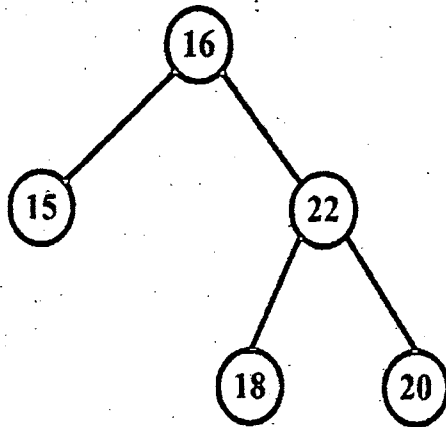
- (d) Apply selection sort algorithm on the following list of numbers. Show the outcome after each iteration : 5

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

- (e) Mention whether True/False : 5
- (i) Queue works on the principle of FIFO.
 - (ii) Efficiency of Binary Search algorithm is $\log(n)$.
 - (iii) Recursion is 'a process in which a problem is defined in terms of itself.
 - (iv) In a doubly linked list the two pointers in a node point to the first and last node of the linked list.
 - (v) In a tree, nodes are arranged in hierarchical order and so there is only one way in which these nodes can be traversed.
- (f) List *two* applications of stacks. Give reasons why stack would be preferable to array. 2
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
3. (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

P.T.O.

- (c) (i) Which *one* of the trees given below is a valid Binary search tree and which *one* is not. 1



- (ii) Compare an iterative process with a recursive process. 2
- (iii) is a data structure which represents hierarchial relationship among its elements. 1

4. (a) Define the following terms : * 3

- (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

P.T.O.

7. (a) Write a function QUEDEL () in C++ to display and delete an element from a dynamically allocated queue containing nodes of the following given structure : 6

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) ? 4

8. (a) Write a function for deleting the node from a single linked list which has a value N. 5
- (b) Write the algorithm to evaluate a postfix expression using a stack. 5