CS & IT ENGINEERING

Data Structure

Tree-7

DPP-07 (Discussion Notes)

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01 Question

02 Discussion

Q.1 Which of the following is/are correct inorder traversal sequence(s) of binary search tree(s)? [MCQ]

inc. order of keys

I. 3, 5, 7, 8, 15, 19, 25

II. 5, 8, 9, 12, 10, 15, 25

III. 2, 7, 10, 8, 14, 16, 20

IV. 4, 6, 7, 9 18, 20, 25

(A)

A. I and IV

B. II and III

C. II and IV

D. II only

Q.2 What is the worst-case time complexity of inserting n^2 elements into an AVL-tree with n elements initially? **[MCQ]**

A. $O(n^2)$

B. $O(n^2 \log n)$

C. $O(n^4)$

D. $O(n^3)$

n^2

1st elem $\longrightarrow$ $\log n$

2nd elem $\longrightarrow$ $\log(n+1)$

3rd elem $\longrightarrow$ $\log(n+2)$

$\vdots$

n^2 elem $\longrightarrow$ $\log(n+n^2-1)$

n elements

$(n+1)$

$(n+2)$

$$O(\log n + \log(n+1) + \log(n+2) + \cdots \log(n+n^2-1))$$

$$= O(\log[(n)(n+1)(n+2)(n+3)\cdots(n+n^2-1)])$$

$$= O(\log(n)^{n^2})$$

$$= O(n^2 \log n)$$

Q.3

Suppose the numbers 7, 5, 1, 8, 3, 6, 0, 9, 4, 2 are inserted in that order into an initially empty binary search tree. The binary search tree uses the usual ordering on natural numbers. What is the pre-order traversal sequence of the resultant tree?

[MCQ]

A. 7 5 1 0 3 2 4 6 8 9

B. 0 2 4 3 1 6 5 9 8 7

C. 0 1 2 3 4 5 6 7 8 9

D. 9 8 6 4 2 3 0 1 5 7

7 5 1 0 3 2 4 6 8 9

Q.4

[MCQ]

Consider the following statements.

S_1: The sequence of procedure calls corresponds to a preorder traversal of the activation tree.

True

S_2: The sequence of procedure returns corresponds to a postorder traversal of the activation tree.

True

Which one of the following options is correct?

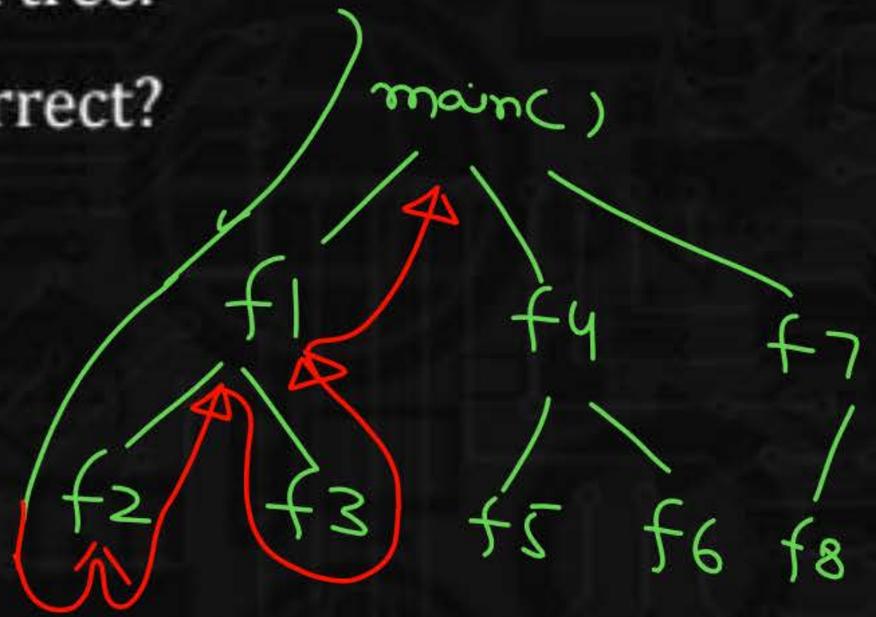
A. S_1 only

B. S_2 only

C. Both S_1 and S_2

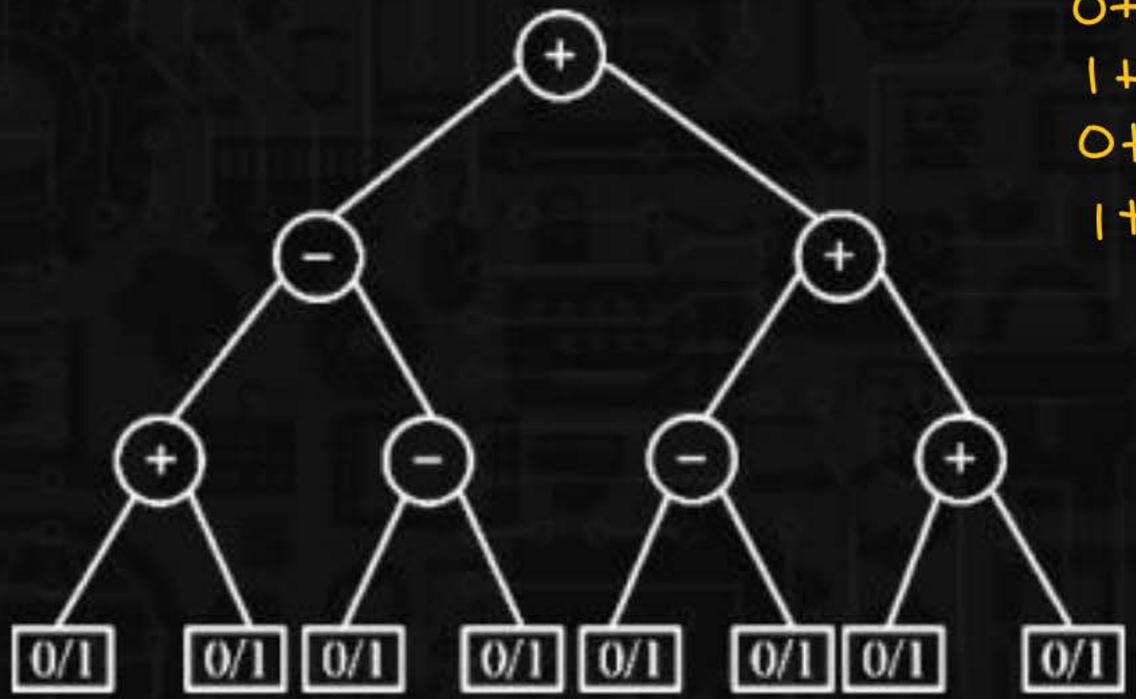
D. Neither S_1 nor S_2

```
Void f4()
{
f5();
f6();
}

main(){
f1();
f4();
f7();
}

Void f7(){
f8();
}

Void f1()
{
f2();
f3();
}
```



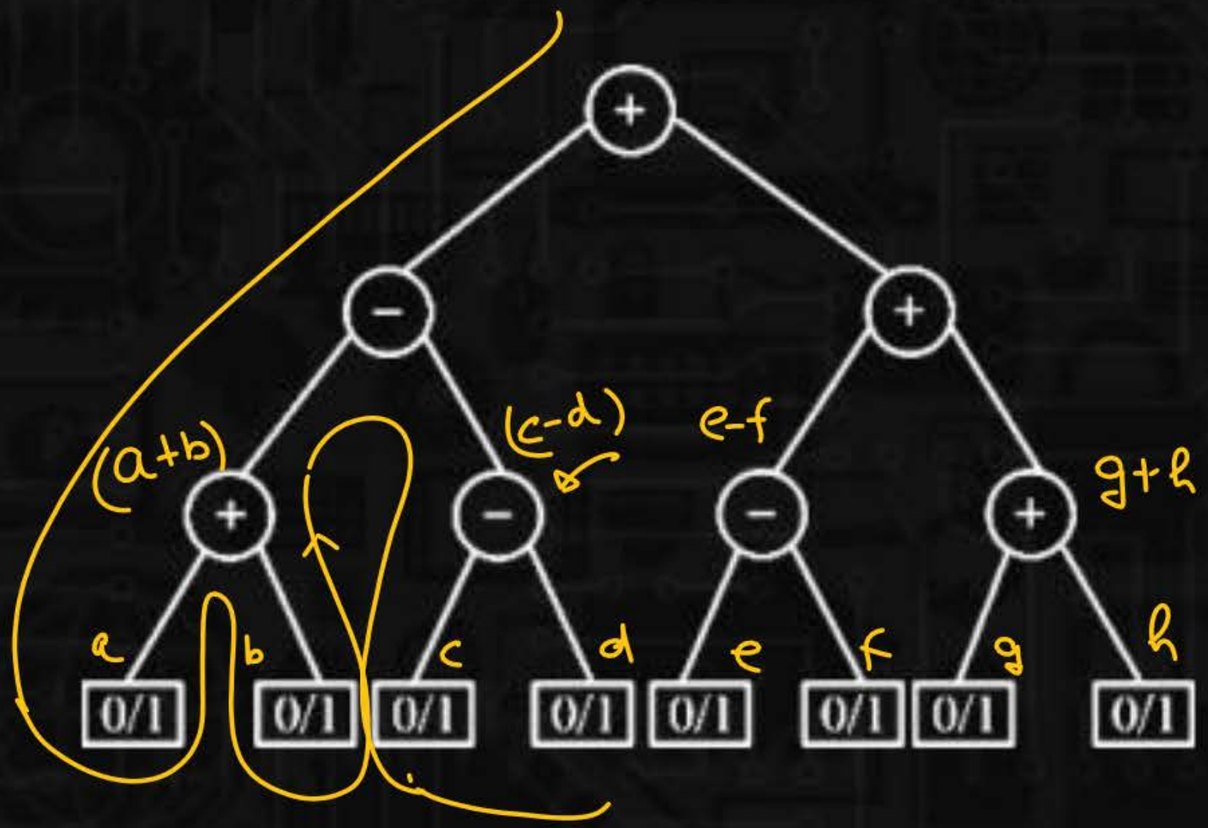
Q.5

Consider the expression tree shown. Each leaf represents a numerical value, which can either be 0 or 1. Over all possible choices of the values at the leaves, the maximum possible value of the expression represented by the tree is ___. [NAT]



	Subtraction		Max	Min
0+0=0	0−0=0	a+b	2	0
1+0=1	1−0=1	a−b	1	−1
0+1=1	0−1=−1			
1+1=2	1−1=0			

Q.5 Consider the expression tree shown. Each leaf represents a numerical value, which can either be 0 or 1. Over all possible choices of the values at the leaves, the maximum possible value of the expression represented by the tree is 6. **[NAT]**



	Max	Min
a+b	2	0
a-b	1	-1

Max

$$[(a+b)-(c-d)]+[(e-f)+(g+h)]$$

Max

$$[2-(c-d)]+[1+(2)]$$

$$[2-(c-d)]+3$$

Min

$$[2-(-1)]+3 = 3+3 = 6$$

Q.6

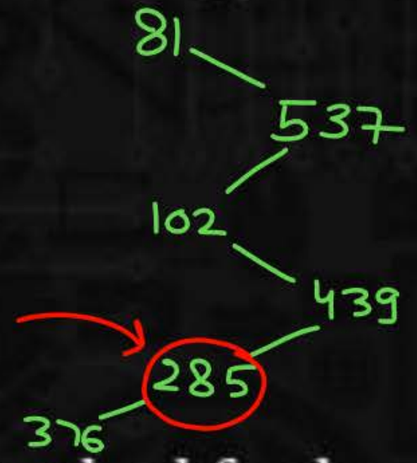
A Binary Search Tree (BST) stores values in the range 37 to 573. Consider the following sequence of keys. **[MCQ]**

I. 81, 537, 102, 439, 285, 376, 305

II. 52, 97, 121, 195, 242, 381, 472

III. 142, 248, 520, 386, 345, 270, 307

IV. 550, 149, 507, 395, 463, 402, 270



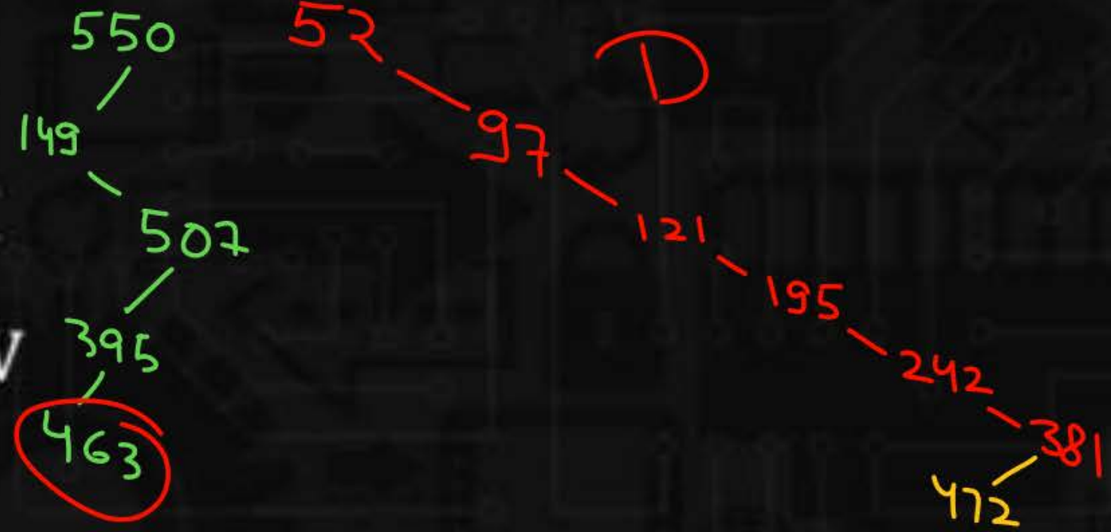
Suppose the BST has been unsuccessfully searched for key 273. Which all of the above sequences list nodes in the order in which we could have encountered them in the search?

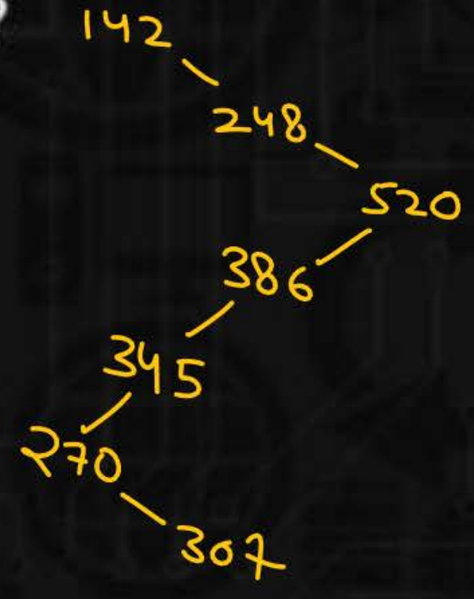
A. I and III

B. II and III

C. III and IV

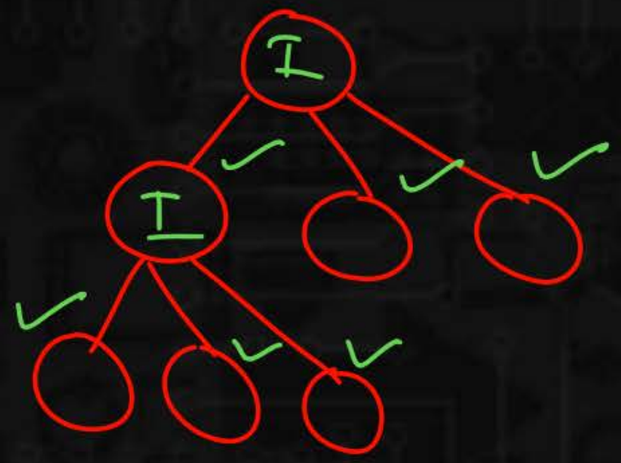
D. III only





Q.7 A complete n-ary tree is a tree in which each node has n children or no children. Let I be the number of internal nodes and L be the number of leaves in a complete n-ary tree. If L = 41, and I = 10, what is the value of n? 5. **[NAT]**

Each internal node ⇒ n child



$2 \times 3 + 1$

Root

No. of internal node

#child (for Each internal node)

Total = $I \times n + 1$

$51 = 10 \times n + 1$

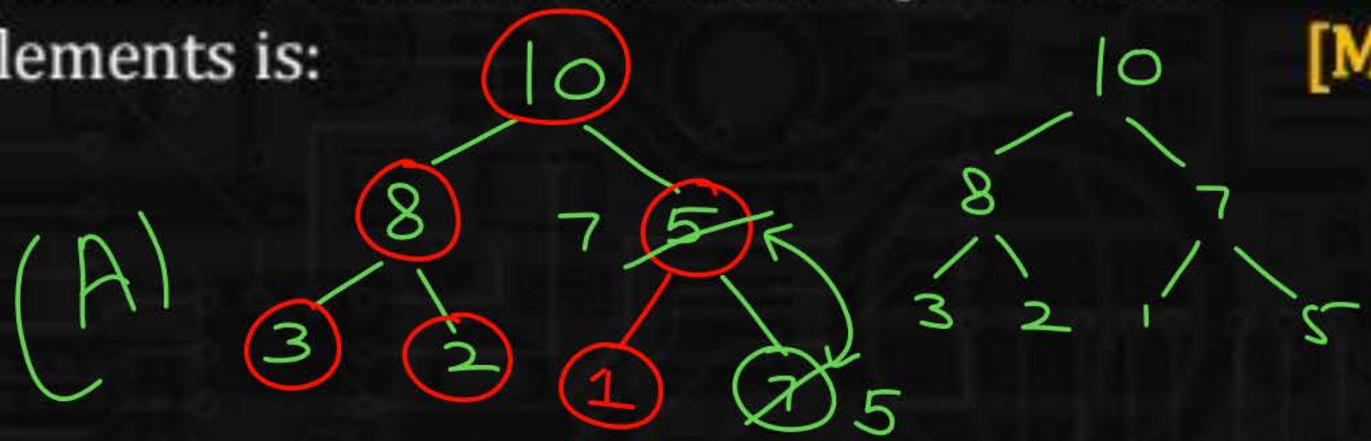
$50 = 10 \times n$

$\boxed{n = 5}$

Q.8

A Priority-Queue is implemented as a Max-Heap. Initially, it has 5 elements. The level-order traversal of the heap is given below: 10, 8, 5, 3, 2. Two new elements '1' and '7' are inserted in the heap in that order. The level-order traversal of the heap after the insertion of the elements is:

[MCQ]



A. 10, 8, 7, 3, 2, 1, 5

B. 10, 8, 7, 2, 3, 1, 5

C. 10, 8, 7, 3, 2, 5, 1

D. None of the above

THANK YOU GW
SOLDIERS !