Branch : CSE/IT   Batch : Hinglish

Data Structure
Tree   DPP-07

[MCQ]
1. Which of the following is/are correct inorder traversal sequence(s) of binary search tree(s)?
   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) I and IV   (b) II and III
   (c) II and IV   (d) II only

[MCQ]
2. What is the worst-case time complexity of inserting n^2 elements into an AVL-tree with n elements initially?
   (a) $O(n^2)$ (b) $O(n^2 \log n)$
   (c) $O(n^4)$ (d) $O(n^3)$

[MCQ]
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?
   (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

[MCQ]
4. Consider the following statements.
   S_1: The sequence of procedure calls corresponds to a preorder traversal of the activation tree.
   S_2: The sequence of procedure returns corresponds to a postorder traversal of the activation tree.
   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

[NAT]
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 ___.
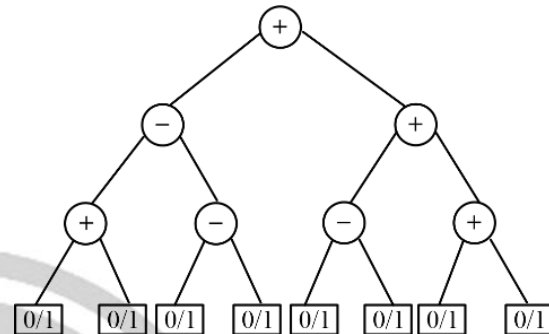
[MCQ]
6. A Binary Search Tree (BST) stores values in the range 37 to 573. Consider the following sequence of keys.
   I.   81, 537, 102, 439, 285, 376, 305
   II. 52, 97, 121, 195, 242, 381, 472
   III. 142, 248, 520, 386, 345, 270, 307
   IV. 550, 149, 507, 395, 463, 402, 270
   Suppose the BST has 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

[NAT]
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? _____.

[MCQ]
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:
   (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

Answer Key

1. (a)
2. (b)
3. (a)
4. (c)
5. (6)

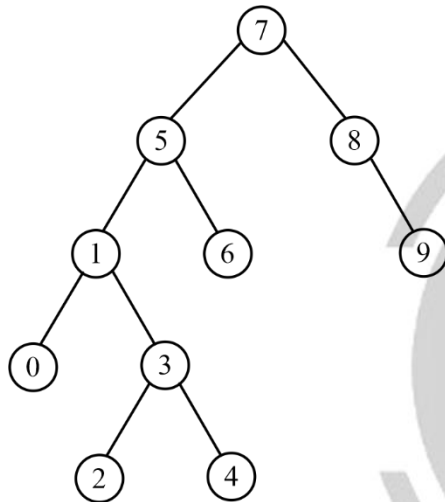6. (d)
7. (5)
8. (a)

Hints and Solutions

1. (a)

The inorder traversal of BST is always in sorted order.

2. (b)

The worst-case time complexity of inserting n^2 elements into an AVL-tree with n elements initially is $O(n^2 \log n)$
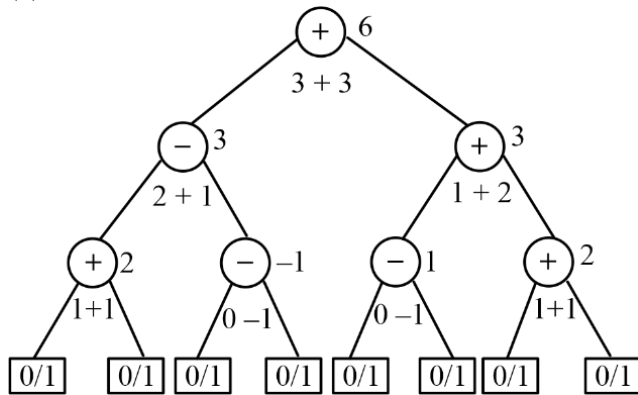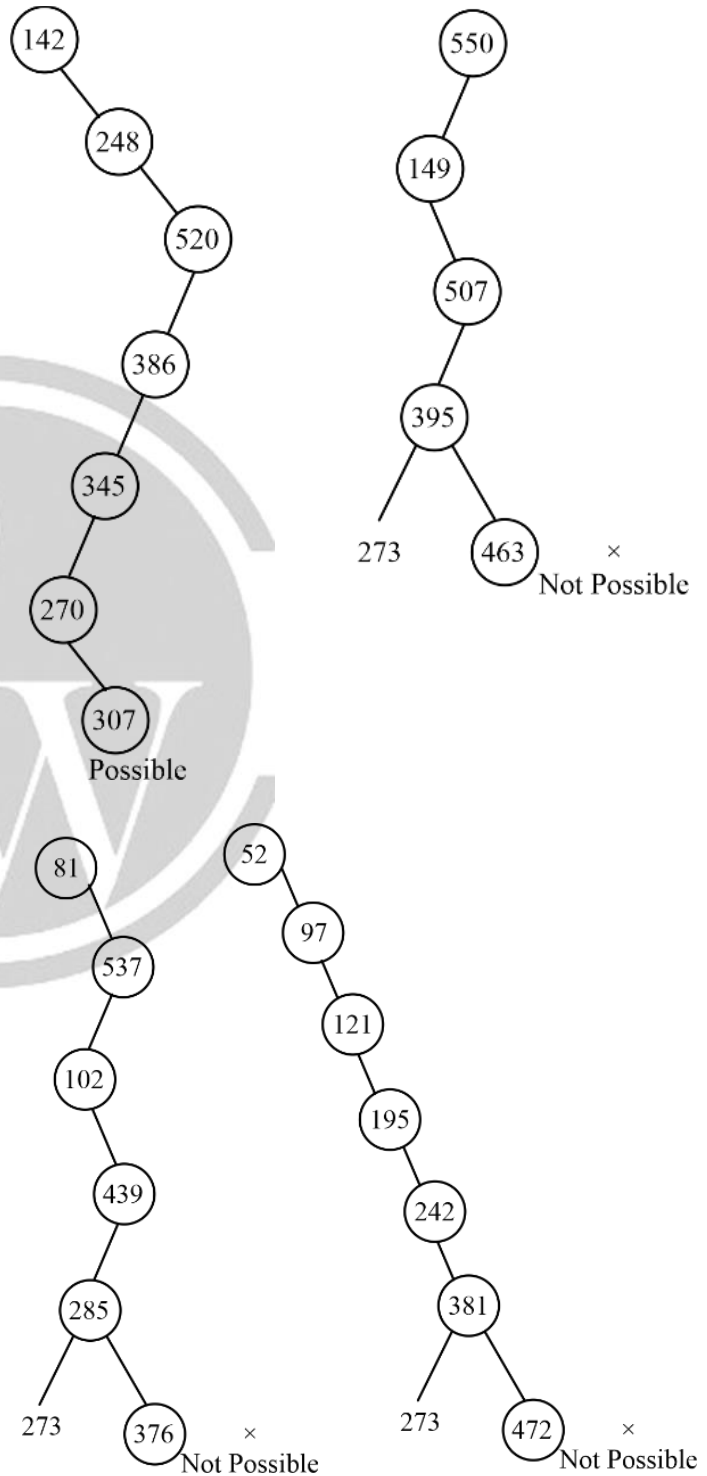
3. (a)

Preorder traversal

7 5 1 0 3 2 4 6 8 9

4. (c)

Both S_1 and S_2 are CORRECT.

5. (6)

6. (d)

7. **(5)**

$L = (N-1) * I + 1$

$L = 41,\ I = 10 -$
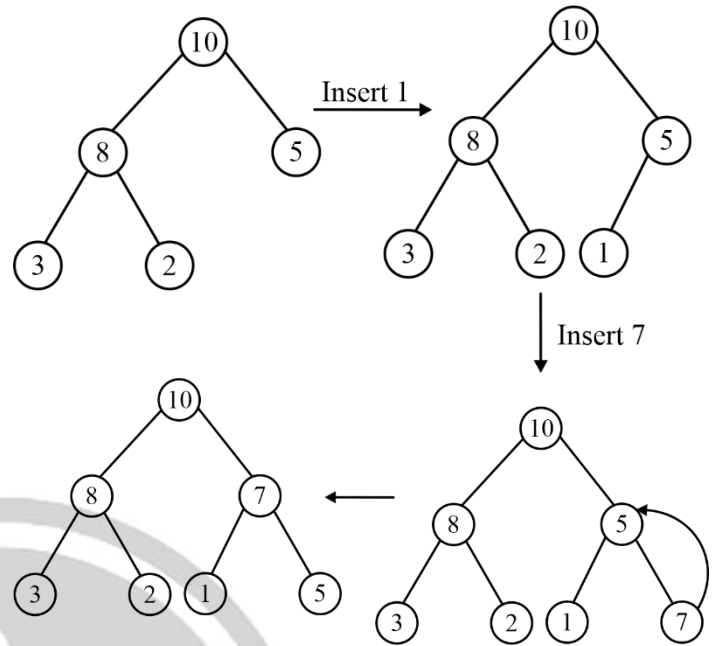
$41 = (N-1) * 10 + 1$

$N - 1 = \dfrac{40}{10} = 4$

$N = 4 + 1 = 5$

8. **(a)**

Level order Traversal:
10 8 7 3 2 1 5