Started on	Wednesday, 27 January 2021, 11:37 AM
State	Finished
Completed on	Wednesday, 27 January 2021, 11:39 AM
Time taken	1 min 41 secs
Marks	10.00/10.00
Grade	**100.00** out of 100.00

Question **1**

Correct

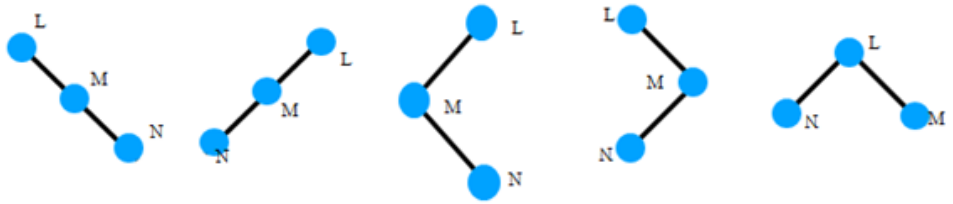
Mark 1.00 out of 1.00

What is the possible number of binary trees that can be created with 3 nodes, giving the sequence N,M,L when traversed in post-order.

Select one:

- **a. 3**
- **b. 5** ✓

5 binary trees are possible and they are,



No of trees with given post order traversal = No of trees with given preorder traversal

= No of trees with given inorder traversal

= Catalan Number [C(2n,n) / (n+1)]

- **c. 8**
- **d. 15**

The correct answer is: 5

Question **2**

Correct

Mark 1.00 out of 1.00

Given two keys K1 & K2, To write an algorithm that prints all the elements between them with K1<=K2 in a BST,

Select one:

- **a. Solution need 2 extra spaces**
- **b. Linear solution is possible without using any extra space** ✓ Perform an inorder traversal. Once you find K1 print it and continue traversal now, print all other traversed elements until you reach K2.
  Note: If K1 == K2 stop once you find K1.
  Algorithm:

  Create a recursive function that takes root as a parameter and the range is (k1, k2)
  If the value of root's key is greater than k1, then recursively call in left subtree.
  If the value of root's key is in range, then print the root's key.
  If the value of root's key is smaller than k2, then recursively call in the right subtree.
  Complexity Analysis:
  Time Complexity: O(n), where n is the total number of keys in tree.
  A single traversal of the tree is needed.
  Space Complexity: O(1). No extra space is required.
- **c. No linear solution exist**
- **d. Solution need 1 extra space**

The correct answer is: Linear solution is possible without using any extra space

Question 3

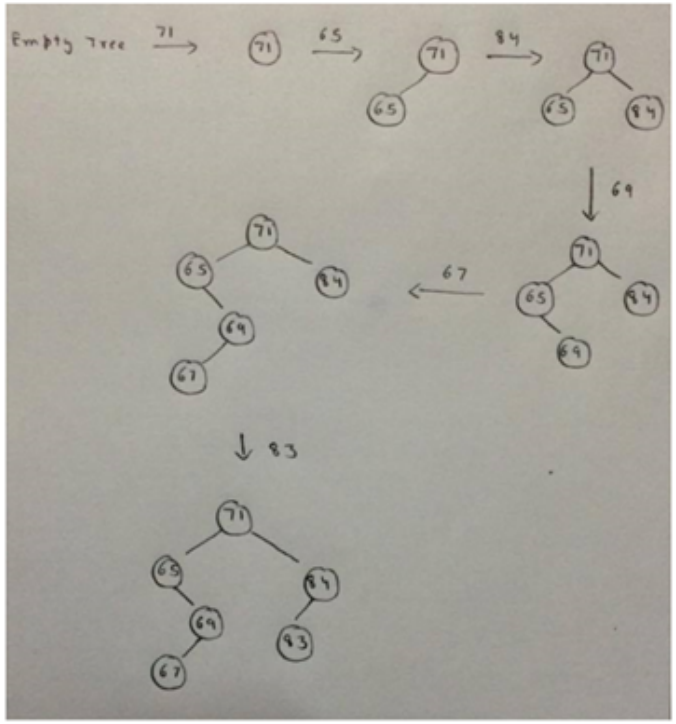
Correct

Mark 1.00 out of 1.00

While inserting the elements 71, 65, 84, 69, 67, 83 in an empty binary search tree (BST) in the sequence shown, the element in the lowest level is

Select one:

- a. 67
- b. 83
- c. 69 ✓



- d. 65

The correct answer is: 69

Question 4

Correct

Mark 1.00 out of 1.00

When searching for the key value 60 in a binary search tree, nodes containing the key values 10, 20, 40, 50, 70 80, 90 are traversed, not necessarily in the order given. How many different orders are possible in which these key values can occur on the search path from the root to the node containing the value 60?

Select one:

- **a. 64**
- **b. 5040**
- **c. 35** ✓ **Explanation 1**: There are two set of values, smaller than 60 and greater than 60. Smaller values 10, 20, 40 and 50 are visited, means they are visited in order. Similarly, 90, 80 and 70 are visited in order.
  = 7!/(4!3!)
  = 35
  Explanation 2: The four lesser keys must appear in ascending order while the three greater ones must appear in descending order otherwise some keys will be left out in the traversal.
  Note that in the traversal, these lesser keys might not be continuous and can be separated by greater keys.
  For eg: 10, 90, 20, 80, 40, 70, 50
  but the order of both groups of keys (lesser and greater) remains the same individually.
  Now, out of total seven positions, the lesser keys acquire four positions which can be selected in 7C4 ways. Once we know the places of these four keys, the places of the three greater keys only have one permutation.
  For eg: if we know that
  10, _, 20, 30, _, 40, _, 50
  Then there's only one permutation of places for 90, 80 & 70 which is place number 2, 5 & 7 respectively.
  Therefore for each combination of lesser keys, there's a unique combination of greater keys.
  So total combinations= 7C4*1 =35 ways
- **d. 128**

The correct answer is: 35

Question 5

Correct

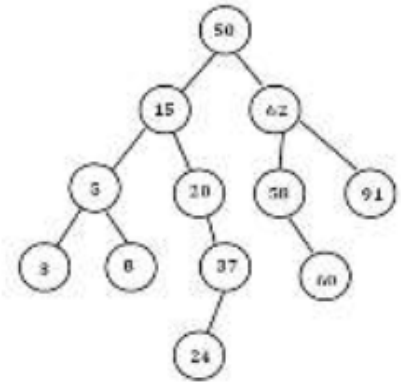
Mark 1.00 out of 1.00

A binary search tree is generated by inserting in order the following integers:
50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24.

The number of nodes in the left subtree and right subtree of the root respectively is

Select one:

a. (7,4) ✓



b. (4,7)

c. (3,8)

d. (8,3)

The correct answer is: (7,4)

Question 6

Correct

Mark 1.00 out of 1.00

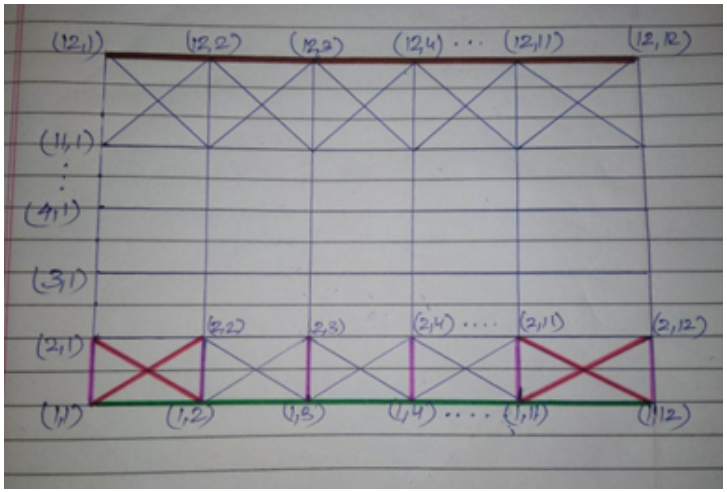
Consider an undirected graph G where self-loops are not allowed. The vertex set of G is {(i, j): 1 <= i <= 12, 1 <= j <= 12}.

There is an edge between (a, b) and (c, d) if |a − c| <= 1 and |b − d| <= 1. The number of edges in this graph is _____.

Select one:

a. 506 ✓

Given:
The vertex set of G is {(i, j): 1 <= i <= 12, 1 <= j <= 12}.
There is an edge between (a, b) and (c, d) if |a − c| <= 1 and |b − d| <= 1.
There can be total 12*12 possible vertices. The vertices are (1, 1), (1, 2) ....(1, 12) (2, 1), (2, 2), ...(12,12).
The number of edges in this graph?



Red color cross ×: 11×2=22
Pink color lines | | =12
Green color lines : 11
One row :22+12+11=45
So, for 11 rows till (11,1):11×45=495
And lastly Brown color line :11
Total number of edges :495+11=506

b. 510

c. 502

d. 500

The correct answer is: 506

Question 7

Correct

Mark 1.00 out of 1.00

Suppose we are sorting an array of Seven integers using heapsort, and we have just finished some heapify (either maxheapify or minheapify) operations. The array now looks like this:

16 14 15 10 12 27 28.

How many heapify operations have been performed on root of heap?

Select one:

- **a. 2** ✓ In Heapsort, we first build a heap, then we do following operations till the heap size becomes 1.
  a) Swap the root with last element
  b) Call heapify for root
  c) reduce the heap size by 1.

  In this question, it is given that heapify has been called few times and we see that last two elements in given array are the 2 maximum elements in array. So situation is clear, it is maxheapify which has been called 2 times.
- **b. 1**
- **c. 5 or 6**
- **d. 3 or 4**

The correct answer is: 2

Question 8

Correct

Mark 1.00 out of 1.00

The following postfix expression with single-digit operands is evaluated using a stack:

8 2 3 ^ / 2 3 * + 5 1 * -

Note that ^ is the exponentiation operator. The top two elements of the stack after the first * is evaluated are:

Select one:

- **a. 3, 2**
- **b. 5, 7**
- **c. 6, 1** ✓ First three tokens are values, so they are simply pushed. After pushing 8, 2 and 3, the stack is as follows
  8, 2, 3
  When ^ is read, top two are popped and power(2^3) is calculated
  8, 8
  When / is read, top two are popped and division(8/8) is performed
  1
  Next two tokens are values, so they are simply pushed. After pushing 2 and 3, the stack is as follows
  1, 2, 3
  When * comes, top two are popped and multiplication is performed.
  1, 6
- **d. 1, 5**

The correct answer is: 6, 1

Question 9

Correct

Mark 1.00 out of 1.00

The five items: A, B, C, D, and E are pushed in a stack, one after other starting from A. The stack is popped four items and each element is inserted in a queue. The two elements are deleted from the queue and pushed back on the stack. Now one item is popped from the stack. The popped item is

Select one:

- **a. D** ✓ Four elements in Queue are E,D,C,B. Now E,D will be deleted from Queue and pushed on to Stack. Now Top of the Stack is D. So the answer is D.
- **b. C**
- **c. B**
- **d. A**

The correct answer is: D

Question **10**

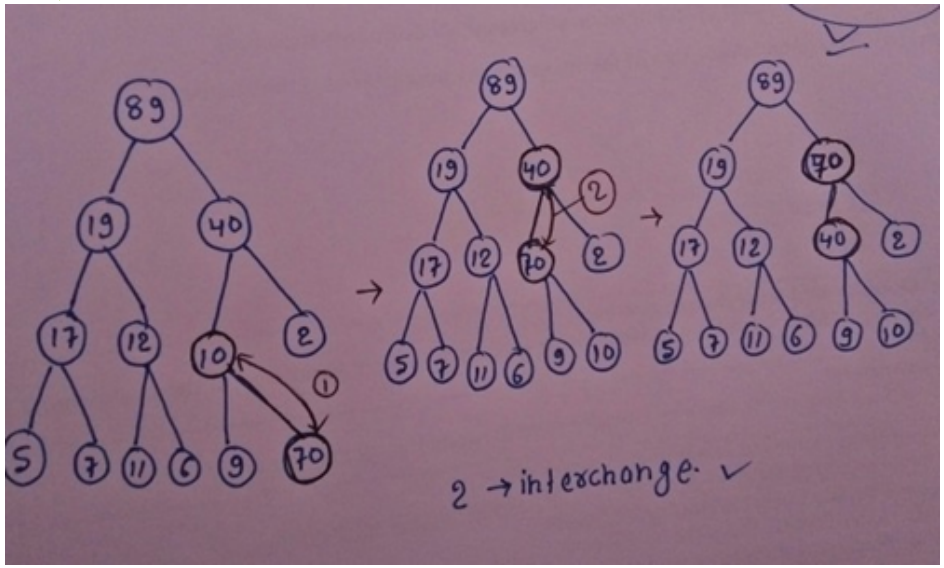
Correct

Mark 1.00 out of 1.00

The minimum number of interchanges needed to convert the array 89, 19, 40, 17, 12, 10, 2, 5, 7, 11, 6, 9, 70 into a heap with the maximum element at the root is

Select one:

- **a. 2** ✓



- **b. 0**
- **c. 3**
- **d. 1**

The correct answer is: 2