Started on Monday, 1 February 2021, 4:44 PM

State Finished

Completed on Monday, 1 February 2021, 4:47 PM

Time taken 2 mins 35 secs

Marks 10.00/10.00

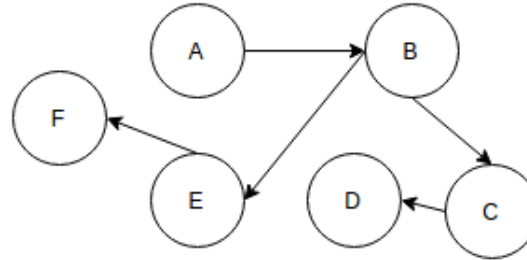**Grade** **100.00** out of 100.00

Which of the following is not a topological sorting of the given graph?

Question 1

Correct

Mark 1.00 out of 1.00

Select one:

○ **a. A B E F C D**

◉ **b. A B C D F E** ✓ Explanation: Topological sorting is a linear arrangement of vertices such that for every directed edge uv from vertex u to vertex v, u comes before v in the ordering. In A B C D F E, F comes before E in ordering.

○ **c. A B E C F D**

○ **d. A B C D E F**

The correct answer is: A B C D F E

Question 2

Correct

Mark 1.00 out of 1.00

Assuming value of every weight to be greater than 10, in which of the following cases the shortest path of a directed weighted graph from 2 vertices u and v will never change?

Select one:

- ○ **a. subtract 10 from all the values**
- ○ **b. in both the cases of multiplying and adding by 10**
- ○ **c. add all values by 10**
- ● **d. multiply all values by 10** ✓ In case of addition or subtraction the shortest path may change because the number of edges between different paths may be different, while in case of multiplication path won't change.

The correct answer is: multiply all values by 10

Question 3

Correct

Mark 1.00 out of 1.00

The number of ways in which the numbers 1, 2, 3, 4, 5, 6, 7 can be inserted in an empty binary search tree, such that the resulting tree has height 6, is _____

Note: The height of a tree with a single node is 0.

Select one:

- a. 32
- b. 2
- c. 4
- d. 64 ✓

  Explanation: To get height 6, we need to put either 1 or 7 at root.

  So count can be written as T(n) = 2*T(n-1) with T(1) = 1

```
    7
   /
 [1..6]


    1
     \
     [2..7]
```

  Therefore count is $2^6 = 64$

The correct answer is: 64

Suppose that we have numbers between 1 and 100 in a binary search tree and want to search for the number 55. Which of the following sequences CANNOT be the sequence of nodes examined?

Select one:

- ○ **a. {79, 14, 72, 56, 16, 53, 55}**

- ○ **b. {90, 12, 68, 34, 62, 45, 55}**

- ○ **c. {10, 75, 64, 43, 60, 57, 55}**

- ⦿ **d. {9, 85, 47, 68, 43, 57, 55}** ✔

  Explanation: In BST, on right child of parent should be greater than parent and left child should be smaller than the parent, but in C after 47, 68 goes on the right side because it greater then parent, now everything below this point should be greater then 47 but 43 appears that does not satisfy the BST property.

Here 43 is not greater than 47 but its present on the right side.
  Not Possible !
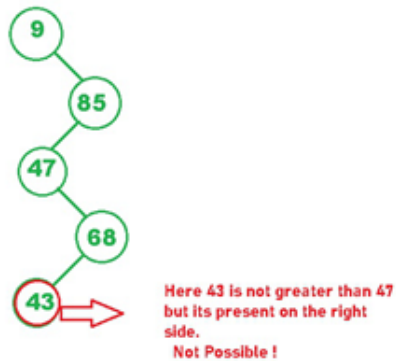
The correct answer is: {9, 85, 47, 68, 43, 57, 55}

Question 5

Correct

Mark 1.00 out of 1.00

Given an empty AVL tree, how would you construct AVL tree when a set of numbers are given without performing any rotations?

Select one:

○ **a. use trial and error**

○ **b. use dynamic programming to build the tree**

○ **c. just build the tree with the given input**

⊙ **d. find the median of the set of elements given, make it as root and construct the tree** ✓ Explanation: Sort the given input, find the median element among them, make it as root and construct left and right subtrees with elements lesser and greater than the median element recursively. this ensures the subtrees differ only by height 1.

The correct answer is: find the median of the set of elements given, make it as root and construct the tree

Question 6

Correct

Mark 1.00 out of 1.00

Given an array of element 5, 7, 9, 1, 3, 10, 8, 4. Which of the following is the correct sequences of elements after inserting all the elements in a min-heap?
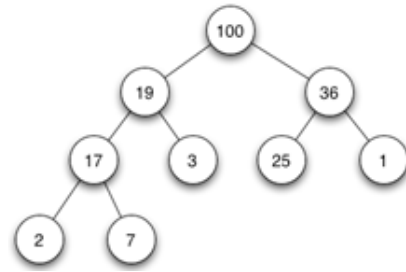
Select one:

○ **a. 1,3,7,4,8,5,9,10**

○ **b. 1,4,3,9,8,5,7,10**

○ **c. 1,3,4,5,8,7,9,10**

⊙ **d. 1,3,4,5,7,8,9,10** ✓ Explanation: Building a min-heap the result will a sorted array so the 1, 3, 4, 5, 7, 8, 9, 10 is correct. If we change the implementation strategy 1, 4, 3, 8, 9, 5, 7, 10 is also correct. (First filling the right child rather than left child first).

The correct answer is: 1,3,4,5,7,8,9,10

Question 7

Correct

Mark 1.00 out of 1.00

If we implement heap as a maximum heap, adding a new node of value 35, What values will be at leaf nodes of the left subtree of the heap.

Select one:

○ a. 35 , 2 and 7

○ b. 35 and 7

⦿ c. 3 and 2 and 7 ✓
Explanation: As 35 is greater than 3, so there is a violation and the node will swap at that position. So leaf nodes with value s are 2 , 7 and 3.

○ d. 2 and 7

The correct answer is: 3 and 2 and 7

Question 8

Correct

Mark 1.00 out of 1.00

Consider the Quick sort algorithm which sorts elements in ascending order using the first element as pivot. Then which of the following input sequence will require a maximum number of comparisons when this algorithm is applied on it?

Select one:

○ a. 22 25 76 67 50

○ b. 52 25 76 67 89

⦿ c. 22 25 56 67 89 ✓ Explanation: If the input sequence is already sorted then worst case behaviour occurs for the Quick sort algorithm which use the first element as pivot. Therefore, the input sequence given in 22 25 56 67 89 will require a maximum number of comparisons.

○ d. 52 25 89 67 76

The correct answer is: 22 25 56 67 89

Question 9

Correct

Mark 1.00 out of 1.00

Consider two strings A = "qpqrr" and B = "pqprqrp". Let x be the length of the longest common subsequence (not necessarily contiguous) between A and B and let y be the number of such longest common subsequences between A and B. Then x + 10y = ___.

Select one:

◉ **a. 34** ✓ The longest length is 4. There are 3 LCS of length 4 "qprr", "pqrr" and "qpqr".

○ **b. 24**

○ **c. 44**

○ **d. 23**

The correct answer is: 34

Question 10

Correct

Mark 1.00 out of 1.00

Let P be a QuickSort Program to sort numbers in ascending order using the first element as pivot. Let t1 and t2 be the number of comparisons made by P for the inputs {1, 2, 3, 4, 5} and {4, 1, 5, 3, 2} respectively. Which one of the following holds?

Select one:

○ **a. t1 < t2**

○ **b. t1 = 5**

○ **c. t1 = t2**

◉ **d. t1 > t2** ✓ Explanation: When first element or last element is chosen as pivot, Quick Sort's worst case occurs for the sorted arrays.
In every step of quick sort, numbers are divided as per the following recurrence.
$T(n) = T(n-1) + O(n)$

The correct answer is: t1 > t2