Question Number : 95 Question Id : 640653689499 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Consider a binary search tree consisting of 15 elements. Let m be the maximum height possible for a given binary search tree, and n be the minimum height possible for a given binary search tree.

What will be the value of $m - n$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

11

PDSA

Section Id :	64065348505
Section Number :	7
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	17
Number of Questions to be attempted :	17
Section Marks :	50
Display Number Panel :	Yes
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	Yes

Question Number : 96 Question Id : 640653689508 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : PROGRAMMING, DATA STRUCTURES AND ALGORITHMS USING PYTHON (COMPUTER BASED EXAM)"

ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT?
CROSS CHECK YOUR HALL TICKET TO CONFIRM THE SUBJECTS TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

Options :

6406532306602. ✔ YES

6406532306603. ✖ NO
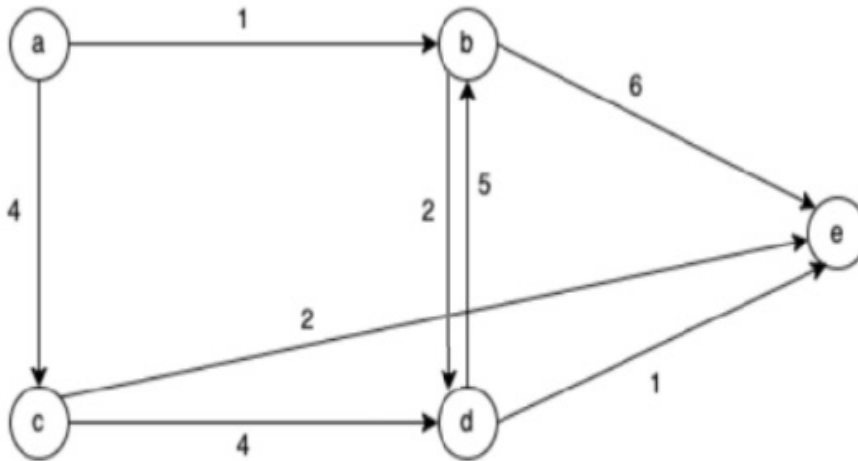
Question Number : 97 Question Id : 640653689509 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following directed graph.

If Dijkstra's algorithm is used with **a** as the source vertex, then what is the order in which all vertices are visited?

Note: *Assume that when multiple unvisited nodes have the same minimum distance, Dijkstra's algorithm visits them alphabetically.*

Options :

6406532306604. ✷ a, b, c, d, e

6406532306605. ✷ a, b, c, e, d

6406532306606. ✔ a, b, d, c, e

6406532306607. ✷ a, b, d, e, c

Question Number : 98 Question Id : 640653689512 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Let G = (V, E) be an undirected graph having distinct positive edge weights. Let V be partitioned into two non-empty sets X and Y. Let e = (s, t) be the minimum cost edge, with s belonging to X and t belonging to Y. Which of the following statement(s) is/are true?

1. The edge e must belong to each path from s to t.
2. The edge e must belong to the minimum cost spanning tree of G.

Options :

6406532306614. ✱ Only 1

6406532306615. ✔ Only 2

6406532306616. ✱ Both 1 and 2

6406532306617. ✱ Neither 1 nor 2

Question Number : 99 Question Id : 640653689514 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider a min-heap represented as the following list:

`[3, 6, 27, 65, 45, 33, 29, 72]`.

What would be the resultant min-heap after the following operations are done on it?

1. delete_min()
2. Insert(10)
3. Insert(5)

Options :

6406532306622. ✱ [5, 6, 27, 10, 72, 29, 33, 65, 45]

6406532306623. ✱ [5, 6, 27, 10, 72, 33, 29, 45, 65]

6406532306624. ✱ [5, 6, 27, 72, 10, 33, 29, 45, 65]

6406532306625. ✔ [5, 6, 27, 10, 72, 33, 29, 65, 45]

Question Number : 100 Question Id : 640653689516 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following class for nodes in BST.

```
1   class Node:
2       def __init__(self, value = None):
3           self.data = value
4           self.left = None
5           self.right = None
```

You are given a binary search tree where each node is created by the given class `Node` and, the `root` contains the reference to the root node of the BST. Which of the following implementations is suitable to print the node's data in **descending order**?

Options :

```
1   def traverse(root):
2       if root is None:
3           return
4       traverse(root.left)
5       traverse(root.right)
6       print(root.data, end=' ')
```
6406532306630. ✖

```
1   def traverse(root):
2       if root is None:
3           return
4       traverse(root.right)
5       traverse(root.left)
6       print(root.data, end=' ')
```
6406532306631. ✖

```
1   def traverse(root):
2       if root is None:
3           return
4       traverse(root.left)
5       print(root.data, end=' ')
6       traverse(root.right)
```
6406532306632. ✖

```
1   def traverse(root):
2       if root is None:
3           return
4       traverse(root.right)
5       print(root.data, end=' ')
6       traverse(root.left)
```
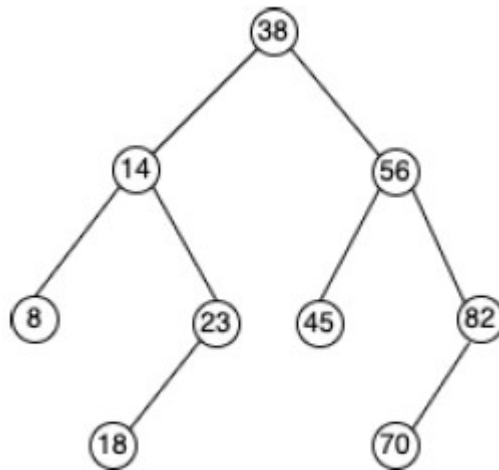6406532306633. ✔

Question Number : 101 Question Id : 640653689518 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0
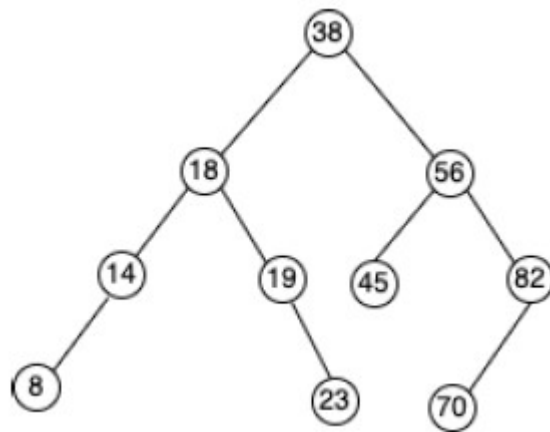
Correct Marks : 3

Question Label : Multiple Choice Question
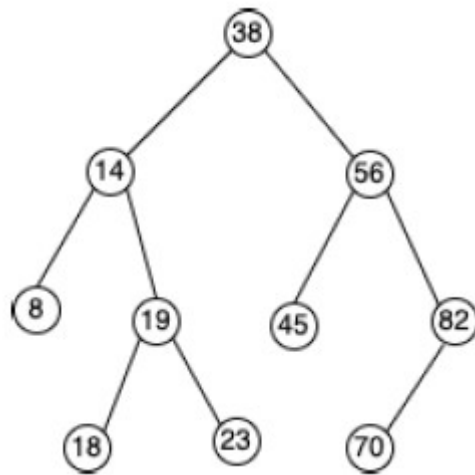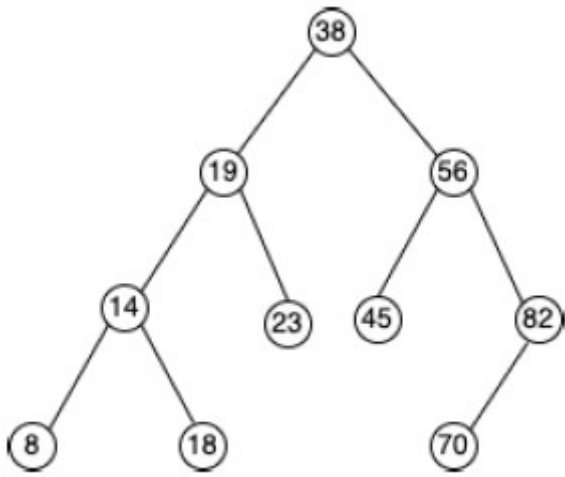
Consider the below AVL tree.

What is the updated AVL tree after inserting 19 in the given AVL tree?

Options :

6406532306635. ✖

6406532306636. ✖

6406532306637. ✔

6406532306638. ✖ None of these

Question Number : 102 Question Id : 640653689519 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Given the following set of characters and their frequencies:

Character	Frequency
A	80
B	60
C	50
D	40
E	30
F	20

Using Huffman coding, construct the Huffman tree for this set of characters. What is the total number of bits needed to represent the message ABCDEF ?

Options :

6406532306639. ✷ 15 bits

6406532306640. ✷ 16 bits

6406532306641. ✔ 17 bits

6406532306642. ✷ 18 bits

Question Number : 103 Question Id : 640653689520 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Suppose you have a set of jobs with their start and end times. If any job finishes at a time T, then the other job can be scheduled at a time T or afterward. Your goal is to find the maximum number of non-overlapping jobs that can be scheduled.

Which of the following greedy strategy can be used to solve this problem optimally?

Options :

6406532306643. ✷ Select jobs with the earliest start times first.

6406532306644. ✔ Select jobs with the earliest end times first.

6406532306645. ✳ Select jobs with the shortest duration first.

6406532306646. ✳ Select jobs with the longest duration first.

Question Number : 104 Question Id : 640653689523 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following function to return the minimum element in the list `L` of size `n`.

```
1  def find_min(L, low, high):
2      if low == high:
3          return L[low]
4      mid = (low + high) // 2
5      min1 = find_min(L, low, mid)
6      min2 = find_min(L, mid + 1, high)
7      return min(min1, min2)
```

Which of the following represents the correct recurrence relation for the given function `find_min`?

Options :

6406532306652. ✳ $T(n) = T(n/2) + n$

6406532306653. ✔ $T(n) = 2T(n/2) + 1$

6406532306654. ✳ $T(n) = 2T(n/2) + n$

6406532306655. ✳ $T(n) = T(n/2) + 1$

Question Number : 105 Question Id : 640653689524 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following recurrences.

1. $T_1(n) = 3T_1(n/3) + O(n^2)$
2. $T_2(n) = 9T_2(n/3) + O(n)$

Base Case:- $T_1(1) = T_2(1) = 1$

Select the correct complexity for given recurrences.

Options :

6406532306656. ✔ $T_1 = O(n^2)$ and $T_2 = O(n^2)$

6406532306657. ✖ $T_1 = O(n \log n)$ and $T_2 = O(n^2)$

6406532306658. ✖ $T_1 = O(n \log n)$ and $T_2 = O(n^2 \log n)$

6406532306659. ✖ $T_1 = O(n^2)$ and $T_2 = O(n \log n)$

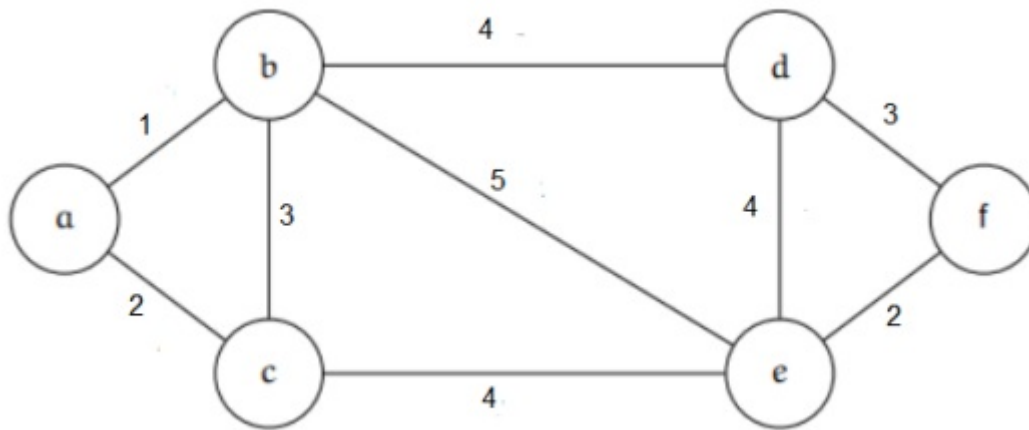|	
Sub-Section Number :	3
Sub-Section Id :	640653100828
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 106 Question Id : 640653689511 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Short Answer Question

Consider the graph G given below.

The cost of the minimum cost spanning tree for the given graph is _____ .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

12

Question Number : 107 Question Id : 640653689521 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Short Answer Question

In a list L, two elements $L[i]$ and $L[j]$ form an **inversion** if $L[i] > L[j]$ and $i < j$.

What is the number of inversion pairs for the list $L = [1, 5, 4, 2, 6, 3]$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Sub-Section Number :   4

Question Number : 108 Question Id : 640653689517 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

What is the maximum possible height of an AVL tree containing **15** nodes? Consider that an AVL tree with a single node has a height of 1.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 109 Question Id : 640653689510 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0
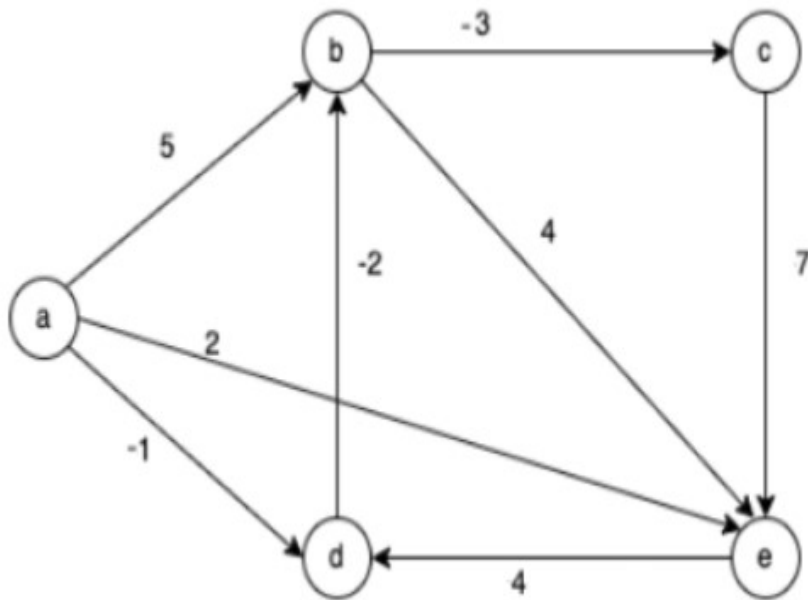
Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following graph.

Which of the following statement(s) is/are **true** about computing the shortest path distance from vertex a to other vertices in the given graph?

Options :

6406532306608. ✔ Dijkstra's algorithm computes the correct shortest path distance.

6406532306609. ✖ Dijkstra's algorithm does not compute the correct shortest path distance.

6406532306610. ✔ Bellman-Ford algorithm computes the correct shortest path distance.

6406532306611. ✖ Bellman-Ford algorithm does not compute the correct shortest path distance.

6406532306612. ✔ Floyd Warshall algorithm computes the correct shortest path distance.

Question Number : 110 Question Id : 640653689513 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements is/are **true** about min-heap with distinct elements?

Options :

6406532306618. ✔ The largest element in a min-heap is always at a leaf node.

6406532306619. ✖ The largest element in a min-heap is always at the lowest level.

6406532306620. ✔ The second-smallest element in a min-heap is always a child of the root node.

6406532306621. ✖ Finding the largest element in min-heap takes *O(log n)* time.

Question Number : 111 Question Id : 640653689515 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

A binary search tree is used to locate the number 43. Which of the following probe sequences of compared elements from the root to 43 is/are not possible?

Options :

6406532306626. ✔ 2, 3, 50, 40, 60, 43

6406532306627. ✖ 61, 52, 14, 17, 40, 43

6406532306628. ✖ 10, 65, 31, 48, 37, 43

6406532306629. ✔ 17, 77, 27, 66, 18, 43

Question Number : 112 Question Id : 640653689522 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following statements and choose the correct ones.

Options :

6406532306648. ✔ The worst case running time of the Quick select algorithm to find the k-th largest number is $O(n^2)$

6406532306649. ✔ The time taken to find the median in an unsorted list using the Median of Medians (MoM) algorithm is $O(n)$

6406532306650. ✅ Quick select algorithm is an example of the divide-and-conquer approach to solving problems

6406532306651. ✖ Using Fast Select (Quick Select using MoM for pivot selection) strategy, the worst-case running time will be $O(n \log n)$.

AppDev1

Section Id :	64065348506
Section Number :	8
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	15
Number of Questions to be attempted :	15
Section Marks :	50
Display Number Panel :	Yes
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653100831
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 113 Question Id : 640653689525 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question