Correct Marks : 4

Question Label : Multiple Choice Question

Which of the following decompositions will help to achieve 2 NF?

Options :

6406532577402. ✔ Table 1: **Drivers** $(Driver\_ID, Driver\_Name)$
Table 2: **Races** $(Driver\_ID, Race, Points)$
Table 3: **Teams** $(Driver\_ID, Team\_Name, Team\_Budget)$

6406532577403. ✖ Table 1: **Drivers** $(Driver\_ID, Driver\_Name)$
Table 2: **Races** $(Driver\_ID, Race, Points, Team\_Name)$
Table 3: **Teams** $(Team\_Name, Team\_Budget)$

6406532577404. ✖ Table 1: **Drivers** $(Driver\_ID, Driver\_Name, Points)$
Table 2: **Races** $(Driver\_ID, Race, Points)$
Table 3: **Teams** $(Team\_Name, Team\_Budget)$

6406532577405. ✖ Table 1: **Drivers** $(Driver\_ID, Driver\_Name)$
Table 2: **Races** $(Driver\_ID, Race, Points)$
Table 3: **Teams** $(Team\_Name, Team\_Budget, Driver\_Name)$

PDSA

Section Id :	64065353263
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

Section Negative Marks :	0
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 :	640653112597
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 107 Question Id : 640653770522 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 :

6406532577406. ✔ YES

6406532577407. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	640653112598
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 108 Question Id : 640653770524 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

In the context of the **Floyd-Warshall algorithm**, what does it mean if the distance matrix has a negative value in its diagonal?

Options :

6406532577412. ✔ The graph has a negative-weight cycle.

6406532577413. ✖ The graph has negative-weight on edge but no negative-weight cycle.

6406532577414. ✖ The graph is acyclic.

6406532577415. ✖ The graph has a disconnected component.

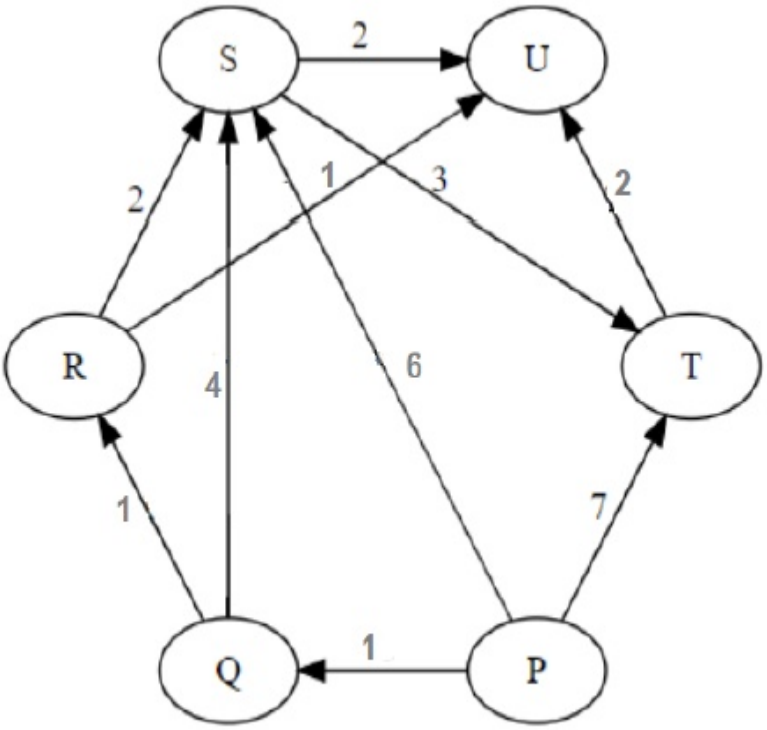
Sub-Section Number :	3
Sub-Section Id :	640653112599
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 109 Question Id : 640653770523 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 graph.



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

Options :

6406532577408. ✖ P, Q, R, U, T, S

6406532577409. ✖ P, Q, R, S, T, U

6406532577410. ✖ P, Q, R, S, U, T

6406532577411. ✔ P, Q, R, U, S, T

Question Number : 110 Question Id : 640653770527 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

You have a **max-heap** with the following set of elements:

{10, 5, 15, 3, 8, 12}

Which of the following elements is guaranteed to be a child of the element **15**?

Options :

6406532577424. ✖ 10

6406532577425. ✖ 5

6406532577426. ✔ 12

6406532577427. ✖ 8

Question Number : 111 Question Id : 640653770529 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 sequence of numbers inserted into an empty **Binary Search Tree(BST):**

50, 30, 20, 40, 70, 60, 80, 35

What will be the height of the resulting BST? Consider that the height of empty binary search tree is 0.

Options :

6406532577429. ✖ 3

6406532577430. ✔ 4

6406532577431. ✖ 5

6406532577432. ✖ 6

Question Number : 112 Question Id : 640653770530 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

Which of the following traversals would visit the nodes of a **binary search tree** in the following order?

10, 5, 3, 8, 15, 12, 20

Options :

6406532577433. ✖ In-order traversal

6406532577434. ✔ Pre-order traversal

6406532577435. ✖ Post-order traversal

Question Number : 113 Question Id : 640653770536 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

Apply the divide and conquer strategy to find the **closest pair of points** in a set. After dividing the set into two halves and recursively finding the closest pairs in each half, what additional step is required?

Options :

6406532577448. ✖ Combine the results directly

6406532577449. ✖ Perform a linear search for the closest pair

6406532577450. ✔ Consider pairs that span both halves

6406532577451. ✖ Sort the points by their distances

Question Number : 114 Question Id : 640653770538 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 recurrence relation for an algorithm:-

$T(n) = 4T(n/2) + O(n)$

Base Case:- $T(1) = 1$

The complexity of this algorithm is__ .

Options :

6406532577456. ✖ $O(n)$

6406532577457. ✖ $O(\log n)$

6406532577458. ✔ $O(n^2)$

6406532577459. ✖ $O(n \log n)$

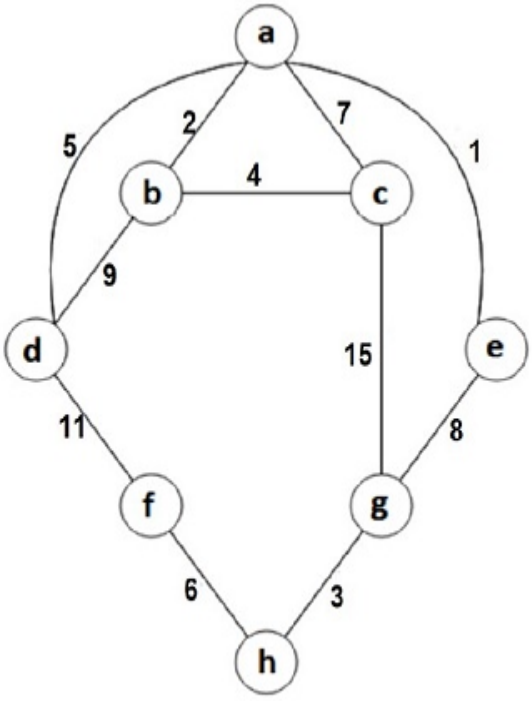
Sub-Section Number :	4
Sub-Section Id :	640653112600
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 115 Question Id : 640653770525 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the following graph.



If **Prim's algorithm** started with vertex `a` to construct a Minimum Spanning Tree, then what is the order in which vertices are marked visited?

Options :

6406532577416. ✔ a, e, b, c, d, g, h, f

6406532577417. ✖ a, e, b, c, g, h, d, f

6406532577418. ✖ a, e, b, d, c, h, g, f

6406532577419. ✖ a, e, b, d, c, g, f, h

Sub-Section Number :	5
Sub-Section Id :	640653112601
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 116 Question Id : 640653770532 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

For a set of symbols with probabilities of occurrence, which of the following statement(s) about the **Huffman tree** is/are correct?

Options :

6406532577441. ✔ Symbols with higher probabilities are generally closer to the root of the tree

6406532577442. ✖ Symbols with lower probabilities are generally closer to the root of the tree

6406532577443. ✖ The Huffman tree is always a complete binary tree

6406532577444. ✔ It generates prefix codes (no code is a prefix of another).

Sub-Section Number :	6
Sub-Section Id :	640653112602
Question Shuffling Allowed :	Yes
Is Section Default? :	null

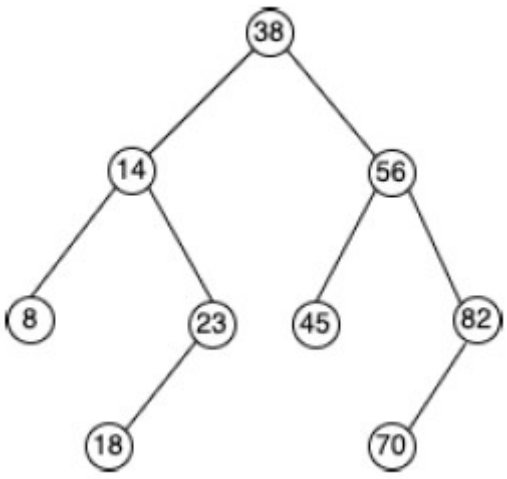
Question Number : 117 Question Id : 640653770531 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Define the **slope** of a node as the absolute difference in height between the left subtree and the right subtree of the node. Consider that the height of the empty tree is 0.

Consider the below AVL Tree.



After inserting **19** in the given AVL tree (before applying rotation), which of the following node's slopes will become greater than 1? Select all that are correct.

Options :

6406532577436. ✖ 38

6406532577437. ✖ 56

6406532577438. ✔ 14

6406532577439. ✖ 18

6406532577440. ✔ 23

Question Number : 118 Question Id : 640653770537 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 :

6406532577452. ✖ The worst case running time of Quick select algorithm to find the kth largest number is $O(n)$

6406532577453. ✔ The time taken to find the median in an unsorted list using the Median of Medians(MoM) algorithm is $O(n)$

6406532577454. ✔ The Quick select algorithm is an example of the divide-and-conquer approach.

6406532577455. ✖ Using the Fast Select (Quick Select using MoM for pivot selection) strategy, the worst-case running time will be $O(n^2)$ to find the kth largest number.

Sub-Section Number : 7

Sub-Section Id : 640653112603

Question Shuffling Allowed : Yes

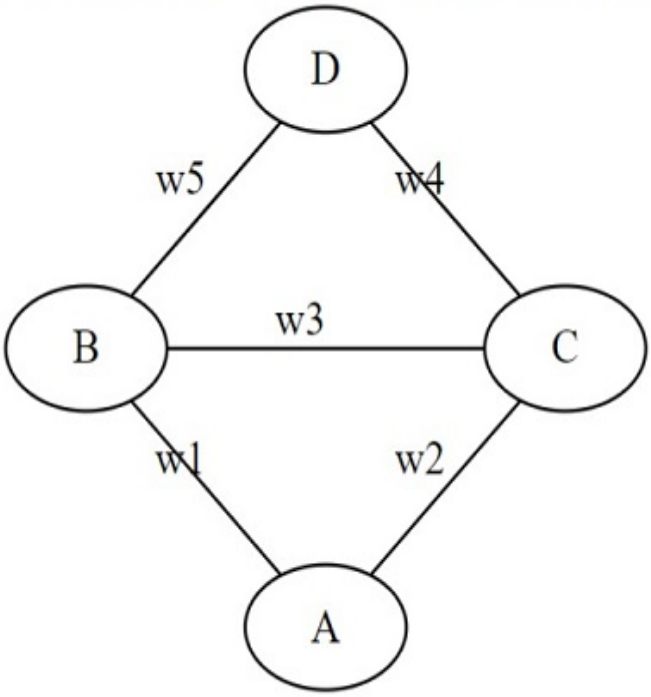
Is Section Default? : null

Question Number : 119 Question Id : 640653770526 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following graph where w1, w2, w3, w4, and w5 represent the weights on edges.



Which of the following statement(s) is/are always **true** for the **Minimum Spanning Tree(MST)**?

Options :

6406532577420. ✔ If all given weights are distinct, then only one unique MST is possible.

6406532577421. ✖ If w1 and w2 are the same and largest among all weights and other weights are distinct, then only one unique MST is possible.

6406532577422. ✔ If w1 and w3 are the same and largest among all weights and other weights are distinct, then only one unique MST is possible.

6406532577423. ✔ If w1 and w4 are the same and smallest among all weights and other weights are distinct, then only one unique MST is possible.

Sub-Section Number : 8

Sub-Section Id : 640653112604

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 120 Question Id : 640653770528 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 tree with 21 nodes. The maximum number of leaves possible in tree is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

11

Question Number : 121 Question Id : 640653770535 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

Let `L` be an integer list of length `n`. The number of **inversions** is the number of the different pairs `(i, j)` where:

- `0 <= i < j < n`
- `L[i] > L[j]`

The total number of **inversions** for `L = [1, 3, 5, 7, 9, 8, 6, 4, 2]` is ___.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

16

Sub-Section Number :	9
Sub-Section Id :	640653112605
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 122 Question Id : 640653770533 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

You are given a list of `7` activities to be conducted in a single available room, each represented by **(start time, end time)**. If any activity finishes at time `T`, then another activity can be started at time `T` or afterwards.

Activities: `[(1, 4), (3, 5), (0, 2), (2, 3), (5, 8), (8, 9), (5, 7)]`

How many activities can be scheduled at most by following the timing constraints given above?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 123 Question Id : 640653770534 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

You are given a list of 8 meetings, each represented by a tuple (start time, end time). Your goal is to schedule all meetings in the minimum number of conference rooms. If a meeting ends at time `t` in a conference room, another meeting can start at time `t` or afterwards in the same room.

Meetings: `[(1, 4), (6, 12), (2, 8), (11, 15), (3, 7), (5, 10), (9, 14), (13, 16)]`

The minimum number of conference rooms needed to schedule all meetings is__.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

AppDev1

Section Id :	64065353264
Section Number :	8
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
Section Negative Marks :	0
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 :	640653112606