Text Areas : PlainText

Possible Answers :

9

Question Number : 102 Question Id : 640653445541 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 m be the maximum number of super keys for $\mathbf{R}$ based on $\mathcal{F}_1$, n be the maximum number of super keys for $\mathbf{R}$ based on $\mathcal{F}_2$ and p be the maximum number of super keys for $\mathbf{R}$ based on $\mathcal{F}_3$.

Find out the value of $m + n + p$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

67

PDSA

Section Id :	64065328980
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	16
Number of Questions to be attempted :	16

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 :	64065363313
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 103 Question Id : 640653445545 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"

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 :

6406531484557. ✔ Yes

6406531484558. ✖ No

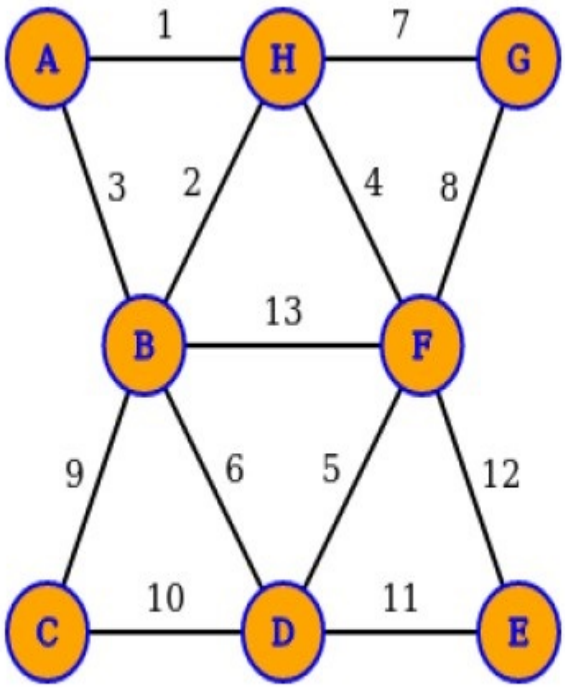
Sub-Section Number :	2
Sub-Section Id :	64065363314
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 104 Question Id : 640653445546 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.



Let α denote the number of minimum spanning trees of G and β denote the weight of such a minimum spanning tree.
The value of $\alpha + \beta$ is _____.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

40

Question Number : 105 Question Id : 640653445551 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 a binary tree *T* that has 50 leaf nodes. Then the number of nodes in *T* that has exactly two children are_____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

49

Question Number : 106 Question Id : 640653445557 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

Meetings M1, M2, ..., M10 are to be conducted in a single available meeting room. The table below gives the start and end times of these meetings. If any activity finishes at time `T`, then other activities can be started at time `T` or afterward.

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
start	8	2	11	4	10	6	6	3	1	2
end	15	3	12	7	11	9	10	5	4	7

How many meetings 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 : 107 Question Id : 640653445560 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 an array `A`, two elements `A[i]` and `A[j]` form an inversion pair, if `A[i] > A[j]` for `i < j`.
The maximum number of inversion pairs possible in an integer array `A` of size `12` is _ _ _ _.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

66

Sub-Section Number :	3
Sub-Section Id :	64065363315
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 108 Question Id : 640653445547 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* be a connected graph with at least 5 vertices and all edges in G having distinct weights. Let *T* be a minimum spanning tree of *G*. Consider the following statements:

1. If *e* is the heaviest edge in a cycle in G, then T must exclude *e*.
2. If *e* is the lightest edge in a cycle in G, then T must include *e*.
3. If e_3 and e_4 are the third and fourth smallest edges in G, then T must include at least one of them.

Which of the above statement(s) is/are **correct** regarding G and T?

Options :

6406531484560. ✖ Statement 1 only

6406531484561. ✖ Statement 3 only

6406531484562. ✖ Statements 1 and 2

6406531484563. ✔ Statements 1 and 3

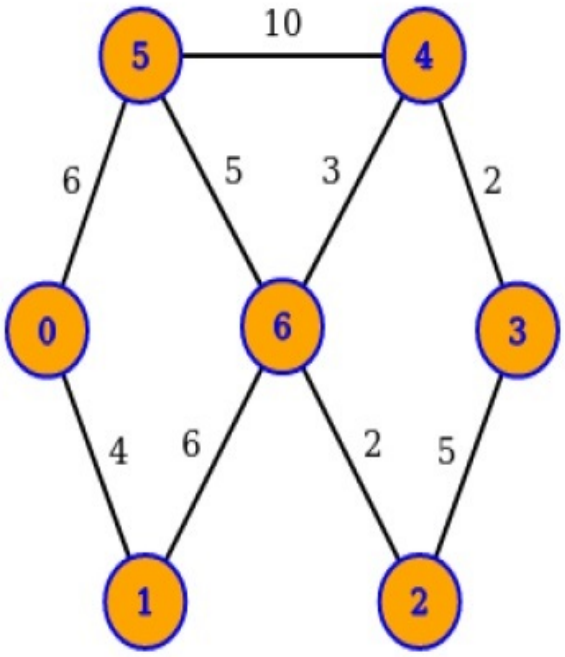
Question Number : 109 Question Id : 640653445548 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

In the given graph, if we try to find the shortest path from node `0` to all other nodes using the Dijkstra's algorithm given below, in what order will the nodes be marked as `True` in the `visited` dictionary?

```
def dijkstralist(WList,s):
    infinity = 1 + len(WList.keys())*max([d for u in WList.keys() for (v,d) in WList[u]])
    (visited,distance) = ({},{})
    for v in WList.keys():
        (visited[v],distance[v]) = (False,infinity)
    distance[s] = 0
    for u in WList.keys():
        nextd = min([distance[v] for v in WList.keys() if not visited[v]])
        nextvlist = [v for v in WList.keys() if (not visited[v]) and distance[v] == nextd]
        if nextvlist == []:
            break
        nextv = min(nextvlist)
        visited[nextv] = True
        for (v,d) in WList[nextv]:
            if not visited[v]:
                distance[v] = min(distance[v],distance[nextv]+d)
    return(distance)
```



Options :

6406531484564. ✖ `0 1 2 6 5 4 3`

6406531484565. ✖ `0 1 5 6 2 3 4`

6406531484566. ✔ `0 1 5 6 2 4 3`

6406531484567. ✖ `0 1 5 6 4 2 3`

Question Number : 110 Question Id : 640653445550 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 max-heap `H = [20, 10, 12, 8, 9]`. If we perform the following operations in the given order on the max-heap `H` then the resulting max-heap would be _____

```
insert(15) #The resulting heap after inserting 15 would be max-heap
delete_max() #The resulting heap after deleting the max element would be max-heap
```

Options :

6406531484573. ✖ `[15, 9, 8, 10, 12]`

6406531484574. ✔ `[15, 10, 12, 8, 9]`

6406531484575. ✖ `[15, 12, 10, 9 ,8]`

6406531484576. ✖ `[15, 12, 10, 8, 9]`

Question Number : 111 Question Id : 640653445552 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 statements:

1. Time required for searching an item in a min-heap of size *n* is bounded by *O(log n)*.
2. Time required for searching an item in a balanced binary search tree of size *n* is bounded by

O(log n).

3. A binary tree can be reconstructed back if either its preorder or postorder traversal is known.

4. A binary search tree can be reconstructed back if its inorder traversal is known.

Which of the above given statement(s) is/are **true**?

Options :

6406531484578. ✖ Statements 1 and 3

6406531484579. ✖ Statements 3 and 4

6406531484580. ✖ Statements 1 and 2

6406531484581. ✖ Statement 4 only

6406531484582. ✔ Statement 2 only

Question Number : 112 Question Id : 640653445553 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

While inserting the elements 20, 60, 10, 45, 65, 30, and 90 in an empty binary search tree (BST) in the sequence shown, the elements at maximum depth are___

Options :

6406531484583. ✔ 30, 90

6406531484584. ✖ 45, 90

6406531484585. ✖ 65, 90

6406531484586. ✖ 45, 65

Question Number : 113 Question Id : 640653445555 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 string: I I T M B S I I T T M B B I I T

What is the average length of bits required for encoding each letter using Huffman encoding ?

Options :

6406531484592. ✖ 1.87

6406531484593. ✖ 3.15

6406531484594. ✖ 2.46

6406531484595. ✔ 2.18

Question Number : 114 Question Id : 640653445556 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 random sequence of positive integers $x_1, x_2, x_3, \ldots, x_n$, we have to partition them in two sets $P\,(p_1, p_2, \ldots p_k)$ and $Q\,(q_1, q_2, \ldots q_{n-k})$ such that the difference between the sum of these two sets is minimum i.e. $\left|\sum p_i - \sum q_i\right|$ is minimum.

Which of the following greedy strategy would work for this problem ?

Options :

6406531484596. ✖ Sort $x_1, x_2, x_3, \ldots, x_n$ and put all even positioned elements in P and odd positioned element in Q from the sorted sequence.

6406531484597. ✖ Find the median element of $x_1, x_2, x_3, \ldots, x_n$ put all elements lesser or equal to the median in P and greater than the median in Q.

6406531484598. ✖ Sort $x_1, x_2, x_3, \ldots, x_n$, from the sorted sequence at i^{th} step, x_i is placed in that set (P or Q) whose sum of all current elements is smaller in the i^{th} step.

6406531484599. ✔ None of these.

Question Number : 115 Question Id : 640653445559 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 statement is **true** for searching the k^{th} smallest element in an unsorted array of size n ?

Options :

6406531484605. ✖ Using Quick select strategy the worst case running time will be *O(n log n).*

6406531484606. ✖ Using max-heap of size *k* the worst case running time will be *O (k).*

6406531484607. ✔ Using Quick select strategy the worst case running time will be *O* (n^2).

6406531484608. ✖ Using Quick select strategy the worst case running time will be *O(n).*

Sub-Section Number :	4
Sub-Section Id :	64065363316
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 116 Question Id : 640653445549 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Selectable Option : 0

Question Label : Multiple Select Question

Which of the following statement(s) is/are **true** ?

Options :

6406531484568. ✔ Bellman Ford algorithm can detect negative weight cycles in a graph.

6406531484569. ✖ Time complexity of Dijkstra's algorithm when implemented using an adjacency list is $O(E+V)$.

6406531484570. ✖ The formula to update the length of the shortest path from vertex `i` to `j` in Floyd-Warshall algorithm is

$$SP^k[i,j] = min[SP^k[i,k] + SP^k[k,j], SP^{k-1}[i,j]]$$

6406531484571. ✖ The shortest path returned by Dijkstra's algorithm always passes through the least number of vertices.

6406531484572. ✔ Given a graph where all edges have positive weights, the shortest path produced by Dijkstra's and Bellman-Ford algorithm may be different, but the path weight would be the same.

Question Number : 117 Question Id : 640653445554 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Selectable Option : 0

Question Label : Multiple Select Question

Consider that the following elements are inserted in the given order to create an AVL tree *T*:

`36, 40, 32, 18, 72, 5, 35, 34`

Which of the following node(s) would be leaf nodes of *T* ?

Options :

6406531484587. ✔ 5

6406531484588. ✔ 32

6406531484589. ✖ 40

6406531484590. ✔ 35

6406531484591. ✖ 34

Sub-Section Number :	5
Sub-Section Id :	64065363317
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 118 Question Id : 640653445558 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 recurrences and choose the **correct** option.

1. $T_1(n) = 9T_1(n/3) + O(n)$
   Base Case : $T_1(1) = O(1)$
2. $T_2(n) = 3T_2(n/4) + O(n^2)$
   Base Case : $T_2(1) = O(1)$

Options :

6406531484601. ✖ $T_1 = O(n^{\log_2 3})$ and $T_2 = O(n^2)$

6406531484602. ✔ $T_1 = O(n^2)$ and $T_2 = O(n^2)$

6406531484603. ✖ $T_1 = O(n)$ and $T_2 = O(n^2)$

6406531484604. ✖ $T_1 = O(n^2)$ and $T_2 = O(n^{\log_3 4})$

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Section Id :	64065328981
Section Number :	7
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	19
Number of Questions to be attempted :	19
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