6406531736719. ✖ *U* in *PSUV* → *TQ*

PDSA

Section Id :	64065333933
Section Number :	5
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 :	64065373931
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 66 Question Id : 640653521055 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 :

6406531736728. ✔ YES

6406531736729. ✖ NO

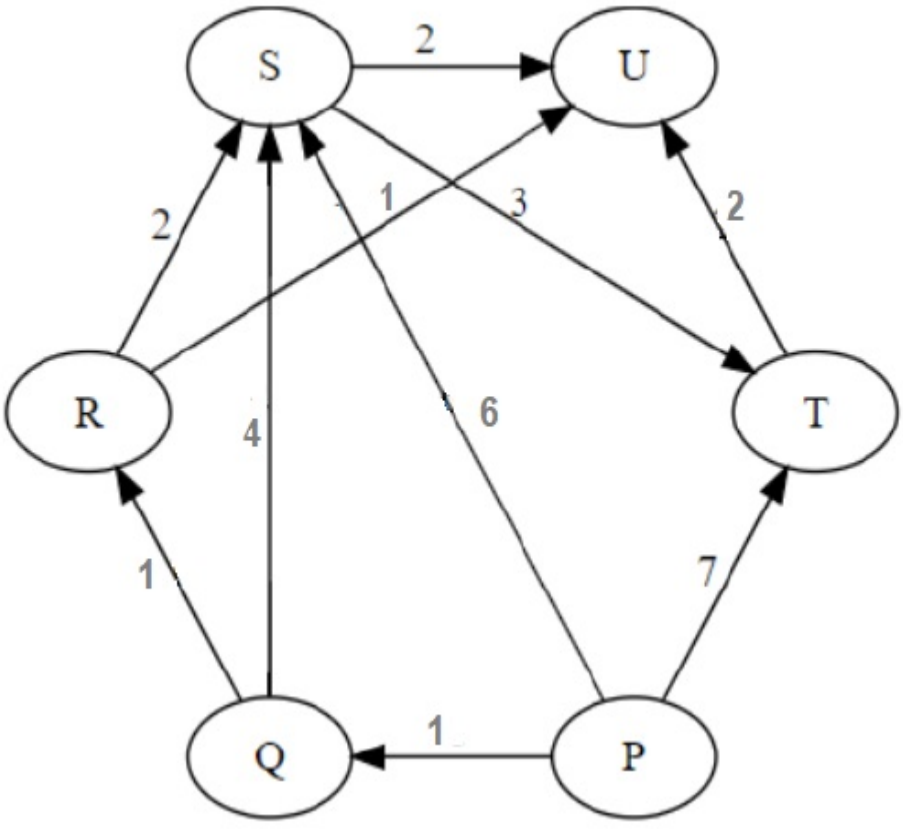
Sub-Section Number :	2
Sub-Section Id :	64065373932
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 67 Question Id : 640653521056 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 P to all other nodes using **Dijkstra's algorithm**, in what order do the nodes get included in the visited set?



Options :

6406531736730. ✖ P, Q, R, S, T, U

6406531736731. ✖ P, Q, R, U, T, S

6406531736732. ✖ P, Q, T, R, U, S

6406531736733. ✔ P, Q, R, U, S, T

Question Number : 68 Question Id : 640653521057 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 statements is/are true?

I. 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.
II. Given a weighted graph where the weights of all edges are unique, there is always a unique shortest path from a source to a destination in such a graph.

Options :

6406531736734. ✔ Only (I)

6406531736735. ✖ Only (II)

6406531736736. ✖ Both (I) and (II)

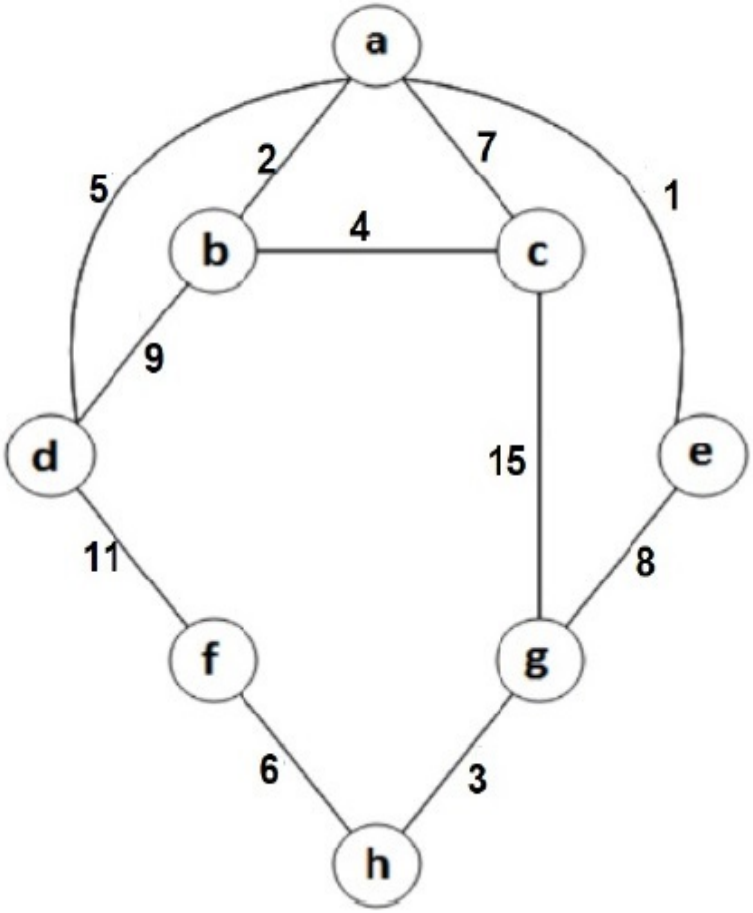
6406531736737. ✖ None of these

Question Number : 69 Question Id : 640653521058 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

For the undirected, weighted graph given below, which of the following sequences of edges represents a correct execution of **Prim's algorithm** started with vertex `a` to construct a Minimum Spanning Tree?



Options :

6406531736738. ✖ (a, e), (a, b), (b, c), (a, d), (g, h), (f, h), (e, g)

6406531736739. ✔ (a, e), (a, b), (b, c), (a, d), (e, g), (g, h), (f, h)

6406531736740. ✖ (a, e), (a, b), (g, h), (b, c), (a, d), (f, h), (e, g)

6406531736741. ✖ (a, e), (a, b), (g, h), (b, c), (a, d), (f, h), (a, c)

Question Number : 70 Question Id : 640653521060 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 binary **min-heap** operation has the highest time complexity? Consider the size of min-heap is `n` and implemented using an array.

Options :

6406531736747. ✖ Inserting a new element

6406531736748. ✖ Deleting the minimum element

6406531736749. ✔ Merging with another min-heap of size n

6406531736750. ✖ Update the value at the known index

Question Number : 71 Question Id : 640653521061 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** with 37 distinct elements implemented using array A with index 0 to 36. The smallest element be always situated at any position in between ___.

Options :

6406531736751. ✖ A[16] and A[36] (both inclusive)

6406531736752. ✔ A[18] and A[36] (both inclusive)

6406531736753. ✖ A[32] and A[36] (both inclusive)

6406531736754. ✖ A[31] and A[36] (both inclusive)

Question Number : 72 Question Id : 640653521062 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 statements is **true** about the worst case time complexity of searching operation in binary search tree of size `n`?

Options :

6406531736755. ✖ $O(n)$ whether the tree is balanced or unbalanced.

6406531736756. ✖ $O(n)$ if the tree is balanced, $O(logn)$ otherwise.

6406531736757. ✖ $O(logn)$ whether the tree is balanced or unbalanced.

6406531736758. ✔ $O(\log n)$ if the tree is balanced, $O(n)$ otherwise.

Question Number : 73 Question Id : 640653521064 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 problem scenario where n Meetings $M_1, M_2, \ldots, M_n$ are to be conducted in a single available meeting room. Each meeting has `start_time` and `end_time`. If any meeting finishes at time `T`, then other meetings can be started at time `T` or afterward.

To find the maximum number of meetings that can be held in the meeting room without conflicts, Which of the following greedy strategy would always work correctly?

Options :

6406531736760. ✖ Always choose the meeting whose `start_time` is the earliest.

6406531736761. ✖ Always choose the meeting spanning the shortest interval.

6406531736762. ✖ Always choose the meeting that overlaps the minimum number of other meetings.

6406531736763. ✔ Always choose the meeting whose `end_time` is the earliest.

Question Number : 74 Question Id : 640653521067 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

What will be the minimum and maximum number of nodes possible in an AVL tree of height `7`? Consider that the height of the empty tree is 0.

Options :

6406531736766. ✖ 33, 63

6406531736767. ✔ 33, 127

6406531736768. ✖ 7, 127

6406531736769. ✖ 7, 63

Sub-Section Number : 3

Sub-Section Id : 64065373933

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 75 Question Id : 640653521070 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

	Recurrence Relation		Complexity
A	$T(n) = 2T(n/4) + O(n)$	1	$O(log\, n)$
B	$T(n) = 3T(n/3) + O(n)$	2	$O(n)$
C	$T(n) = 9T(n/3) + O(n)$	3	$O(n\, log\, n)$
D	$T(n) = T(n/2) + O(1)$	4	$O(n^2)$

Note- Consider the base Case for each recurrence: $T(1) = 1$

Select the correct match of recurrence relation with corresponding complexity.

Options :

6406531736775. ✖ A-2, B-4, C-3, D-1

6406531736776. ✔ A-2, B-3, C-4, D-1

6406531736777. ✖ A-2, B-3, C-1, D-4

6406531736778. ✖ A-3, B-2, C-4, D-1

Sub-Section Number : 4

Sub-Section Id : 64065373934

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 76 Question Id : 640653521059 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 the following algorithm on a connected, weighted, and undirected graph with `n` vertices and `m` edges.

- Sort the edges as `[E1, E2, . . . , Em]` in decreasing order of weight.
- Consider each edge `Ej` in sorted order.
- If this edge `Ej` is part of any cycle of the graph, then delete it. Otherwise, keep it in the resulting graph.

Which of the following statements is/are true?

Options :

6406531736742. ✔ Exactly `m - n + 1` edges will be deleted.

6406531736743. ✖ At most, `n - 1` edges will be deleted.

6406531736744. ✔ After processing all `m` edges, the resulting graph is connected.

6406531736745. ✔ What remains at the end is a minimum cost spanning tree.

6406531736746. ✖ After processing all `m` edges, the resulting graph has exactly `n` edges.

Question Number : 77 Question Id : 640653521069 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 is **true** for searching the k^{th} smallest element in an unsorted array of size n, where all elements are distinct?

Options :

6406531736771. ✔ Using Quick Select strategy, the worst-case running time will be $O(n^2)$.

6406531736772. ✖ Using a max-heap of size k, the worst-case running time will be $O(k)$.

6406531736773. ✔ Using Fast Select (Quick Select using MoM for pivot selection) strategy, the worst-case running time will be $O(n)$.

6406531736774. ✖ Using Fast Select (Quick Select using MoM for pivot selection) strategy, the worst-case running time will be $O(n * k)$.

Sub-Section Number :	5
Sub-Section Id :	64065373935
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 78 Question Id : 640653521063 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

The post-order traversal of a binary search tree is `1, 3, 4, 5, 2, 7, 8, 6`. The height of a tree is the number of nodes in the longest path from the root to any leaf (including root and leaf node). The height of the binary search tree is ___.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 79 Question Id : 640653521065 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 following 4 items (one unit for each) with their weights and value.

Item No.	Weight(W)	Value(V)
1	7	28
2	10	60
3	2	24
4	4	28

The task is to pick a subset of these items such that their total weight should be lesser or equal to 13 (maximum weight capacity C <= 13) and their total value is maximized. Consider that each item has only one unit and it can not be split.

V_{opt} = The total value of items picked by an optimal algorithm.

V_{greedy} = The total value of items picked by one greedy approach that sorts the item by `value(v)` to `weight(w)` ratio in descending order and picks them greedily starting from the first item in the ordered list (pick the item if the total weight of that item is less than or equal to the remaining capacity, otherwise, skip that item).

The value of $V_{opt} - V_{greedy}$ is _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 80 Question Id : 640653521066 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

A networking company uses Huffman coding compression technique to encode the message before transmitting it over the network. An entire message is created using characters from the set S = {A, B, C, D, E, F}. The probability of occurrence of each character is given in the table below.

Character	A	B	C	D	E	F
Frequencies	0.12	0.28	0.06	0.16	0.14	0.24

How many bits(0 or 1) are required to transmit the message `ABCDEF` over the network?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

16

Question Number : 81 Question Id : 640653521068 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

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 = [9, 8, 7, 6, 5, 4, 3, 2, 1]` is _____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

36

AppDev1

Section Id :	64065333934
Section Number :	6
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
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065373936
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 82 Question Id : 640653521071 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 : MODERN APPLICATION