

NOTE: Enter your answer to the nearest integer.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

25

Question Number : 81 **Question Id :** 640653351296 **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

Given that the rotational speed of the disk is 6000 revolutions per minute. Consider the seek time is 3ms. What will be the rotational latency?

Options :

6406531165916. ✖ 10 sec

6406531165917. ✖ 5 sec

6406531165918. ✖ 10 ms

6406531165919. ✔ 5 ms

PDSA

Section Id :	64065322135
Section Number :	5
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 :	64065350388
Question Shuffling Allowed :	No

Question Number : 82 Question Id : 640653351305 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 " 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 :

6406531165952. ✓ Yes

6406531165953. ✖ No

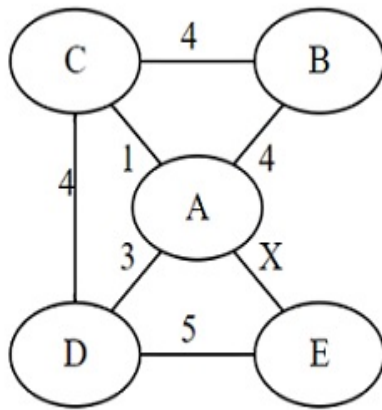
Sub-Section Number :	2
Sub-Section Id :	64065350389
Question Shuffling Allowed :	Yes

Question Number : 83 Question Id : 640653351308 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 G .



Choose a value for x that will maximize the number of minimum cost spanning trees [MCSTs] for graph G . The number of minimum cost spanning trees [MCSTs] of G for this value of x is_____.

Options :

6406531165962. ✖ 1

6406531165963. ✖ 3

6406531165964. ✔ 4

6406531165965. ✖ 5

Question Number : 84 Question Id : 640653351311 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

A Priority-Queue is implemented as a Min-Heap. Initially, the Min-Heap is $[7, 8, 11, 15, 20, 27]$.

Two new elements 9 and 5 are inserted in the given Min-Heap in that order. Min-Heap after the insertion of the elements is_____.

Options :

6406531165975. ✖ $[5, 7, 8, 9, 20, 27, 11, 15]$

6406531165976. ✔ $[5, 7, 9, 8, 20, 27, 11, 15]$

6406531165977. ✖ $[5, 7, 9, 8, 11, 20, 27, 15]$

6406531165978. ✖ $[5, 7, 8, 9, 11, 15, 20, 27]$

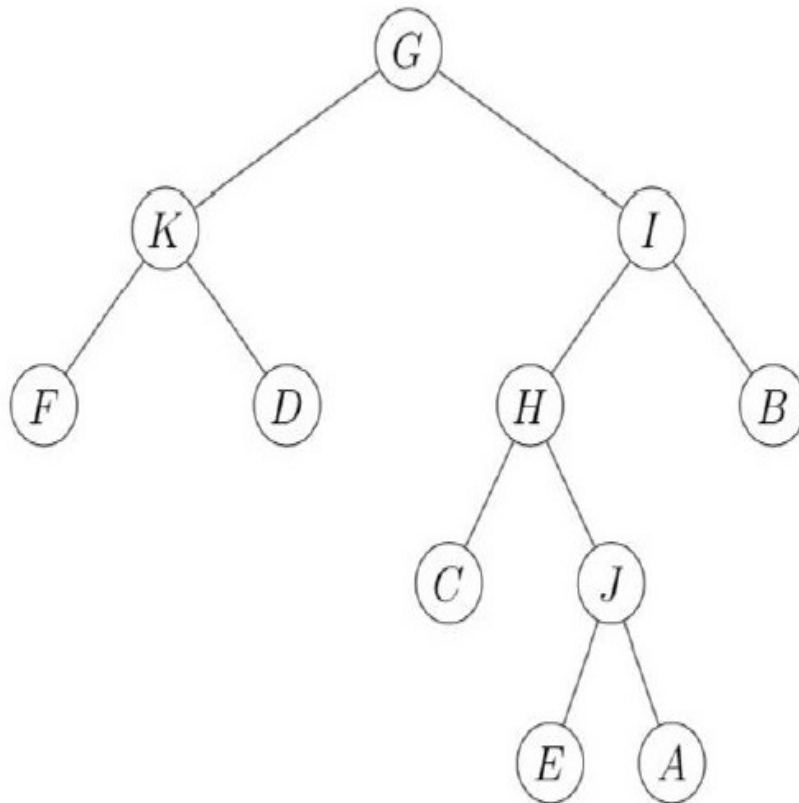
Question Number : 85 Question Id : 640653351312 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following class for tree nodes in the given tree.

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



```
1 def traversal(t):
2     if t != None:
3         traversal(t.left)
4         traversal(t.right)
5         print(t.value, end = ' ')
6 traversal(root) # 'root' is the reference of the root node of the given tree.
```

Which of the following order will be printed by the given code-snippet?

Options :

6406531165979. ✖ F D K C E J A H B I G

6406531165980. ✖ F K D G C H E J A I B

6406531165981. ✔ F D K C E A J H B I G

6406531165982. ✖ F D K C E J A H I B G

Question Number : 86 Question Id : 640653351314 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 one of the following **can not** be a possible sequence of elements in the path from the root to any leaf in a binary search tree?

Options :

6406531165984. ✖ 70, 60, 20, 50, 30, 46

6406531165985. ✔ 50, 10, 36, 40, 31, 46

6406531165986. ✖ 20, 75, 58, 30, 55, 46

6406531165987. ✖ 60, 10, 40, 50, 42, 46

Question Number : 87 Question Id : 640653351318 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

	Recurrence Relation		Complexity
A	$T(n) = 2T(n/8) + O(n)$	1	$O(\log n)$
B	$T(n) = 4T(n/4) + O(n)$	2	$O(n)$
C	$T(n) = T(n-1) + O(n)$	3	$O(n \log n)$
D	$T(n) = T(n/2) + O(1)$	4	$O(n^2)$

Select the correct match of recurrence relation with corresponding complexity.

Options :

6406531165994. ✖ A-2, B-4, C-3, D-1

6406531165995. ✔ A-2, B-3, C-4, D-1

6406531165996. ✖ A-2, B-3, C-1, D-4

6406531165997. ✖ A-3, B-2, C-4, D-1

Sub-Section Number :

3

Sub-Section Id :

64065350390

Question Shuffling Allowed :

Yes

Question Number : 88 Question Id : 640653351315 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

Which of the following is the correct length of codes for the character set $S = \{A, B, C, D, E, F\}$, generated using the Huffman algorithm for given frequencies?

Character	A	B	C	D	E	F
Frequency	13	30	6	35	2	11

Options :

6406531165988. ✖ A-3, B-3, C-5, D-1, E-5, F-4

6406531165989. ✖ A-3, B-2, C-5, D-2, E-5, F-4

6406531165990. ✖ A-3, B-3, C-5, D-2, E-5, F-4

6406531165991. ✔ A-3, B-2, C-5, D-1, E-5, F-4

Sub-Section Number :

4

Sub-Section Id :

64065350391

Question Shuffling Allowed :

Yes

Question Number : 89 Question Id : 640653351307 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Select Question

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

Options :

6406531165958. ✓ 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.

6406531165959. ✗ Given a graph where weights of all edges are unique, there is always a unique shortest path from a source to destination in such a graph.

6406531165960. ✓ Bellman-Ford and Floyd-Warshall's algorithm can calculate the shortest path correctly if the graph has negative edge weights but does not have negative weight cycles.

6406531165961. ✗ The time complexity of Floyd-Warshall is $O(V^2)$, where V is the number of vertices in the graph.

Question Number : 90 Question Id : 640653351309 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Select Question

Let $G = (V, E)$ be an undirected connected graph with more than two vertices where each edge has a distinct weight, and e is a particular edge of G . Which of the following statement(s) is/are always **true** about the minimum cost spanning trees (MCSTs) of G ?

Options :

6406531165966. ✗ If e is the lightest weight edge of some cycle in G , then MCST of G includes e

6406531165967. ✓ If e is the heaviest weight edge of some cycle in G , then MCST of G excludes e

6406531165968. ✗ If e is the heaviest weight edge in G , then MCST of G excludes e

6406531165969. ✓ If e is the lightest weight edge in G , then MCST of G includes e

Question Number : 91 Question Id : 640653351310 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Select Question

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

Options :

6406531165970. ✓ The smallest element in a max-heap is always at a leaf node

6406531165971. ✗ The smallest element in a max-heap is always at the lowest level

6406531165972. ✓ The second-largest element in a max-heap is always a child of the root node

6406531165973. ✗ Finding a minimum element in max-heap takes $O(\log n)$ time

6406531165974. ✓ Insert a new element in max-heap takes $O(\log n)$ time in worst case

Sub-Section Number : 5

Sub-Section Id : 64065350392

Question Shuffling Allowed : Yes

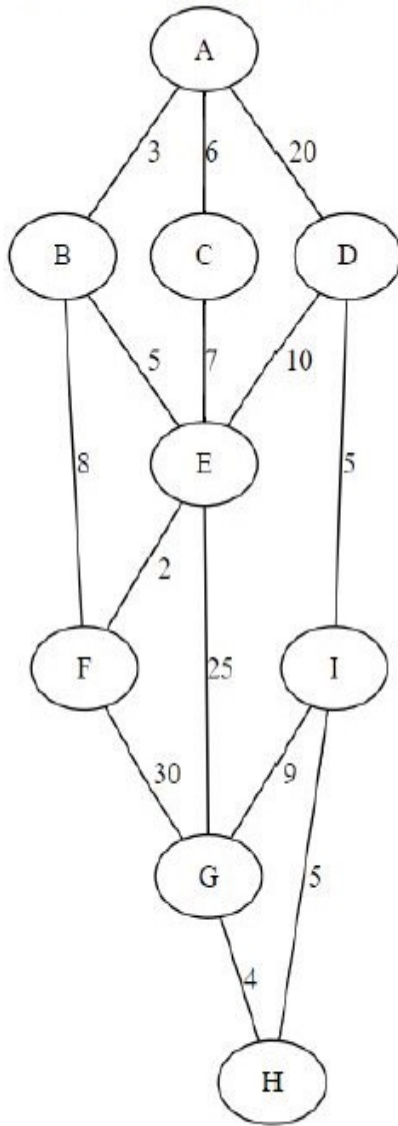
Question Number : 92 Question Id : 640653351306 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Select Question

Consider the following graph.



Apply Dijkstra's algorithm from vertex **A** in the given graph. Which of the following statement(s) is/are **true**?

Options :

6406531165954. ✓ If **A** is the 1st visited vertex, then The 5th visited marked vertex is **F**

6406531165955. ✗ The shortest path cost from **A** to **G** is 33

6406531165956. ✓ There is exactly one path with minimum cost from **A** to **F**

6406531165957. ✓ More than one path with the same minimum cost are available from **A** to **G**

Sub-Section Number :

6

Sub-Section Id :

64065350393

Question Shuffling Allowed :

Yes

Question Number : 93 Question Id : 640653351313 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

While inserting the elements 60, 20, 68, 10, 45, 50, 30, 47, and 85 in an empty binary search tree (BST) in the sequence shown, the height of the created binary search tree is_____. Assume that the height of the empty tree is 0.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

5

Question Number : 94 Question Id : 640653351316 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,, M11 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. What is the maximum number of meetings that can be held in the meeting room without conflicts?

	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11
Start	5	4	8	9	12	7	5	3	4	1	8
End	7	5	10	11	14	9	8	5	9	3	13

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Question Number : 95 Question Id : 640653351317 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 $i < j$. The total number of inversions in $L = [2, 7, 6, 1, 5]$ is_____

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

6

Sub-Section Number : 7

Sub-Section Id : 64065350394

Question Shuffling Allowed : No

Question Id : 640653351319 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Calculator : None Response Time : N.A

Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (96 to 97)

Question Label : Comprehension

Consider the following function that takes a list `L` of distinct integers and an integer `k` ($1 \leq k \leq \text{len}(L)$) as input.

```
1 #lower and upper argument represent lower index and upper index of L
  respectively
2 def mystery(L, lower, upper, k):
3     if (k > 0 and k <= upper - lower + 1):
4         pos = partition(L, lower, upper)
5         if (pos - lower == k - 1):
6             return L[pos]
7         if (pos - lower > k - 1):
8             return mystery(L, lower, pos - 1, k)
9         else:
10            return mystery(L, pos + 1, upper, k - pos + lower - 1)
```

In line 3, `partition` function treats the first element of `L` as a pivot and rearranges the list so that all elements less than or equal to the pivot are in the left part of the list, and all elements greater than the pivot are in the right part. In addition, it moves the pivot so that the pivot is the last element of the left part. The function returns the index of pivot in the list `L`.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 96 Question Id : 640653351320 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 does function `mystery` return?

Options :

6406531165998. ✖ The smallest value in `L` that is greater than `k`.

6406531165999. ✖ The largest value in `L` that is less than or equal to `k`.

6406531166000. ✖ The k^{th} largest element in `L`.

6406531166001. ✔ The k^{th} smallest element in `L`.

Question Number : 97 Question Id : 640653351321 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 $T(n)$ denote the worst-case running time for the given function `mystery`, where n is the length of `L`. The asymptotic expression for $T(n)$ is _____. Consider that the running time for `partition` function is $O(n)$.

Options :

6406531166002. ✖ $O(\log n)$

6406531166003. ✖ $O(n)$

6406531166004. ✖ $O(n \log n)$

6406531166005. ✔ $O(n^2)$

AppDev-1

Section Id :	64065322136
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