```
double c = Stream.iterate(1, n -> n+1)
        .map(n -> n * n * n)
        .dropWhile(n -> n <= 125)
        .count();
```
D. ✖

PDSA

Number of Questions : 14

Section Marks : 50

Question Number : 175 Question Type : MCQ

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 :

A. ✔ YES

B. ✖ NO

Question Number : 176 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Let *G* be a complete undirected graph on 4 vertices, having 6 edges with weights being 1, 2, 3, 4, 5,

and 6. The maximum possible weight that a minimum weight spanning tree of *G* can have is

_____.

Options :

A. � 9

B. ✗ 8

C. ✔ 7

D. ✗ 6

Question Number : 177 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

If we perform the following operations in the given order on the min-heap [2, 6, 12, 10, 8, 15, 20, 25, 18] then the resulting min-heap would be_____.

```
1   delete_min()
2   insert(5)
```

Options :

A. ✗ [5, 6, 12, 8, 18, 15, 20, 10, 20]

B. ✔ [5, 6, 12, 8, 18, 15, 20, 25, 10]

C. ✗ [5, 6, 12, 18, 8, 15, 20, 25, 10]

D. ✗ [5, 6, 12, 8, 15, 18, 20, 25, 10]

Question Number : 178 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Suppose we have a Min heap H which contains n elements and is implemented using a list. We want to update the value located at index i. What will be the complexity of the worst case of an efficient algorithm to perform this update operation?

Options :

A. ✖ $O(n \ log \ n)$

B. ✔ $O(log \ n)$

C. ✖ $O(n)$

D. ✖ $O(1)$

Question Number : 179 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

While inserting the elements 50, 80, 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 :

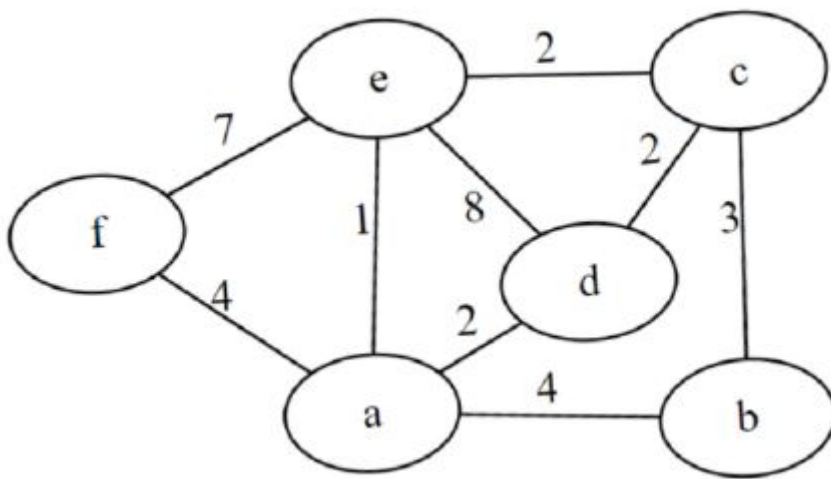A. ✖ 30, 90

B. ✖ 10, 90

C. ✔ 30, 65

D. ✖ 65, 90

Question Number : 180 Question Type : MSQ

Correct Marks : 3

Question Label : Multiple Select Question

Consider the graph shown below.

Which of the following can be the sequence of edges added, in that order, to create a minimum spanning tree using Kruskal's algorithm?

Options :

A. ✔ (a,e), (a,d), (c,d), (b,c), (a,f)

B. ✔ (a,e), (c,e), (a,d), (b,c), (a,f)

C. ✖ (a,e), (a,d), (b,c), (a,b), (a,f)

D. ✖ (a,e), (c,d), (a,d), (a,b), (a,f)

E. ✔ (a,e), (c,d), (a,d), (b,c), (a,f)

Question Number : 181 Question Type : MSQ

Correct Marks : 3

Question Label : Multiple Select Question

Which of the following is/are always **true** about the Floyd-Warshall algorithm?

Options :

A. ✔ If the shortest path entry SP[i][i] in the resultant matrix is negative, then it represents the graph has a negative weight cycle.

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

It works correctly if the graph has negative edge weights but does not have negative weight cycles.

The formula to compute the shortest path from vertex i to j in Floyd-Warshall algorithm is

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

Question Number : 182 Question Type : MSQ

Correct Marks : 3

Question Label : Multiple Select Question

Which of the following are possible **valid** codes for the character set S = {A, B, C, D, E, F}, generated using the Huffman algorithm?

Options :

Character	A	B	C	D	E	F
Huffman code	000	0010	0101	01	10	11

Character	A	B	C	D	E	F
Huffman code	000	0010	0011	01	10	11

Character	A	B	C	D	E	F
Huffman code	100	1011	1001	011	101	000

| Character	A	B	C	D	E	F
Huffman code	00	010	011	10	110	111

Question Number : 183 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

In the given graph, if we try to find the shortest path from node `a` 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?

```
1   def dijkstralist(WList,s):
2       infinity = 1 + len(WList.keys())*max([d for u in WList.keys() for (v,d)
    in WList[u]])
3       (visited,distance) = ({},{})
4       for v in WList.keys():
5           (visited[v],distance[v]) = (False,infinity)
6       distance[s] = 0
7       for u in WList.keys():
8           nextd = min([distance[v] for v in WList.keys() if not visited[v]])
9           nextvlist = [v for v in WList.keys() if (not visited[v]) and
    distance[v] == nextd]
10          if nextvlist == []:
11              break
12          nextv = min(nextvlist)
13          visited[nextv] = True
14          for (v,d) in WList[nextv]:
15              if not visited[v]:
16                  distance[v] = min(distance[v],distance[nextv]+d)
17      return(distance)
```
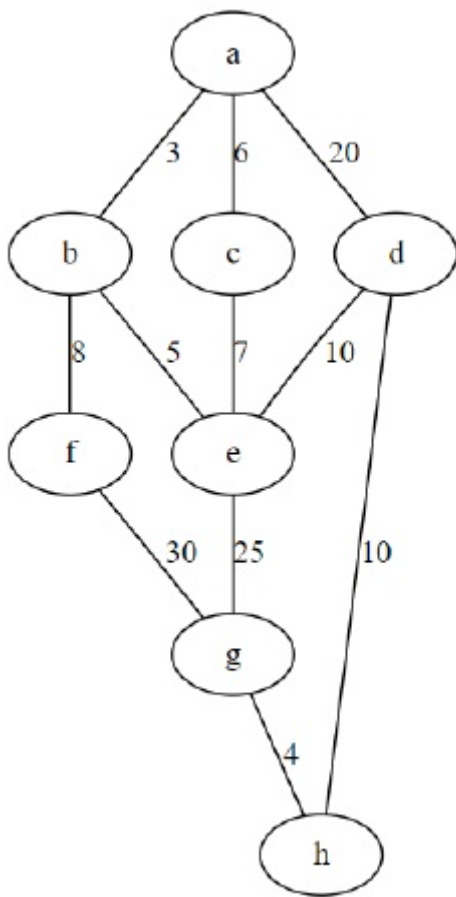
Options :

A. ✖ a b c d f e h g

B. ✖ a b c e f d g h

C. ✔ a b c e f d h g

D. ✖ a b c f e d h g

Question Number : 184 Question Type : MSQ

Correct Marks : 4

Question Label : Multiple Select Question

Which of the following is/are **true** about AVL Trees? Assume that the height of the empty tree is 0.

Options :

A. ✖

Let s(h) denote the minimum number of nodes in an AVL tree of height h then
s(h) = s(h-1) + s(h-2) - 1, where s(0) = 0 and s(1) = 1.

B. ✔ In AVL tree, the absolute difference between the height of the left subtree and the height of the right subtree of any node can't be more than 1.

C. ✔ The complexity of searching in an AVL tree is $O(\log n)$.

D. ✔ If the height of an AVL tree is h, the maximum number of nodes will be $2^h - 1$.

E. ✘ The complexity of both insertion and deletion in AVL tree is $O(n)$.

Question Number : 185 Question Type : SA

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	4	2	11	9	10	7	6	3	6	2	13
end	7	3	12	12	11	9	8	5	9	7	15

NOTE: Enter your answer to the nearest integer.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Possible Answers :

6

Question Number : 186 Question Type : SA

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 _____ .

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 :

66

Question Type : COMPREHENSION
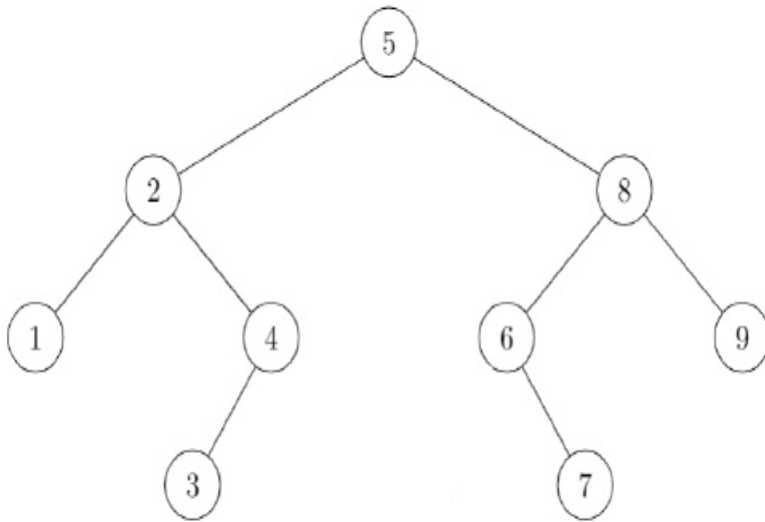
Question Numbers : (187 to 188)

Question Label : Comprehension

Consider the following class for tree nodes in the given tree and answer the subquestions.

```
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.
```

Sub questions

Question Number : 187 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

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

Options :

A. ✖ 1 3 4 2 7 6 8 9 5

B. ✖ 5 2 1 4 3 8 6 7 9

C. ✖ 1 3 4 2 5 7 6 9 8

D. ✔ 1 3 4 2 7 6 9 8 5

Question Number : 188 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Which of the following statements is

true about the complexity of the

given `traversal` function,

where `n` is the number of nodes?

Options :

A. ✖ $O(n \log n)$ whether the tree is balanced or unbalanced.

B. ✖ $O(n)$ if the tree is balanced, $O(n \log n)$ otherwise.

C. ✔ $O(n)$ whether the tree is balanced or unbalanced.

D. ✖ $O(\log n)$ if the tree is balanced, $O(n^2)$ otherwise.

Question Type : COMPREHENSION

Question Numbers : (189 to 190)

Question Label : Comprehension

Consider the following function `mystery(arr, low, high)`, where `arr` is a list of strings and `low` and `high` are the first and last index of list `arr` respectively.

```
1    def match(str1, str2):
2        result = ''
3        n1, n2 = len(str1), len(str2)
4        i, j = 0, 0
5        while i < n1 and j < n2:
6            if str1[i] != str2[j]:
7                break
8            result += str1[i]
9            i, j = i + 1, j + 1
10       return result
11
12   def mystery(arr, low, high):
13       if low == high:
14           return arr[low]
15       if high > low:
16           mid = (low + high) // 2
17           str1 = mystery(arr, low, mid)
18           str2 = mystery(arr, mid + 1, high)
19           return match(str1, str2)
```

Terminology:-

For example if string t = `abcdef`

- **Suffix** - A string `s` is a suffix of a string `t` if there exist a string `p` such that t = `ps`. (for example, `def`, `ef`)
- **Prefix** - A string `p` is a prefix of a string `t` if there exist a string `s` such that t = `ps`. (for example, `abc`, `ab`)
- **Subsequence** - A subsequence of a string is a sequence that can be derived from the given string by deleting zero or more elements without changing the order of the remaining elements. (for example, `acef`, `adf`)
- **Substring** - A substring is a contiguous sequence of characters within a string.(for example, `bcd`, `cdef`)

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 189 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

What does function `mystery` return?

Options :

A. ✖ Longest common subsequence of all strings in list `arr` .

B. ✔ Longest common prefix of all strings in list `arr` .

C. ✖ Longest common suffix of all strings in list `arr` .

D. ✖ Longest common substring of all strings in list `arr` .

Question Number : 190 Question Type : MSQ

Correct Marks : 3

Question Label : Multiple Select Question

Which of the following is/are **true** about the `mystery` function? Assume the size of the input list is n and the length of the longest string in the list is m.

Options :

A. ✖ Function `mystery` is an example of a greedy algorithm.

B. ✔ Function `mystery` is an example of a divide and conquer algorithm.

C. ✖ Time complexity for function `mystery` is $O(n + m)$

D. ✖ Time complexity for function `mystery` is $O(n \log m)$

E. ✔ Time complexity for function `mystery` is $O(nm)$

System Commands

Number of Questions :   20

Section Marks :   50

Question Number : 191 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL: SYSTEM COMMANDS"

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 :

A. ✔ YES

B. ✖ NO

Question Number : 192 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following shell commands will concatenate the two files `f1.txt` and `f2.txt` into a new file named `f3.txt`.