6406532774654. ✔ $\Pi_{Vname}(\sigma_{Location='Mumbai' \wedge Price<5000}(Parts \bowtie Vendors))$

6406532774655. ✖ $\Pi_{Vname}(\sigma_{Price<5000}(Parts)) \wedge \Pi_{Vname}(\sigma_{Location='Mumbai'}(Vendors))$

6406532774656. ✔ $\Pi_{Vname}(\sigma_{Location='Mumbai' \wedge Price<5000 \wedge Parts.Pid=Vendors.Pid}(Parts \times Vendors))$

Sub-Section Number : 9
Sub-Section Id : 640653122711
Question Shuffling Allowed : Yes

Question Number : 16 Question Id : 640653825000 Question Type : MCQ
Correct Marks : 4
Question Label : Multiple Choice Question

Consider the following table which has three attributes: X, Y and Z, where X is the primary key and Z is the foreign key referencing X.

X	Y	Z
1	1	5
2	2	5
3	1	5
4	2	4
5	2	4
6	1	1
7	4	1
8	4	7

Which of the following sets of tuples are additionally deleted when the tuple (4,2,4) is deleted and ON DELETE CASCADE construct is applied over the table?

Options :

6406532774657. ✖ (2,2,5) and (3,1,5)

6406532774658. ✖ (5,2,4), (1,1,5), (2,2,5) and (3,1,5)

6406532774659. ✖ (6,1,1),(7,4,1) and (8,4,7)

6406532774660. ✔ All the remaining rows will be deleted

PDSA

Section Id : 64065359209
Section Number : 2
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
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653122712
Question Shuffling Allowed :	No

Question Number : 17 Question Id : 640653825003 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 (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 :

6406532774669. ✔ YES

6406532774670. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	640653122713
Question Shuffling Allowed :	Yes

Question Number : 18 Question Id : 640653825004 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Suppose f, g, and h are three functions. Which of the following statement(s) is/are **true**?

1. If $f = O(g)$ and $g = O(h)$ then $f = O(h)$
2. If $f = O(h)$ and $g = O(h)$ then $f + g = O(h)$.

Options :

6406532774671. ✖ Only statement 1 is true.

6406532774672. ✖ Only statement 2 is true

6406532774673. ✔ Both Statements 1 and 2 are true

6406532774674. ✖ Both Statements 1 and 2 are false

Question Number : 19 Question Id : 640653825005 Question Type : MCQ
Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following two implementations to finding the n^{th} Fibonacci number.

Code-A

```
def fib(n):
    if n <= 1:
        return n
    else:
        return fib(n-1) + fib(n-2)
```

Code-B

```
def fib(n):
    L = [0,1]
    for i in range(2, n):
        L.append(L[-2] + L[-1])
    return L[-1]
```

Let $f(n)$ and $g(n)$ denote the asymptotic complexity of **Code-A** and **Code-B** respectively. Which of the following statements is **true**?

Options :

6406532774675. ✖ $f(n) = O(g(n))$

6406532774676. ✔ $g(n) = O(f(n))$

6406532774677. ✖ Both $f(n) = O(g(n))$ and $g(n) = O(f(n))$ are true.

6406532774678. ✖ None of these

Question Number : 20 Question Id : 640653825007 Question Type : MCQ
Correct Marks : 3

Question Label : Multiple Choice Question

You are given a non-empty list with n elements and the values are supposed to be 1 to n, in ascending order in the list. However, it is possible that one element is missing from the list between the first and last element (excluding the first and last element). For instance, a five elements list may contain `[1,3,4,5]` instead of `[1,2,3,4,5]`, here element 2 is missing from the list.

What is the time complexity of the best possible algorithm to find the missing element?

Options :

6406532774680. ✖ $O(1)$

6406532774681. ✖ $O(\sqrt{n})$

6406532774682. ✖ $O(n)$

6406532774683. ✔ $O(\log n)$

Question Number : 21 Question Id : 640653825008 Question Type : MCQ Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following Selection sort algorithm:

```
def selectionsort(L):
    n = len(L)
    if n < 1:
        return(L)
    for i in range(n):
        minpos = i
        for j in range(i+1,n):
            if L[j] < L[minpos]:
                minpos = j
        (L[i],L[minpos]) = (L[minpos],L[i])
    return(L)
```

What will be the time complexity of selection sort if the input list of `n` elements is already sorted in ascending order?

Options :

6406532774684. ✖ $O(n)$

6406532774685. ✖ $O(\log n)$

6406532774686. ✖ $O(n \log n)$

6406532774687. ✔ $O(n^2)$

Question Number : 22 Question Id : 640653825013 Question Type : MCQ
Correct Marks : 3

Question Label : Multiple Choice Question

Select the most appropriate data structure for the following operations:

Application	data structure
1. Checking if a word is palindrome	i. Queue
2. Finding order in which courses should be taken	ii. Undirected Graph
3. Social media network	iii. Stack
4. Traffic Management	iv. Directed Graphs

Options :

6406532774701. ✖ 1 - ii, 2 - iii, 3 - iv, 4 - i

6406532774702. ✔ 1 - iii, 2 - iv, 3 - ii, 4 - i

6406532774703. ✖ 1 - i, 2 - ii, 3 - iv, 4 - iii

6406532774704. ✖ 1 - iii, 2 - ii, 3 - iv, 4 - i

Question Number : 23 Question Id : 640653825017 Question Type : MCQ
Correct Marks : 3

Question Label : Multiple Choice Question

Consider a connected, directed graph G on which **DFS** is executed. Let for an edge (u, v) in G, the following are the pre and $post$ numbers used in the DFS algorithm on the graph.

$pre[u] = 3, post[u] = 6$

$pre[v] = 1, post[v] = 10$

Which of the following options is correct for edge (u, v)?

Options :

6406532774716. ✖ Edge (u, v) is a tree edge.

6406532774717. ✔ Edge (u, v) is a back edge.

6406532774718. ✖ Edge (u, v) is a cross edge.

6406532774719. ✖ Edge (u, v) is a forward edge.

Sub-Section Number : 3
Sub-Section Id : 640653122714
Question Shuffling Allowed : Yes

Question Number : 24 Question Id : 640653825006 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

The Tower of Hanoi problem discussed in the lecture is a classic puzzle with three rods and n disks of different sizes that can slide onto any rod. The puzzle starts with the disks neatly stacked in ascending order of size on one rod, with the smallest disk at the top. The objective is to move the entire stack to another rod, obeying the following rules:

1. Only one disk can be moved at a time.
2. Each move consists of taking the top disk from one stack and placing it on another stack.
3. No disk may be placed on top of a smaller disk.

Following is the recurrence of the recursive solution to find the minimum number of moves $M(n)$ for the given problem with n disk.

- $M(1) = 1$
- $M(n) = 2M(n-1) + 1$

The number of moves if $n = 6$ is__.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
63

Question Number : 25 Question Id : 640653825014 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question
An undirected connected graph *G* has **46** edges. The minimum number of vertices in G is ___.
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal

Text Areas : PlainText

Possible Answers :

11

Sub-Section Number : 4

Sub-Section Id : 640653122715

Question Shuffling Allowed : Yes

Question Number : 26 Question Id : 640653825009 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following statements is/are **true** about the **Quicksort algorithm** to sort elements in ascending order? Assume that the last element in the list is selected as a pivot for partitioning each time.

Options :

6406532774688. ✔ The best case is when the pivot element always divides the list into two equal halves.

6406532774689. ✖ The best case is when the input list is already arranged in ascending order.

6406532774690. ✖ The best case is when the input list is arranged in descending order.

6406532774691. ✔ The worst case is when the input list is arranged in either ascending or descending order.

Question Number : 27 Question Id : 640653825015 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following is/are **true** about **Breadth First Search(BFS)** in an unweighted directed graph *G*?

Options :

6406532774706. ✔ BFS can be used to compute the number of connected components in G.

6406532774707. ✖ BFS can not check if there are any cycles in G.

6406532774708. ✔ Paths computed by BFS are the shortest paths in G in terms of the number of edges.

6406532774709. ✖ If the graph is represented as an adjacency matrix, then BFS can be performed in $O(m+n)$ time, where m is the number of edges in G and n is the number of nodes in G.

6406532774710. ✔ Let T be a BFS Tree, let x and y be nodes in T belonging to layers L_i and L_j, and let (x, y) be an edge of G. Then i and j differ by at most 1.

Sub-Section Number : 5

Sub-Section Id : 640653122716

Question Shuffling Allowed : Yes

Question Number : 28 Question Id : 640653825010 Question Type : SA
Correct Marks : 4
Question Label : Short Answer Question

```
class Node:
    def __init__(self,data):
        self.data = data
        self.next = None
```

Suppose each node of the linked list is an object of class Node, `head` is the first node of the linked list and the list has the following elements initially:

`23, 21, 4, 67, 12, 6, 17, 24, 20, 33`

Consider the following function

```
def operation(head):
    ptr1 = head
    ptr2 = head
    while (ptr2.next!= None):
        ptr1 = ptr1.next
        if ptr2.next.next != None:
            ptr2 = ptr2.next.next
        else:
            ptr2 = ptr2.next
    print(ptr1.data)
```

What will be the output of the given function if it is called on the `head` node of the given linked list?

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
6

Sub-Section Number : 6
Sub-Section Id : 640653122717
Question Shuffling Allowed : Yes

Question Number : 29 Question Id : 640653825011 Question Type : MSQ
Correct Marks : 4 Max. Selectable Options : 0
Question Label : Multiple Select Question

A hash table of size 10 uses open addressing with hash function `h(k) = k mod 10`, and linear probing. After inserting six values into an empty hash table, the table is as shown below.

index	k
0	70
1	20
2	32
3	41
4	
5	
6	
7	
8	48
9	58

Which of the following option(s) give a possible order in which the key values could have been inserted in the table?

Options :

6406532774693. ✔ 70, 32, 20, 48, 41, 58

6406532774694. ✔ 32, 48, 70, 20, 58, 41

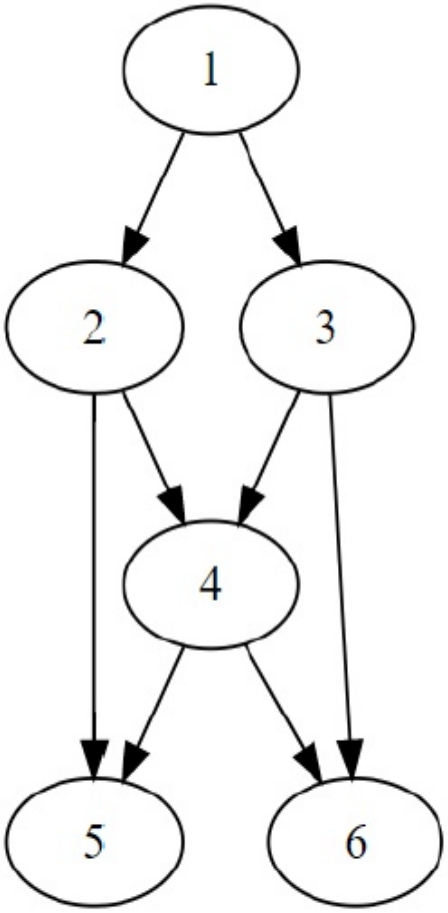
6406532774695. ✖ 48, 32, 70, 41, 20, 58

6406532774696. ✖ 70, 32, 58, 20, 41, 48

Question Number : 30 Question Id : 640653825016 Question Type : MSQ
Correct Marks : 4 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the following graph:



If we run **Depth First Search(DFS)** on the given graph starting from vertex `1`, which of the following is/are valid order(s) of visiting the nodes?

Note: *Assume that when a node has multiple neighbours, DFS can visit any vertex first.*

Options :

6406532774711. ✔ 1, 2, 4, 6, 5, 3

6406532774712. ✖ 1, 2, 5, 3, 4, 6

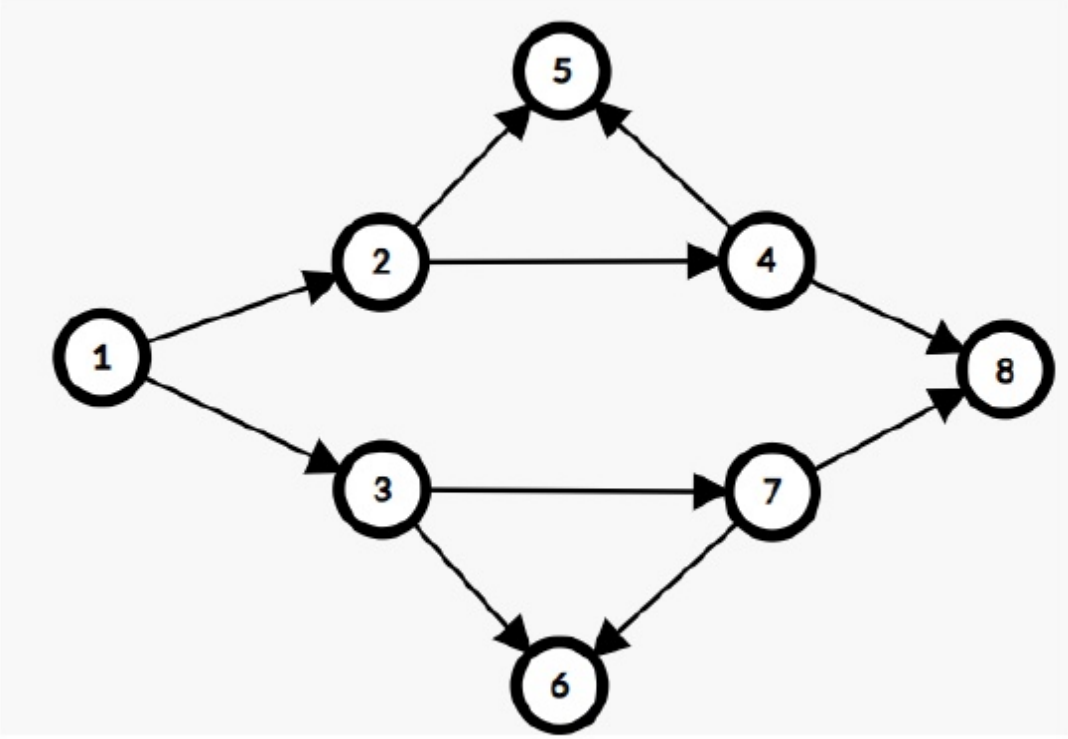
6406532774713. ✖ 1, 3, 4, 6, 2, 5

6406532774714. ✖ 1, 2, 3, 4, 5, 6

6406532774715. ✔ 1, 3, 6, 4, 5 ,2

Question Number : 31 Question Id : 640653825018 Question Type : MSQ
Correct Marks : 4 Max. Selectable Options : 0
Question Label : Multiple Select Question

Consider the following Directed Acyclic Graph(DAG).



Which of the following is/are **not** a topological ordering of the given graph G?

Options :

6406532774720. ✖ `[1,2,3,4,5,7,6,8]`

6406532774721. ✖ `[1,3,2,4,7,8,6,5]`

6406532774722. ✔ `[1,3,2,7,6,5,4,8]`

6406532774723. ✔ `[1,2,3,4,5,6,7,8]`

Sub-Section Number :	7
Sub-Section Id :	640653122718
Question Shuffling Allowed :	Yes

Question Number : 32 Question Id : 640653825012 Question Type : MCQ
Correct Marks : 4
Question Label : Multiple Choice Question

Let `S` be a stack and `Q` be a queue supporting the following operations:

Stack operation:

- `Push(d)` : Insert element `d` in stack
- `Pop()` : Remove the element from the stack and return the removed element

Queue Operation:

- `Enqueue(d)` : Insert element `d` in queue from rear
- `Dequeue()` : Remove the front element from the queue and return the removed element

Suppose the initial state of the queue `Q` is `[26, 78, 45, 10, 19, 56]` where 26 is at the front and 56 is at the rear and the stack `S` is empty initially.

```
1 S.Push(Q.Dequeue())
2 S.Push(Q.Dequeue())
3 S.Push(Q.Dequeue())
4 Q.Enqueue(S.Pop())
5 S.Push(Q.Dequeue())
6 Q.Enqueue(S.Pop())
```

After performing the given sequence of operations, what will be the front and rear elements in queue `Q`?

Options :

6406532774697. ✖ front: 10, rear: 78

6406532774698. ✖ front: 45, rear: 78

6406532774699. ✔ front: 19, rear: 10

6406532774700. ✖ front: 19, rear: 78

AppDev1

Section Id :	64065359210
Section Number :	3
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 :	No