IIT M QUIZ EXAM POD21TE3QZ1QPD

Notations :

1.Options shown in green color and with ✔ icon are correct.

2.Options shown in red color and with ✖ icon are incorrect.

Question Paper Name :	IIT M QUIZ EXAM POD21TE3QZ1QPD 10 Oct 2021
Total Marks :	250

PDSA

Number of Questions :	13
Section Marks :	50
Enable Mark as Answered Mark for Review and	Yes

Clear Response :

Question Number : 1 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 PYHTON"

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 : 2 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

All text editor offer an `Undo` feature to reverse the effects of the last change. What is a good data structure to store updates to implement `Undo` feature?

Options :

A. ✖ Array

B. ✖ List

C. ✖ Queue

D. ✔ Stack

Question Number : 3 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following functions can be used to detect a loop in a linked list, where each node of linked list is an object of class Node? In the below options, `head` is the first node in the linked list. Assume that the `flag` for every node in the linked list is set to `False` before calling `detect_loop(head)`.

```
class Node:
    def __init__(self, value):
        self.value = value
        self.next = None
        self.flag = False
```

Options :

A. ✖

```
def detect_loop(h):
    while (h == None):
        if (h.flag == True):
            return True
        h.flag = True
        h = h.next
    return False
```

B. ✖

```
def detect_loop(h):
    while (h != None):
        if (h.flag == True):
            return False
        h.flag = True
        h = h.next
    return True
```

C. ✔

```
def detect_loop(h):
    while (h != None):
        if (h.flag == True):
            return True
        h.flag = True
        h = h.next
    return False
```

D. ✖

```
def detect_loop(h):
    while (h != None):
        if (h.flag == True):
            return True
        h.flag = True
    return False
```

Question Type : COMPREHENSION

Question Numbers : (4 to 5)

Question Label : Comprehension

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

```
def mystery(L, k):
    n = len(L)
    if (k > n):
        return L[n - 1]
    v = L[0]
    LL = [ L[j] for j in range(0,n) if L[j] < v ]
    Lv = [ L[j] for j in range(0,n) if L[j] == v ]
    LR = [ L[j] for j in range(0,n) if L[j] > v ]
    if (len(LL) >= k):
        return mystery(LL, k)
    if (len(LL) + len(Lv) >= k):
        return v
    return mystery(LR, k - (len(LL) + len(Lv)))
```

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 4 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

What does `mystery(L, k)` return?

Options :

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

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

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

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

E. ✖ The number of elements in `L` less than or equal to `k`.

Question Number : 5 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Let `T(n)` denote the worst case running time of the algorithm, where `n` is the length of `L`. The asymptotic expression for `T(n)` is:

Options :

A. ✖ $O(\log n)$

B. ✖ $O(n)$

C. ✖ $O(n \log n)$

D. ✔ $O(n^2)$

Question Type : COMPREHENSION

Question Numbers : (6 to 7)

Question Label : Comprehension

A friend sent you a hundred boxes as a gift on your birthday. Following are the points to note regarding these 100 boxes:

- Only 1 box is open and remaining 99 are locked.
- There is a unique key inside the open box which will open one of the locked boxes.
- Only one locked box has the actual gift, remaining boxes contain a unique key similar to the key in the open box.
- The keys are arranged in such a way that the actual gift can be seen only after all the boxes are opened.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 6 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following strategy to open `n` boxes and collect the gift. For each key that you find, go through the remaining boxes to determine which box it will open, to extract the next key. What will be the worst case time complexity of this algorithm?

Options :

A. ✖ $O(n)$

B. ✖ $O(\log n)$

C. ✔ $O(n^2)$

D. ✖ $O(n^3)$

Question Number : 7 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Trying to unlock a box takes 10 seconds. Time spent in other activities like picking a key, collecting the gift, etc. can be ignored. What is the maximum time required (in seconds) to collect the gift?

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 :

49500

Question Number : 8 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Suppose a new generation CPU can process 10^{10} operations per second. Suppose you have to sort a list with 10^8 elements. Which of the following is true?

Options :

A. ✖ Insertion sort will always take several hours while Quicksort will always take less than 1 second.

B. ✖ Insertion sort will always take several hours while Selection sort will always take less than 1 second.

C. ✔ Insertion sort could take several hours while Merge sort will always take less than 1 second.

D. ✖ Insertion sort could take several hours while Quicksort will always take less than 1 second.

Question Number : 9 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

The aim is to sort an array in descending order. Which of the following statement is true?

Options :

A. ✖ Input in ascending order is worst case for insertion sort but not for selection sort.

B. ✖ Input in ascending order is worst case for selection sort but not for insertion sort.

C. ✖ Input in descending order is worst case for both selection sort and insertion sort.

D. ✔ Input in ascending order is worst case for both selection sort and insertion sort.

Question Type : COMPREHENSION

Question Numbers : (10 to 11)

Question Label : Comprehension

There are 11 courses offered in a program. Few courses require other courses to be completed as a prerequisite. The below table gives the prerequisite of all courses. All prerequisites of a course must be completed before opting for that course in any semester.

Course	Prerequisite
Course 1	Course 8
Course 2	Course 8
Course 3	Course 1, Course 2, Course 11
Course 4	Course 1, Course 3
Course 5	Course 9
Course 6	Course 7
Course 7	Course 4, Course 2
Course 8	None
Course 9	Course 4
Course 10	None
Course 11	Course 10

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 10 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

Consider one semester is of 6 months. If a student wishes to complete all 11 courses, what is the minimum number of `months` in which the student can do so? There is no constraint on how many courses a student can take in a semester.

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 :

36

Question Number : 11 Question Type : MSQ

Correct Marks : 3

Question Label : Multiple Select Question

Select all the possible orders of courses that can be opted by a student if he/she wishes to complete all 11 courses. Parenthesis represents all courses opted in the same semester.

Options :

A. ✖ (8, 10) -> (9, 1, 2) -> (11, 3) -> (4) -> (7, 5, 6)

B. ✖ (8) -> (1, 2) -> (3) -> (10, 4) -> (9, 7, 11) -> (5, 6)

C. ✔ (8, 10) -> (1, 2, 11) -> (3) -> (4) -> (9, 7) -> (5, 6)

D. ✔ (8) -> (10, 1, 2) -> (11) -> (3) -> (4) -> (9, 7) -> (5, 6)

Question Number : 12 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider a graph `G` with `7` vertices, where there exists a path between every pair of vertices.
Which of the following is a possible listing of the degrees of vertices in graph `G`?

Options :

A. ✖ 2, 3, 4, 1, 6, 2, 3

B. ✖ 4, 4, 4, 3, 4, 3, 3

C. ✖ 1, 2, 1, 1, 1, 2, 1

D. ✔ 1, 2, 2, 2, 2, 2, 1

Question Number : 13 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

We are given a directed graph, using an adjacency list representation. For each vertex v, we want to compute the set of incoming edges (u, v). Which of the following is the most accurate description of the complexity of this computation? (Recall that n is the number of vertices and m is the number of edges.)

Options :

A. ✖ $O(n)$

B. ✖ $O(n^2)$

C. ✔ $O(n+m)$

D. ✖ $O(nm)$

Question Number : 14 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider a list `L` of `n` sorted numbers that are circularly shifted `s` positions to the right. For example, `[46, 54, 82, 7, 13, 15, 27]` is a sorted list that has been circularly shifted `s = 3` positions, while `[27, 46, 54, 82, 7, 13, 15]` has been shifted `s = 4` positions. What will be the complexity of the most efficient algorithm to search for the smallest element in `L` for the two cases listed below?

I. Value of `s` is known.

II. Value of `s` is not known.

Options :

A. ✖ I. $O(1)$, II. $O(1)$

B. ✔ I. $O(1)$, II. $O(\log n)$

C. ✖ I. $O(\log n)$, II. $O(n)$

D. ✖ I. $O(\log n)$, II. $O(n^2)$

Question Number : 15 Question Type : MSQ

Correct Marks : 4

Question Label : Multiple Select Question

Which of the following statement(s) is/are `true` about Depth First Search (DFS) on an undirected graph?

Options :

A. ✔ DFS systematically computes reachability in graphs.

B. ✔ Complexity of DFS is $O(n^2)$ using adjacency matrix and $O(m+n)$ using adjacency list.

C. ✖ Paths discovered by DFS are shortest paths, like BFS

D. ✔ DFS can be used to check for cycles in the graph.

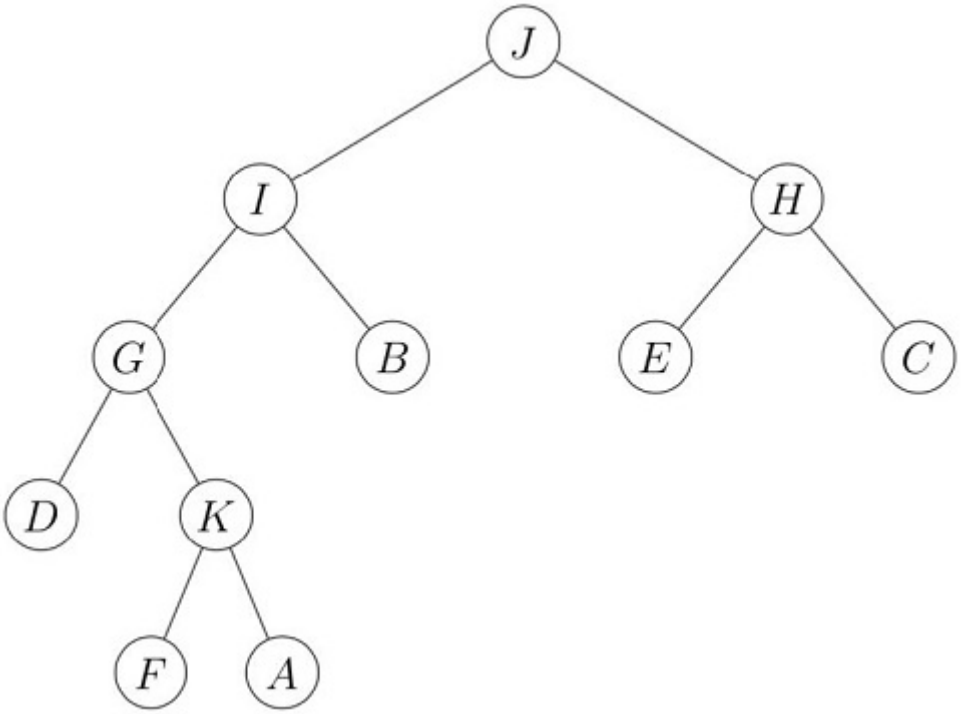
E. ✔ DFS can be used to identify connected components in an undirected graph.

Question Number : 16 Question Type : MSQ

Correct Marks : 4

Question Label : Multiple Select Question

Suppose we obtain the following BFS tree rooted at node G for an undirected graph with vertices {A, B, C, D, E, F, G, H, I, J, K}.



Which of the following cannot be an edge/edges in the original graph?

Options :

A. ✖ (C,G)

B. ✖ (B,K)

C. ✔ (B,F)

D. ✔ (A,H)

E. ✖ (E,C)

MLF

Number of Questions :	16
Section Marks :	50
Enable Mark as Answered Mark for Review and Clear Response :	Yes

Question Number : 17 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL: MACHINE LEARNING FOUNDATIONS"

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 : 18 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

A sugar patient records his daily blood glucose levels in the morning before taking a breakfast. He continues to do that for an year. The Table below shows a few samples of the data set with food items he had on the previous nights. Being a data scientist, he developed and trained a simple linear model. Eventually, he settled with the following model $f(\mathrm{x}) = 6.8x_1 + 2.4x_2 + 19.9x_3 + 2.2x_4 + 70.8$ to predict the glucose level.

Idli (x_1)	Dosa(x_2)	Ice Cream(x_3)	Slept by 11 p.m (x_4)	Level (mg/dL)
⋮	⋮	⋮	⋮	⋮
1	1	1	1 (Yes)	104.2
0	4	0.5	1 (Yes)	96.1
1	2	0	-1 (No)	81
⋮	⋮	⋮	⋮	⋮

One fine day, he had three idli, two dosa, one ice cream and continued working beyond 11 p.m. to submit the MLF assignment. On the next day, he found the actual glucose level was 118.2 mg/dL. Then he used the trained model to predict the glucose level. What would be the squared error between the model's prediction and the actual level?

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

20.0 to 21.0

Question Number : 19 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

The ML team in a movie production company wanted to predict whether a movie will be successful or not by using some classification models. Therefore, the team collected presence/absence of various factors $\mathbf{x} = [x_1, x_2, x_3]$ from both successful and unsuccessful movies in the past. The data and the corresponding label is shown in the Table below.

x	y
[0,1,1]	0
[1,0,1]	1
[1,0,0]	1
[1,1,1]	1
[1,1,0]	1

Compute the loss of the model if they use

$$u(z) = \begin{cases} 1, & \text{if } z \geq 0 \\ 0, & \text{otherwise} \end{cases}$$

and $z = x_1 - 0.8x_2 - 0.4x_3$

NOTE: Enter your answer in two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.19 to 0.21

Question Number : 20 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

The dimensionality of the data points shown in the Table is to be reduced from $\mathbb{R}^3$ to $\mathbb{R}$. To achieve it, the encoder function $f(x_1, x_2, x_3) = \frac{2x_1 - x_2 - x_3}{2}$ and the corresponding decoder function $g(u) = [u, 2u, u]$ is proposed. Compute the loss (or reconstruction error) of the proposed model.

x
[1,2,3]
[2,3,4]
[-1,0,1]
[0,1,1]

NOTE: Enter your answer to the nearest integer.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

38 to 41

Question Number : 21 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

Consider the following table that shows the data points (x) and two possible distributions $(P_1(x), P_2(x))$ which might have generated those data points.

x	$P_1(x)$	$P_2(x)$
0.2	$\frac{1}{6}$	0.5
0.4	$\frac{1}{6}$	0.2
0	$\frac{1}{6}$	0.1
-0.2	$\frac{1}{6}$	0.1
-0.4	0.332	0.05
0.1	0.001	0.05

Rahul argues that the data points are less likely generated by $P_1(x)$. Let L_1 be the loss for $P_1(x)$ and L_2 be the loss for $P_2(x)$.Verify his claim by computing the average loss for both distributions and enter the difference $L_1 - L_2$.

NOTE: Enter your answer in two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.35 to 0.40

Question Number : 22 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

The two eigenvalues of the matrix $\begin{bmatrix} 3 & 1 \\ 1 & p \end{bmatrix}$ have a ratio 2:1 for $p = 3$. What is another value of p for which eigenvalues have same ratio 2:1?

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

4.4 to 4.6

Question Number : 23 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

The first order derivative of $f(x) = \frac{e^{7x}}{\sqrt{7+x}}$ at $x = 0$ is

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

2.5 to 2.75

Question Number : 24 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Let $f(x, y, z) = 6x + 3ye^z$. Find the directional derivative of f at $(-1, -1, 0)$ in the direction of unit vector along $[2, 1, -1]^T$.

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

7.2 to 7.5

Question Number : 25 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the element $P_{1,2}$ of the projection matrix P of vector $v = \begin{bmatrix} 2 \\ 1 \\ -6 \end{bmatrix}$. (Assume matrix index starts from 1).

NOTE: Enter your answer in three decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.030 to 0.055

Question Type : COMPREHENSION

Question Numbers : (26 to 27)

Question Label : Comprehension

The linear approximation of $f(x) = 3x^2 - 9x + 7$ around $x = 0.1$ is

NOTE : If your answer is ax+b then enter your answer for a,b in the given subquestions.

Sub questions

Question Number : 26 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **a**: _____

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

-8.6 to -8.2

Question Number : 27 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **b**: _____

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

6.8 to 7.1

Question Type : COMPREHENSION

Question Numbers : (28 to 30)

Question Label : Comprehension

The linear approximation of $f(x_1, x_2) = 3x_1^2 + 4x_2^2$ around $(1, 1)$ is

NOTE : If your answer is ax_1+bx_2+c then enter your answer for a,b,c in the given subquestions.

Sub questions

Question Number : 28 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

Enter the correct answer for **a**: _____

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 :

6

Question Number : 29 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

Enter the correct answer for **b**: _____

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 :

8

Question Number : 30 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **c**: _____

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 :

-7

Question Type : COMPREHENSION

Question Numbers : (31 to 33)

Question Label : Comprehension

The second degree polynomial that best-fits the following data under the 'sum of squares' error is:

x	y
1	3
2	4
3	8

NOTE : If your answer is $y=a+bx+cx^2$ then enter your answer for a,b,c in the given subquestions.

Sub questions

Question Number : 31 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

Enter the correct answer for **a**: _____

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

4.9 to 5.1

Question Number : 32 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

Enter the correct answer for **b**: _____

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

-3.6 to -3.4

Question Number : 33 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **c**: _____

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

1.4 to 1.6

Question Type : COMPREHENSION

Question Numbers : (34 to 37)

Question Label : Comprehension

Find the projection of vector $b = \begin{bmatrix} 2 \\ 3 \\ -1 \\ 2 \end{bmatrix}$ onto vector $a = \begin{bmatrix} 1 \\ 2 \\ 1 \\ 3 \end{bmatrix}$

NOTE : If your answer is $\begin{bmatrix} a \\ b \\ c \\ d \end{bmatrix}$ then enter your answer for a,b,c,d in the given subquestions.

Sub questions

Question Number : 34 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

Enter the correct answer for **a**: _____

NOTE: Enter your answer in two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.85 to 0.89

Question Number : 35 Question Type : SA

Correct Marks : 0.5

Question Label : Short Answer Question

Enter the correct answer for **b**: _____

NOTE: Enter your answer in two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

1.71 to 1.75

Question Number : 36 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **c**: _____

NOTE: Enter your answer in two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.75 to 0.79

Question Number : 37 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **d**: _____

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

2.4 to 2.8

Question Type : COMPREHENSION

Question Numbers : (38 to 39)

Question Label : Comprehension

The best fit line using least squares method for the data set is

x	y
1	3
2	4
3	8
4	11
5	14

NOTE : If your answer is y=mx+c then enter your answer for m,c in the given subquestions.

Sub questions

Question Number : 38 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Enter the correct answer for **m**: _____

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

2.8 to 3.0

Question Number : 39 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **c**: _____

NOTE: Enter your answer in one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

-0.8 to -0.6

Question Type : COMPREHENSION

Question Numbers : (40 to 43)

Question Label : Comprehension

The eigenvalues and corresponding eigenvectors of a 2×2 matrix A are given by

Eigenvalue	Eigenvector
-1	$\begin{bmatrix} 1 \\ -1 \end{bmatrix}$
-2	$\begin{bmatrix} 1 \\ -2 \end{bmatrix}$

What will be the matrix A?

NOTE : If your answer is $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then enter your answer for a,b,c,d in the given subquestions.

Sub questions

Question Number : 40 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **a**: _____

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 :

0

Question Number : 41 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **b**: _____

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 :

1

Question Number : 42 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

Enter the correct answer for **c**: _____

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 :

-2

Question Number : 43 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Enter the correct answer for **d**: _____

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 :

-3

Question Number : 44 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

The function $f(x) = a\sin|x| + de^{|x|}$ is differentiable at $x = 0$. Which of the following options are correct?

Options :

A. ✖ $a - d = 0$

B. ✖ $a = 0$

C. ✖ $d = 0$

D. ✔ $a + d = 0$

BDM

Number of Questions :	15
Section Marks :	50
Enable Mark as Answered Mark for Review and Clear Response :	Yes

Question Number : 45 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL: BUSINESS DATA MANAGEMENT"

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 : 46 Question Type : MCQ

Correct Marks : 2.5

Question Label : Multiple Choice Question

Kumbak is hungry and has decided to eat roti at his mess. His total joy after eating the first roti is 10 utils. He is still hungry and so he eats another roti, and the total utils increases to 20. Kumbak is

still hungry and eats one more roti which takes his total utils to 27. Then, suddenly his friend Lakshman enters the mess and decides to join him. So Kumbak decides to eat three more roties making his total utils become 29, 28 and 23 respectively. Then what is the number of roties when Kumbak should have stopped eating?

Options :

A. ✖ 2

B. ✖ 3

C. ✔ 4

D. ✖ 5

Question Number : 47 Question Type : MCQ

Correct Marks : 2.5

Question Label : Multiple Choice Question

IITM-BDM's price elasticity for number of student registrations is expected to be constant at -0.9 for the next couple of years. Currently the course fee is Rs.10,000 and 1500 students have registered. If the course fee is increased to Rs. 12,000 (everything else remaining the same), how many students will register?

Options :

A. ✖ 270

B. ✖ 1770

C. ✔ 1230

D. ✖ Cannot say, insufficient data

Question Number : 48 Question Type : MCQ

Correct Marks : 2.5

Question Label : Multiple Choice Question

Which of the following statement is true?

Options :

A. ✔ Cross Price Elasticity and Income Elasticity both measure shift in demand curve

B. ✖ Cross Price Elasticity and Income Elasticity both measure movement along demand curve

C. ✖ Cross Price Elasticity measures shift in demand curve and Income Elasticity measure

movement along demand curve

D. ✖ Cross Price Elasticity measure movement along demand curve and Income Elasticity measure shift in demand curve

Question Number : 49 Question Type : MCQ

Correct Marks : 2.5

Question Label : Multiple Choice Question

Which of the following is not an objective of pricing strategies?

Options :

A. ✖ To maximize profits for the next ten years

B. ✖ To create an entry barrier to a competitor

C. ✖ To drive out the competitors from the market

D. ✖ To make a product affordable to a large mass of people

E. ✔ None of these

Question Number : 50 Question Type : MCQ

Correct Marks : 2.5

Question Label : Multiple Choice Question

Which of the following is not an example of price discrimination?

Options :

A. ✔ An airline charging Rs 350 for an aisle seat but charging Rs. 700 for a seat with extra leg space.

B. ✖ Swami could book an economy seat for Rs 7,000 while Mahesh had to pay Rs 9,000 for a similar seat on the same aircraft.

C. ✖ Srivatsa went to a cinema. At the ticket booking he could see on the price list that there are discounts for children as well as senior citizens.

D. ✖ All of these

Question Number : 51 Question Type : MCQ

Correct Marks : 2.5

Question Label : Multiple Choice Question

Match the following

A. Product A was launched in the market at a very high price. However, it was gradually reduced in a year	i) Price discrimination
B. There are two painters A and B; B is famous among the people while A is a wannabe painter. Both the painters are of equivalent quality in their paintings and are of the same painting genre. However, A's works are priced at an average of 1 lakh rupees, while B's works go for about 10 lakh rupees	ii) Value pricing
C. Mike booked his flight ticket for Aug 2021 in May for Rs. 15,000. Lin got a seat on the same flight during July for Rs 20,000.	iii) Penetration Pricing
D. XYZ company has a good customer base for its Product A in market M1. Now, XYZ wants to launch A in market M2. They set A's price to be just Rs. 100, which is the lowest in M2.	iv) Market skimming

Options :

A. ✔ A-(iv), B-(ii), C-(i) and D-(iii)

B. ✖ A-(ii), B-(iii), C-(i) and D-(iv)

C. ✖ A-(iii), B-(ii), C-(iv) and D-(i)

D. ✖ A-(i), B-(iv), C-(iii) and D-(ii)

Question Number : 52 Question Type : MCQ

Correct Marks : 2.5

Question Label : Multiple Choice Question

Which of the following is not a profitability ratio?

Options :

A. ✖ Gross profit margin

B. ✖ Net profit margin

C. ✖ Return on Capital Employed (ROCE)

D. ✔ Asset turnover

Question Number : 53 Question Type : MSQ

Correct Marks : 2.5

Question Label : Multiple Select Question

Which of the following statements are correct (choose all that are applicable)

Options :

A. ✖ In the long run, all costs are fixed

B. ✔ In the long run, all costs are variable

C. ✖ In the short run, all costs are fixed

D. ✖ In the short run, all costs are variable

E. ✖ None of these

Question Number : 54 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

Given the supply and demand data, which of the following options correctly denotes equilibrium price, price that creates surplus and price that creates shortage

Price	Supply Quantity	Demand Quantity
10	100	600
20	200	500
30	300	400
40	400	300
50	500	200
60	600	100

Options :

A. ✔ Rs. 35, Rs. 50 and Rs.20

B. ✖ Rs. 35, Rs. 20 and Rs. 50

C. ✖ Rs. 70, Rs. 35 and Rs. 20

D. ✖ Rs. 20, Rs. 50 and Rs. 35

Question Type : COMPREHENSION

Question Numbers : (55 to 56)

Question Label : Comprehension

Table below provides the average household income and monthly expenditure for upper middle-class families living in two different Indian States. Answer the subquestions, given the scenario in which an average family working in Jharkhand moves to TN. (Answer the subquestions after rounding the final calculations to two decimal places)

States	TN	Jharkhand
Average Income (Rs./ Family)	46,692	20,646
Expenditures	Average Amount Spent for Different Items (Rs./ Family)	
1. Rice, Vegetables and Fruits	5603.04	1238.76
2. Meat & Spices	5102.5	6871.32
3. Milk	1300.24	4002.12
4. Education, Clothing & Footwear	567.44	206.46
5. House Rent & EB Bills	11706.62	2064.6
6. House EMI	0	0
7. Vehicle EMI & Fuel	3193.7328	1032.3
8. Transportation	0	419.89
9. Investments & Personal Care	6592.9104	3166.4
10. Entertainment	5536.12	644.15
11. Tobacco & Alcohol	7089.40	1000

Sub questions

Question Number : 55 Question Type : MCQ

Correct Marks : 2.5

Question Label : Multiple Choice Question

For which item, did the spending relative to the income **increase** the most?

Options :

A. ✖ Rice, Vegetables and Fruits

B. ✖ Meat & Spices

C. ✖ Milk

D. ✖ Education, Clothing & Footwear

E. ✖ House rent & EB Bills

F. ✖ Home EMI

G. ✖ Vehicle EMI & fuel

H. ✖ Transportation

I. ✖ Investments & Personal Care

J. ✔ Entertainment

K. ✖ Tobacco & Alcohol

L. ✖ None of these

Question Number : 56 Question Type : MCQ

Correct Marks : 2.5

Question Label : Multiple Choice Question

For which item, did the spending relative to the income **decrease** the most?

Options :

A. ✖ Rice, Vegetables and Fruits

B. ✖ Meat & Spices

C. ✖ Milk

D. ✖ Education, Clothing & Footwear

E. ✖ House rent & EB Bills

F. ✖ Home EMI

G. ✖ Vehicle EMI & fuel

H. ✔ Transportation

I. ✖ Investments & Personal Care

J. ✖ Entertainment

K. ✖ Tobacco & Alcohol

L. ✖ None of these

Question Type : COMPREHENSION

Question Numbers : (57 to 58)

Question Label : Comprehension

The consumption basket of a person for Month-1 and Month-2 is provided in table below. Given this information, if the income for the person has changed from Rs. 10000 in Month-1 to Rs. 8000 in Month-2, then answer the given subquestions.

Item	% Of Income Spent for Item in Month-1	% Of Income Spent for Item in Month-2
A	12	10
B	8	20
C	10	8
D	32	23
E	5	2
F	13	10
G	9	13
H	11	14

Sub questions

Question Number : 57 Question Type : MSQ

Correct Marks : 2.5

Question Label : Multiple Select Question

Which of the following items are **normal** items?

Options :

A. ✔ A

B. ✖ B

C. ✔ C

D. ✔ D

E. ✔ E

F. ✖ H

Question Number : 58 Question Type : MSQ

Correct Marks : 2.5

Question Label : Multiple Select Question

Which of the following items are **inferior** items?

Options :

A. ✔ B

B. ✖ C

C. ✖ D

D. ✖ F

E. ✔ G

F. ✔ H

Question Type : COMPREHENSION

Question Numbers : (59 to 60)

Question Label : Comprehension

Given the following income statement of XYZ company, answer the given subquestions.

Revenue	100
Cost of goods sold	25
Operating expenses	20
Interest expense	10
Tax expense	30

Sub questions

Question Number : 59 Question Type : SA

Correct Marks : 2.5

Question Label : Short Answer Question

The Gross Profit Margin for XYZ is _____ (in %)

NOTE: Enter your answer to the nearest integer.

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

75

75%

Question Number : 60 Question Type : SA

Correct Marks : 2.5

Question Label : Short Answer Question

The Net Profit Margin for XYZ is _____ (in %)

NOTE: Enter your answer to the nearest integer.

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Set

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

15

15%

Question Type : COMPREHENSION

Question Numbers : (61 to 62)

Question Label : Comprehension

An entrepreneur is planning to start his business of selling shoes online. The entrepreneur made an investment of Rs. 100 to buy a computer. Next, the entrepreneur needs to create the online platform using external programmers and also needs to invest in a logistics provider for shipping the shoes. The online platform cost and logistics cost depends on the number of shoes sold online per hour, which is provided in the table below. Given this information, answer the subquestions.

Quantity of shoes to be sold (shoes/ hour)	Platform cost for that quantity (Rs.)	Logistics cost for that quantity (Rs.)
0	0	0
10	20	3
20	35	8
30	50	16
40	70	26
50	85	39
60	100	54
70	120	72
80	135	92
90	150	115
100	195	140

Sub questions

Question Number : 61 Question Type : MCQ

Correct Marks : 5

Question Label : Multiple Choice Question

What should be the target sales quantity for the entrepreneur's online platform?

Options :

A. ✔ 90 shoes/ hour

B. ✖ 40 shoes/ hour

C. ✖ 50 shoes/ hour

D. ✖ 100 shoes/ hour

E. ✖ Cannot say, insufficient information.

Question Number : 62 Question Type : MCQ

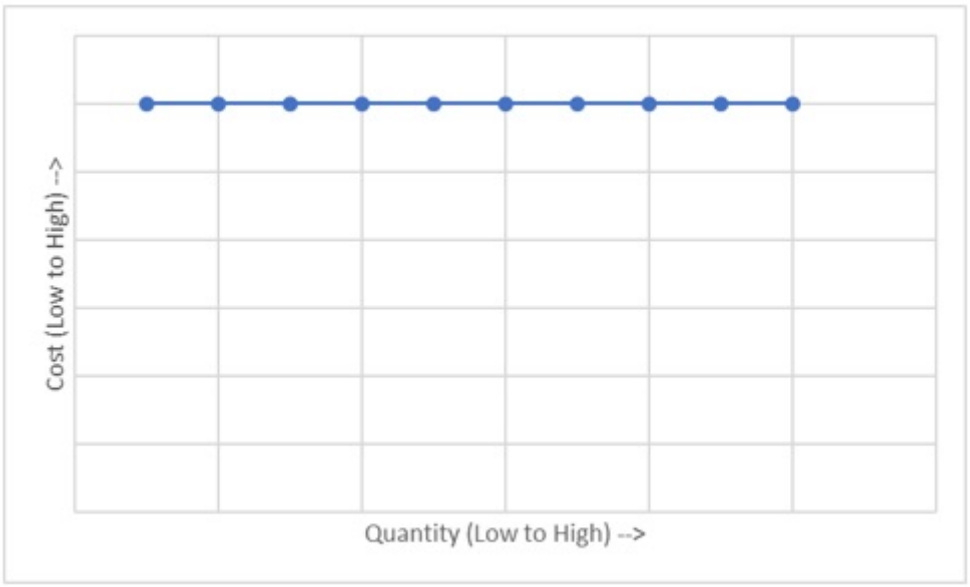
Correct Marks : 2.5

Question Label : Multiple Choice Question

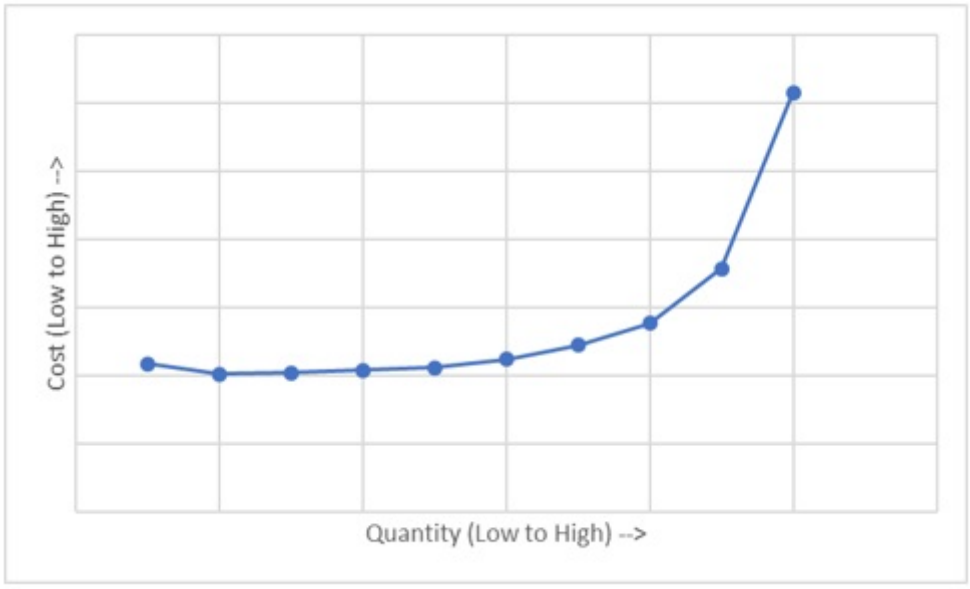
Which of the following depicts the "Average Total Cost" curve most accurately?

Options :

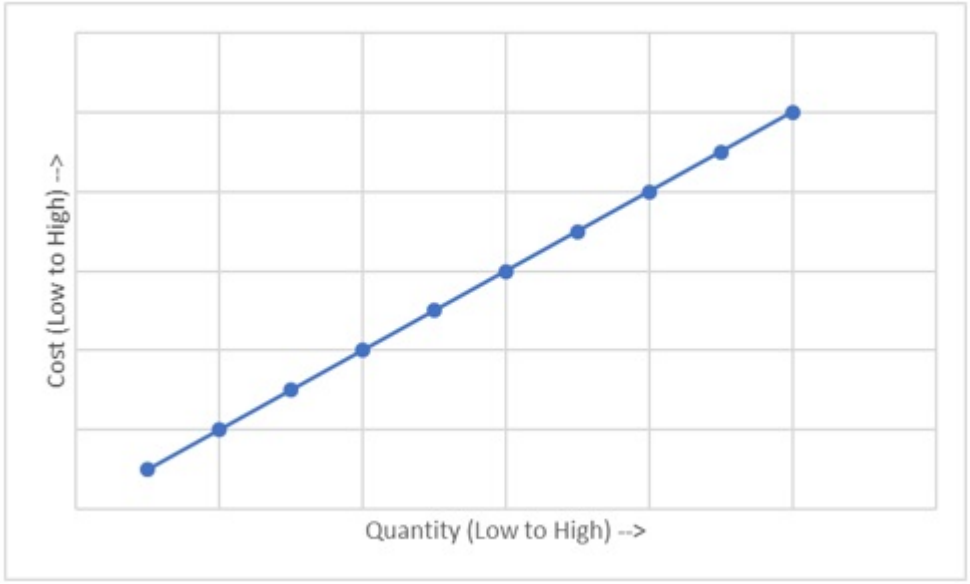
A. ✖


Cost (Low to High) -->
Quantity (Low to High) -->

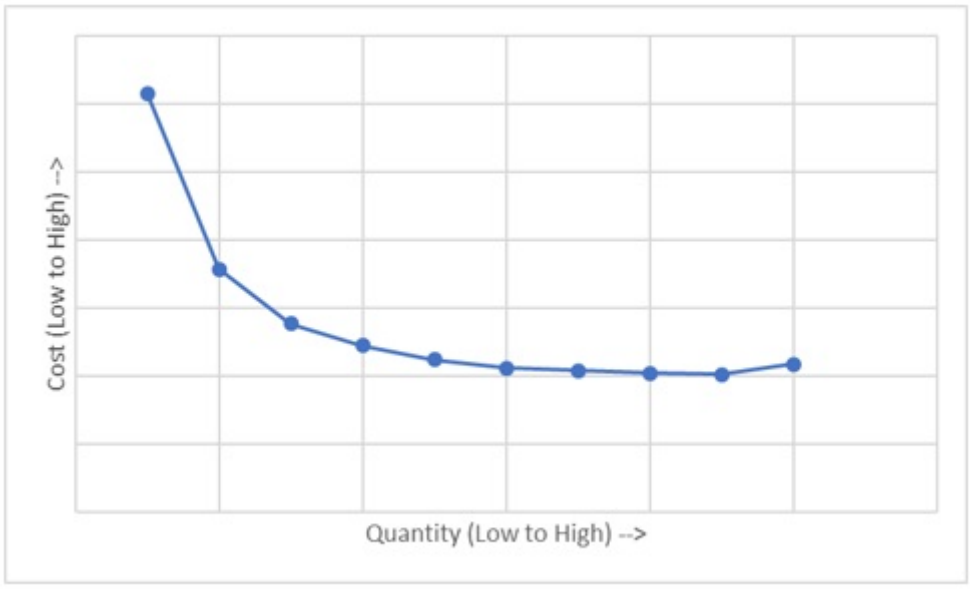
B. ✖


Cost (Low to High) -->
Quantity (Low to High) -->

C. ✖


Cost (Low to High) -->
Quantity (Low to High) -->

D. ✔



Question Number : 63 Question Type : SA

Correct Marks : 2.5

Question Label : Short Answer Question

A college wants to provide pens engraved with its logo to all students who are joining in the coming academic term. The college has two options

(a) Buying pens at Rs.10/piece from a third party or
(b) Establish a factory at Rs. 7000 to make pens at Rs. 3/piece.

What will be the maximum number of pens up to which the college would prefer to buy from the third party?

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 :

1000

DBMS

Number of Questions :	15
Section Marks :	50
Enable Mark as Answered Mark for Review and Clear Response :	Yes

Question Number : 64 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL: DATABASE MANAGEMENT SYSTEMS"

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 : 65 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

What do you mean by the *schema* of a database?

Options :

A. ✔ Definition of the structure of database and type of the attributes.

B. ✖ The tuples in a database at a given point of time.

C. ✖ The definition of the structure of the database, the type of attributes, and the tuples in a database at a given point of time.

D. ✖ None of these

Question Number : 66 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

A company *HypotheticComp* has just completed the vaccination drive for its employees. The database administrator at the systems department of *HypotheticComp* wants to change the value of attribute `vaccination_status` in Table **Employee** to *Yes* for all employees who have been vaccinated. Which among the following categories of SQL commands is used for this purpose?

Options :

A. ✖ DDL

B. ✔ DML

C. ✖ TCL

D. ✖ DCL

Question Number : 67 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider two relational schemas as follows:
employees *(emp_num, emp_name, dept_num)*
departments *(dept_num, dept_name)*

Suppose the instances (tables) for **employees** and **departments** relations have 50 tuples and 8 tuples respectively. What will be the number of tuples and the number of attributes in the table resulting from executing the following SQL statement?

```
SELECT * FROM employees, departments
```

Options :

A. ✖ number of tuples = 50, number of attributes = 4

B. ✖ number of tuples = 400, number of attributes = 4

C. ✔ number of tuples = 400, number of attributes = 5

D. ✖ number of tuples = 50, number of attributes = 5

Question Number : 68 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the relational schema given in Figure 2.

capital	country
countryID(varchar)	countryID(varchar)
capitalID(varchar)	continent(varchar)
capitalName(varchar)	countryName(varchar)

Figure 2: Country Capitals Relational Schema

What does the following query return?

```
SELECT capitalName FROM capital
WHERE countryID IN (SELECT countryID FROM country
                    WHERE continent ='Asia'
                    UNION
                    SELECT countryID FROM country
                    WHERE continent ='Europe');
```

Options :

A. ✔ Capitals of all countries that belong to either Asia or Europe.

B. ✖ Capitals of all countries that belong to both Asia and Europe.

C. ✖ Capitals of all countries that belong to Asia but not Europe.

D. ✖ Capitals of all countries that belong to neither Asia nor Europe.

Question Number : 69 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Which of the following expressions is/are true?

a. $r \cap s = \{t \mid t \in r \text{ and } t \in s\}$
b. $r \cup s = \{t \mid t \in r \text{ or } t \in s\}$
c. $r - s = \{t \mid t \in r \text{ or } t \notin s\}$
d. $r \cap s = r - (r - s)$

Options :

A. ✖ a, b & c

B. ✖ Only d

C. ✔ a, b & d

D. ✖ a and b

Question Number : 70 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Consider two relations as shown in Figure 1.

courses_2019

Code	Course
101	Data Science
102	DBMS
103	JAVA
104	Data Structure
105	Operating System

courses_2020

Code	Course
100	Math
103	JAVA
104	Data Structure
106	Machine Learning
107	Business Analytics

Figure 1: Relations **courses_2019** and **courses_2020**

Identify the correct operation which is equivalent to:
$courses\_2020 - (courses\_2020 \cap courses\_2019)$

Options :

A. ✖ $courses\_2019 - courses\_2020$

B. ✔ $courses\_2020 - courses\_2019$

C. ✖ $courses\_2020 \cap courses\_2019$

D. ✖ $courses\_2019 \div courses\_2020$

Question Number : 71 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

Let X(A, B) and Y(C, D) be two relations with instances as shown in Figure 4.

X	
A	B
4	5
5	4
6	6

Y	
C	D
4	5
6	7
6	8

Figure 4: Relations **X** and **Y**

Find the number of tuples returned by the following query:
$\Pi_A(\sigma_{B=D}(X \times Y))$

Options :

A. ✖ 0

B. ✔ 1

C. ✖ 3

D. ✖ 2

Question Number : 72 Question Type : MSQ

Correct Marks : 3

Question Label : Multiple Select Question

Consider table **Students** given in Figure 3.

Students			
Name	Age	Country	Score
Tom	13	Australia	70
Lucy	15	Scotland	95
Frank	16	Germany	76
Jane	13	Australia	49
Robert	16	Germany	93
Ryan	18	Ireland	56
Mike	13	Germany	84

Figure 3: Table **Students**

From the given options, select the SQL query(queries) that return the names and scores of students from Australia or Germany who scored less than the average score of all students.

Options :

A. ✔
```
SELECT Name, Score
FROM Students
WHERE Country IN ('Australia', 'Germany')
AND Score < (SELECT AVG(Score) FROM Students);
```

B. ✖
```
SELECT Name, Score AS S
FROM Students
WHERE (Country = 'Australia' OR Country = 'Germany')
AND S.Score < AVG(Score);
```

C. ✖
```
SELECT Name, Score
FROM Students
WHERE Country = 'Australia' OR 'Germany'
AND Score < AVG(Score);
```

D. ✔
```
SELECT Name, Score
FROM Students
WHERE (Country = 'Australia' OR Country = 'Germany')
AND Score < (SELECT AVG(Score) FROM Students);
```

Question Number : 73 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the tables given in Figure 5.

A	B	C
a1	b1	c1
a2	b2	c1
a3	b1	c3
a1	b3	c2
a2	b4	c2

Table : r

X	Y	A	C
x1	y1	a1	c1
x2	y2	a1	c2
x3	y3	a2	c2
x3	y3	a3	c2
x1	y4	a3	c3

Table : s

Figure 5: Tables r and s

Let x be the number of tuples returned by $r \bowtie s$ and y be the number of tuples returned by $\sigma_{r.A=s.A \wedge r.C=s.C}(r \times s)$. Then, what is the value of $x - y$?

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 :

0

Question Number : 74 Question Type : SA

Correct Marks : 3

Question Label : Short Answer Question

Consider the relational schema given in Figure 8.

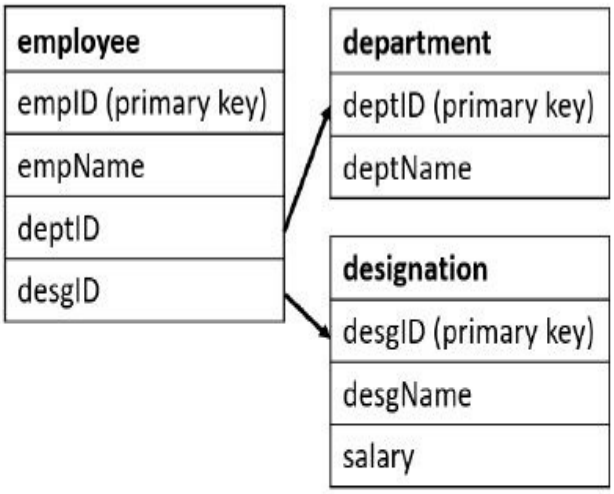


Figure 8: Employee Schema

If the relations **employee**, **designation** and **department** have 100, 6, 5 rows respectively, what is the maximum number of rows returned by the following query?

```
SELECT * FROM employee FULL OUTER JOIN designation
ON employee.desgID = department.desgID;
```

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 :

105

Question Number : 75 Question Type : MSQ

Correct Marks : 4

Question Label : Multiple Select Question

Consider the tables shown in Figure 6 and answer the question that follows.

suppliers

sup_num	sup_name
1001	Able
1002	Peter
1003	Molina
1004	Nikki

parts

part_num	sup_num	part_qty
301	1001	32
301	1004	17
301	1002	41
302	1002	11
302	1003	36
302	1001	16
303	1004	25
304	1002	35
304	1003	40

Figure 6: Table **suppliers** and table **parts**

Identify the SQL statement(s) that find(s) the different part numbers (*part_num*) supplied by the suppliers (*sup_name*) "Able" or "Molina" or both.

Options :

A. ✖
```
SELECT distinct part_num
FROM suppliers s, parts p
WHERE s.sup_num = p.sup_num
AND sup_name = 'Able' OR sup_name = 'Molina';
```

B. ✔
```
SELECT distinct part_num
FROM suppliers s, parts p
WHERE s.sup_num = p.sup_num
AND (sup_name = 'Able' OR sup_name = 'Molina');
```

C. ✔
```
SELECT part_num
FROM suppliers s, parts p
WHERE s.sup_num = p.sup_num AND sup_name = 'Able'
UNION
SELECT part_num FROM suppliers s, parts p
WHERE s.sup_num = p.sup_num AND sup_name = 'Molina';
```

D. ✖
```
SELECT distinct part_num
FROM suppliers s, parts p
WHERE s.sup_num = p.sup_num
AND sup_name = 'Able' AND sup_name = 'Molina';
```

Question Number : 76 Question Type : MSQ

Correct Marks : 4

Question Label : Multiple Select Question

Consider the relational schema given in Figure 7 and answer the question that follows.

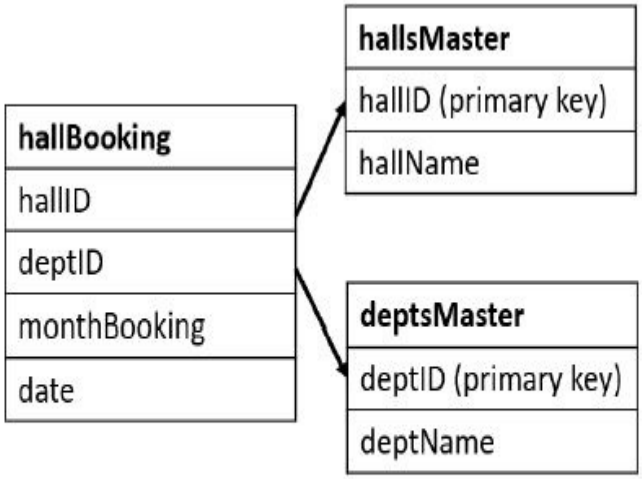


Figure 7: Hall Booking Relational Schema

Find the names of ALL halls that have been booked at least once by a department in the month of February.

Options :

A. ✖
```
SELECT hallName FROM hallsMaster
WHERE hallID NOT IN (SELECT hallID FROM hallBooking
                     WHERE monthBooking = 'Feb');
```

B. ✖
```
SELECT hallName FROM hallsMaster
WHERE hallID = (SELECT hallID FROM hallBooking
                     WHERE monthBooking = 'Feb');
```

C. ✔
```
SELECT hallName FROM hallsMaster
WHERE hallID IN (SELECT hallID FROM hallBooking
                     WHERE monthBooking = 'Feb');
```

D. ✔
```
SELECT hallName FROM hallsMaster
WHERE hallID = ANY (SELECT hallID FROM hallBooking
                     WHERE monthBooking = 'Feb');
```

Question Number : 77 Question Type : MSQ

Correct Marks : 2

Question Label : Multiple Select Question

From the given options, identify the responsibility (responsibilities) of a storage manager.

Options :

A. ✔ Interaction with the operating system file manager

B. ✖ Controlling the interaction among concurrent transactions to ensure data consistency.

C. ✔ Efficiently storing, retrieving and updating of data

D. ✖ Estimate the cost of query operations

Question Type : COMPREHENSION

Question Numbers : (78 to 79)

Question Label : Comprehension

Use the schema given below to answer the subquestions that follow.

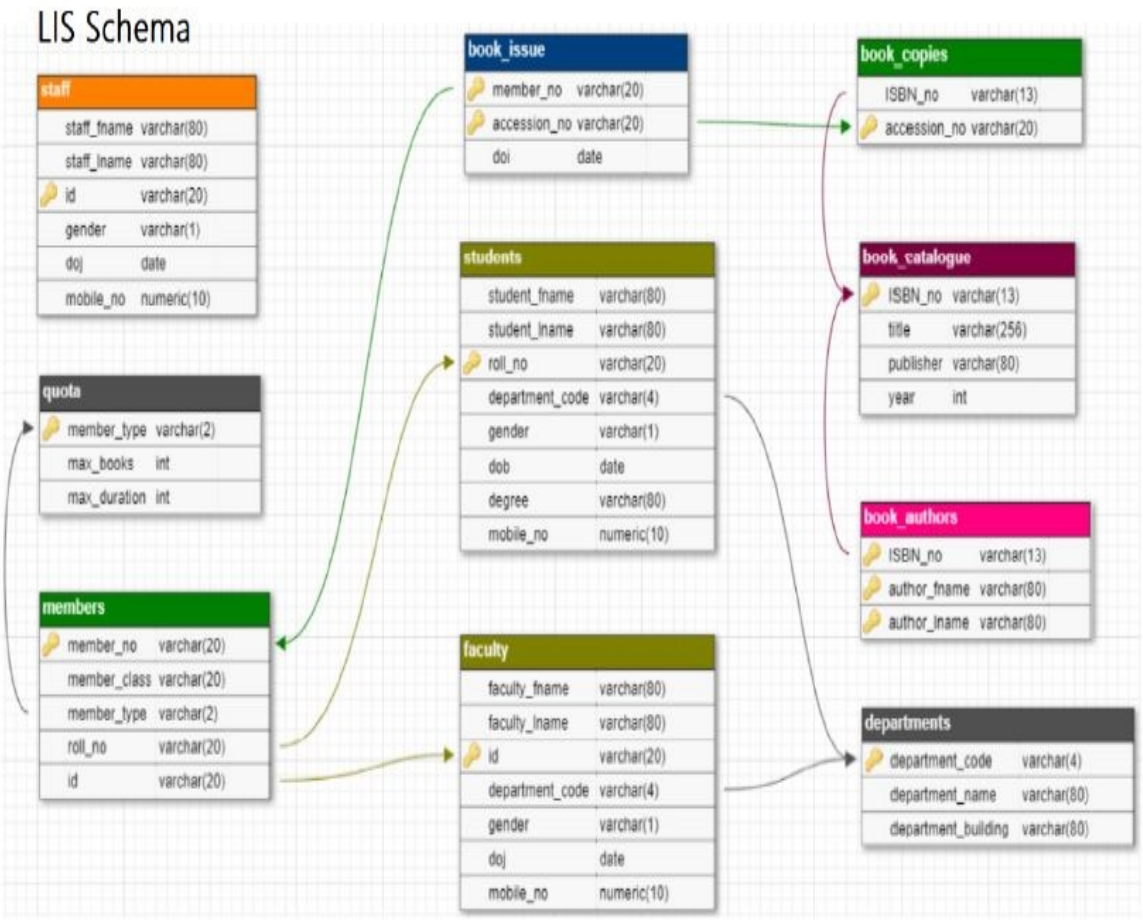


Figure 9: Library Information System

Sub questions

Question Number : 78 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

Write an SQL statement to find the membership number (distinct) of all students who belong to `CS' department.

NOTE: Your answer should not exceed 300 words.

Response Type : Alphanumeric

Evaluation Required For SA : No

Max Word Count : 300

Show Word Count : Yes

Single Line Response : No

Number of Rows : 10

Number Of Columns : 70

Text Areas : PlainText

Question Number : 79 Question Type : SA

Correct Marks : 5

Question Label : Short Answer Question

Write an SQL statement to find the first names (distinct) of faculty who have borrowed at least one book.

NOTE: Your answer should not exceed 300 words.

Response Type : Alphanumeric

Evaluation Required For SA : No

Max Word Count : 300

Show Word Count : Yes

Single Line Response : No

Number of Rows : 10

Number Of Columns : 70

Text Areas : PlainText

App Dev 1

Number of Questions :	17
Section Marks :	50
Enable Mark as Answered Mark for Review and Clear Response :	Yes

Question Number : 80 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL: MODERN APPLICATION DEVELOPMENT 1"

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 : 81 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider the server response shown below:
HTTP/2.0 200 OK
Which of the following is true?

Options :

A. ✔ HTTP/2.0 indicates the version of the protocol.

B. ✖ 200 is the port number.

C. ✖ OK is a status code.

D. ✖ None of these

Question Number : 82 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Consider the following Python code segment and select the correct output.

```
from jinja2 import Template
class Player:
    def __init__(self, name1, name2):
        self.P1 = name1
        self.P2 = name2

    def get_fName(self):
        return self.P1

    def get_sName(self):
        return self.P2

player = Player("James", "Martin")
person = Player("Michael", "Adam")

tm = Template("The captain of the team is {{ per.get_sName() }} and the
              vice-captain of the team is {{per.get_fName() }}.")
info = tm.render(per=person)
print(info)
```

Options :

A. ✖ The captain of the team is James and the vice-captain of the team is Martin.

B. ✖ The captain of the team is Michael and the vice-captain of the team is Adam.

C. ✔ The captain of the team is Adam and the vice-captain of the team is Michael.

D. ✖ The captain of the team is Martin and the vice-captain of the team is James.

Question Number : 83 Question Type : MCQ

Correct Marks : 2

Question Label : Multiple Choice Question

Which of the following statements is valid in the context of the 'foreign key'?

Options :

A. ✔ A foreign key is used to establish the relationship between data from different tables.

B. ✖ Every table must have a foreign key.

C. ✖ A foreign key can never be null.

D. ✖ A foreign key is always unique.

Question Number : 84 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

What does v stand for in the following statement?
curl -v http://127.0.0.1:8080
Note: No space or uppercase letter is allowed in the answer.

Response Type : Alphanumeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Answers Case Sensitive : No

Text Areas : PlainText

Possible Answers :

verbose

Question Number : 85 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Which of the following is/are true for a web server?

Options :

A. ✔ A web server is a program that processes and sends responses to clients requesting for web resources.

B. ✖ The web server always responds to a client request with an HTML document.

C. ✖ All the web resources hosted by a web server must be HTML files.

D. ✖ A web server can host only 2 websites.

Question Number : 86 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following HTML file.

```
<!DOCTYPE html>
<head>
     <title>Document</title>
     <style>
         div{
             position: relative;
             height: 150px;
             width: 150px;
             border: 2px solid black;
         }
         #box-1{
             z-index: 0;
             top: 50px;
             background-color: red;
         }
         #box-2{
             z-index: 1;
             top: 25px;
             background-color: blue;
           }
      </style>
</head>
<body>
     <div id="box-1"></div>
     <div id="box-2"></div>
</body>
</html>
```

How will the browser render the HTML file given above?

Options :

A. ✖ It will display only the blue square box.

B. ✔ It will display two square boxes, blue and red, with the blue box partially covering the red box.

C. ✖ It will display two square boxes, red and blue, with the red box partially covering the blue box.

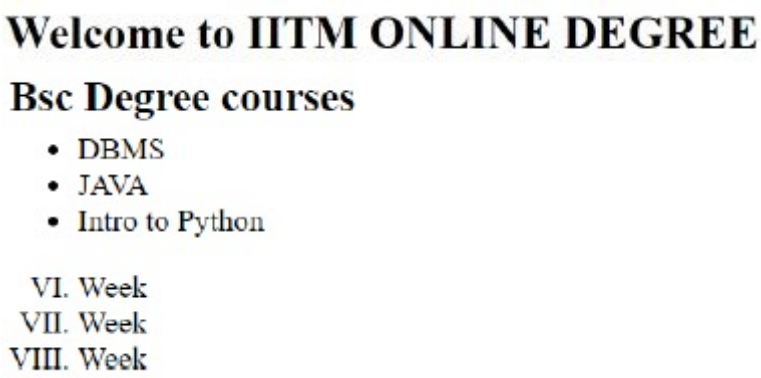
D. ✖ It will display two square boxes with no overlapping.

Question Number : 87 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Which of the following code segments will display the result given below?



Options :

A. ✖

```
<!DOCTYPE html>
<html>
<body>
<h1> Welcome to IITM ONLINE DEGREE </h1>
<h2> Bsc Degree courses</h2>

<ol>
  <li>DBMS</li>
  <li>JAVA</li>
  <li>Intro to Python</li>
</ol>
<ul type="I" start="6">
  <li>Week</li>
  <li>Week</li>
  <li>Week</li>
</ul>
</body>
</html>
```

B. ✖

```
<!DOCTYPE html>
<html>
<body>

<h1> Welcome to IITM ONLINE DEGREE </h1>
<h2> Bsc Degree courses</h2>

<ul>
  <li>DBMS</li>
  <li>JAVA</li>
  <li>Intro to Python</li>
</ul>

<ol type="I" start="6">
  <li> VI. Week</li>
  <li>VII. Week</li>
  <li>VIII. Week</li>
</ol>
</body>
</html>
```

C. ✔

```
<!DOCTYPE html>
<html>
<body>

<h1> Welcome to IITM ONLINE DEGREE </h1>
<h2> Bsc Degree courses</h2>
<ul>
  <li>DBMS</li>
  <li>JAVA</li>
  <li>Intro to Python</li>
</ul>

<ol type="I" start="6">
  <li>Week</li>
  <li>Week</li>
  <li>Week</li>
</ol>
</body>
</html>
```

D. ✖

```
<!DOCTYPE html>
<html>
<body>

<h1> Welcome to IITM ONLINE DEGREE </h1>
<h2> Bsc Degree courses</h2>

<ul>
  <li>DBMS</li>
  <li>JAVA</li>
  <li>Intro to Python</li>
</ul>

<ol>
  <li>VI. Week</li>
  <li>VII. Week</li>
  <li>VIII. Week</li>
</ol>
</body>
</html>
```

Question Number : 88 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

What will be the output of the following Python code?

```
from jinja2 import Template
num = Template("Numbers: {% for num in [0,1,2,3,4,5,6,7]
                if num%2==0 %}_{{num}},{% endfor %}")
out = num.render()
print(out)
```

Options :

A. ✖ The code will generate: SyntaxError: invalid syntax.

B. ✔ Numbers: _0,_2,_4,_6,

C. ✖ Numbers: _0_2_4_6_

D. ✖ Numbers: 1, 3, 5, 7

Question Number : 89 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

What will be the output of the following code snippet?

```
from jinja2 import Template
my_number=Template("The required numbers are:{% for num in
                    range(0,20) if num%2==1 or
                    num%3==1 %} {{num}}" "_{% endfor %}")
print(my_number.render())
```

Options :

A. ✔ The required numbers are: 1_ 3_ 4_ 5_ 7_ 9_ 10_ 11_ 13_ 15_ 16_ 17_ 19_

B. ✖ The required numbers are: 1,3,4,5,7,9,10,11,13,15,16,17,19

C. ✖ The required numbers are: 1_3_4_5_7_9_10_11_13_15_16_17_19_

D. ✖ None of these

Question Number : 90 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

A template file and a templating code are given below.

Template file: named as 'index.html'

```
<!DOCTYPE html>
<html>
  <head>
    <title>{{ data }}</title>
  </head>
  <body>
    <h1> {{ heading }} </h1>
    {{ paragraph }}
  {% for i in items %}
    {{ i | length }}
  {% endfor %}
  </body>
</html>
```

Templating code: named as 'main.py'

```
from jinja2 import Template
with open("index.html") as j:
    template = Template(j.read())
    print(template.render(
    heading="This is my first level heading",
    data = "Home Page",
    paragraph="This is the list of programming languages.",
    items= ["Python","C++", "Java"]
    ))
```

What will be the output of the above Python code?

Options :

A. ✖

```
<!DOCTYPE html>
<html>
  <head>
    <title>Home Page</title>
  </head>
  <body>
    This is the list of programming languages.
    6
    3
    4
  </body>
</html>
```

```
<!DOCTYPE html>
<html>
  <head>
    <title>Home Page</title>
  </head>
  <body>
    <h1> This is my first level heading </h1>
    This is the list of programming languages.

    Python

    C++

    Java

  </body>
</html>
```

B. ✖

```
<!DOCTYPE html>
<html>
  <head>
    <title>Home Page</title>
  </head>
  <body>
    <h1> This is my first level heading </h1>
    This is the list of programming languages.

    6

    3

    4

  </body>
</html>
```

C. ✔

D. ✖ None of these

Question Number : 91 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

What will be output of the following code?

```
from jinja2 import Template
template = """{% for num in nums%}{% if (num%2) != 0 %}{{ num }}
               {{ even }}{% else %}{{num}} {{not_even}}{% endif %}
              {% endfor %}"""

data = {
"even": "is an even number.",
"not_even": "is not an even number.",
    "nums" : [20, 21]
}

jinja_template = Template(template)
print(jinja_template.render(data))
```

Options :

A. ✖
20 is an even number.
21 is not an even number.

B. ✔
20 is not an even number.
21 is an even number.

C. ✖
20 is an even number.
21 is an even number.

D. ✖
20 is not an even number.
21 is not an even number.

Question Number : 92 Question Type : MCQ

Correct Marks : 3

Question Label : Multiple Choice Question

Consider the following code.

```
from flask import Flask
app = Flask(__name__)

@app.route("/course/<converter:variable_name>")
def app_dev(variable_name):
    return variable_name
```

Suppose the flask application is running on http://127.0.0.1:8080, and you need to decide the type of 'converter' in the app route. If the browser renders "diploma/app_dev" for the URL http://127.0.0.1:8080/course/diploma/app_dev, which one of the following is the correct converter for this purpose?

Options :

A. ✔ path

B. ✖ string

C. ✖ Both string and path

D. ✖ None of these

Question Number : 93 Question Type : MCQ

Correct Marks : 4.5

Question Label : Multiple Choice Question

Let L = {'i', 't', 'm', 'n'} be a complete character set (i.e., only these symbols need to be represented in the set). What is the minimum number of bits required to represent 'iitm' in this character set?
Note: You can create your own character encoding method, but each character should be encoded using same number of bits.

Options :

A. ✖ 12

B. ✖ 16

C. ✔ 8

D. ✖ 20

Question Number : 94 Question Type : MCQ

Correct Marks : 4.5

Question Label : Multiple Choice Question

Consider the following tables.

1) Table 1: records

record_id	matches	runs	highest_score	format	average	player_id
1	39	2679	212	test	46.19	1
2	227	9206	264	odi	48.96	1
3	92	7547	254	test	52.05	2
4	254	12169	183	odi	59.07	2
5	114	8765	278	test	50.66	3
6	228	9577	176	odi	53.55	3
7	77	7540	239	test	61.8	4
8	128	4378	164	odi	43.35	4
9	86	7311	335	test	48.1	5
10	128	5455	179	odi	45.08	5

2) Table 2: players

player_id	country	name	role
1	India	Rohit Sharma	opening_batsman
2	India	Virat Kohli	middle_order_batsman
3	South Africa	AB de Villiers	middle_order_batsman
4	Australia	Steven Smith	middle_order_batsman
5	Australia	David Warner	opening_batsman

What will be the output of the following code?

```
SELECT players.name
FROM players
INNER JOIN records ON records.player_id = players.player_id
WHERE records.matches > 50 and records.format = "test"
ORDER BY highest_score DESC
LIMIT 1;
```

Options :

A. ✖ Rohit Sharma

B. ✖ Virat Kohli

C. ✔ David Warner

D. ✖ Steven Smith

Question Number : 95 Question Type : SA

Correct Marks : 4.5

Question Label : Short Answer Question

Suppose a client machine C is communicating with a data center D located 15000 km away from C. Assume that the TCP connection has been established and is kept alive. If each new request can be sent only after receiving an acknowledgement from D for the previous request, then what is the maximum number of requests that can be sent from C to D in one second? (Assume speed of light in cable is 2e8 m/s).

NOTE: Your answer should not exceed 300 words.

Response Type : Alphanumeric

Evaluation Required For SA : No

Max Word Count : 600

Show Word Count : Yes

Single Line Response : No

Number of Rows : 10

Number Of Columns : 70

Text Areas : PlainText

Question Number : 96 Question Type : SA

Correct Marks : 4.5

Question Label : Short Answer Question

Consider the following code and determine the final value of the properties: border, color, font-weight, font-size and padding that will be applied to the p element by the browser.

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="UTF-8" />
    <title>Welcome</title>
    <style>
      .class1 {
        border: 2px solid green;
        color: blue;
        font-weight: bold;
        font-size: 2em;
      }

      .class2 {
        border: 5px solid yellow;
      }

#id1 {
  font-size: 3em;
}
p {
  font-weight: normal;
  font-size: 4em;
  padding: 20px;
}

    </style>
  </head>
  <body>
    <p class="class1 class2" id="id1" style="color: red">
      Welcome to iitm online degree programme.
    </p>
  </body>
</html>
```

NOTE: Your answer should not exceed 300 words.

Response Type : Alphanumeric

Evaluation Required For SA : No

Max Word Count : 600

Show Word Count : Yes

Single Line Response : No

Number of Rows : 10

Number Of Columns : 70

Text Areas : PlainText