

# Indian Institute of Technology, Madras - Centre for Continuing Education

## Notations :

- 1.Options shown in **green** color and with ✓ icon are correct.
- 2.Options shown in **red** color and with ✗ icon are incorrect.

<b>Question Paper Name :</b>	IIT M DIPLOMA AN EXAM QDD2 23 Feb 2025
<b>Subject Name :</b>	2025 Feb23: IIT M AN EXAM QDD2
<b>Creation Date :</b>	2025-02-07 13:40:07
<b>Duration :</b>	120
<b>Total Marks :</b>	725
<b>Display Marks:</b>	Yes
<b>Share Answer Key With Delivery Engine :</b>	Yes
<b>Actual Answer Key :</b>	Yes
<b>Calculator :</b>	Scientific
<b>Magnifying Glass Required? :</b>	No
<b>Ruler Required? :</b>	No
<b>Eraser Required? :</b>	No
<b>Scratch Pad Required? :</b>	No
<b>Rough Sketch/Notepad Required? :</b>	No
<b>Protractor Required? :</b>	No
<b>Show Watermark on Console? :</b>	Yes
<b>Highlighter :</b>	No
<b>Auto Save on Console?</b>	Yes
<b>Change Font Color :</b>	No
<b>Change Background Color :</b>	No
<b>Change Theme :</b>	No
<b>Help Button :</b>	No
<b>Show Reports :</b>	No
<b>Show Progress Bar :</b>	No

## Group I

<b>Group Number :</b>	1
<b>Group Id :</b>	64065323754
<b>Group Maximum Duration :</b>	0
<b>Group Minimum Duration :</b>	90

Show Attended Group? :	No
Edit Attended Group? :	No
Break time :	0
Group Marks :	725
Is this Group for Examiner? :	No
Examiner permission :	Cant View
Show Progress Bar? :	No
Revisit allowed for group Instructions? :	Yes
Maximum Instruction Time :	0
Minimum Instruction Time :	0
Group Time In :	Minutes
Revisit Section :	Yes
Action on Revisit Section :	View and Edit
Navigate To Group Summary From Last Question? :	No
Disable Submit Button During Assessment? :	No
Section Selection Time? :	0
No of Optional sections to be attempted :	0

## CT

Section Id :	64065379118
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	14
Number of Questions to be attempted :	14
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 :	640653168482
Question Shuffling Allowed :	No

Question Number : 1 Question Id : 6406531113688 Question Type : MCQ

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : COMPUTATIONAL THINKING (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 :**

6406533773921. ✓ YES

6406533773922. ✗ NO

**Question Number : 2 Question Id : 6406531113689 Question Type : MCQ****Correct Marks : 0**

Question Label : Multiple Choice Question

<b>Scores</b>								
SeqNo	Name	Gender	DateOfBirth	TownCity	Mathematics	Physics	Chemistry	Total
0	Bhuvanesh	M	7 Nov	Erode	68	64	78	210
29	Naveen	M	13 Oct	Vellore	72	66	81	219

<b>Words</b>			
SeqNo	Word	PartOfSpeech	LetterCount
0	It	Pronoun	2
64	cane.	Noun	4

<b>Library</b>							
SeqNo	Name	Author	Genre	Language	Pages	Publisher	Year
0	Igniting Minds	Kalam	Nonfiction	English	178	Penguin	2002
29	Malgudi Days	Narayan	Fiction	English	150	Indian Thought	1943

# Olympics

SeqNo	Name	Gender	Nationality	Host country	Year	Sport	Medal
0	Karnam Malleswari	F	Indian	Australia	2000	Weightlifting	Bronze
- - -							
49	Michael Phelps	M	American	China	2008	Swimming	Gold

## Three sample cards out of 30 for Shopping Bills dataset

Item List

SV Stores		Srivatsan			1
Item	Category	Qty	Price	Cost	
Carrots	Vegetables/Food	1.5	50	75	
Soap	Toiletries	4	32	128	
Tomatoes	Vegetables/Food	2	40	80	
Bananas	Vegetables/Food	8	8	64	
Socks	Footwear/Apparel	3	56	168	
Curd	Dairy/Food	0.5	32	16	
Milk	Dairy/Food	1.5	24	36	
					567

Sun General		Vignesh			14
Item	Category	Qty	Price	Cost	
Phone Charger	Utilities	1	230	230	
Razor Blades	Grooming	1	12	12	
Razor	Grooming	1	45	45	
Shaving Lotion	Grooming	0.8	180	144	
Earphones	Electronics	1	210	210	
Pencils	Stationery	3	5	15	
					656

Big Bazaar		Sudeep			2
Item	Category	Qty	Price	Cost	
Baked Beans	Canned/Food	1	125	125	
Chicken Wings	Meat/Food	0.5	600	300	
Cocoa powder	Canned/Food	1	160	160	
Capsicum	Vegetables/Food	0.8	180	144	
Tie	Apparel	2	390	780	
Clips	Household	0.5	32	16	
					1525

Options :

6406533773923. ✓ Useful Data has been mentioned above.

6406533773924. ✗ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number :

2

Sub-Section Id :

640653168483

Question Shuffling Allowed :

Yes

Question Number : 3 Question Id : 6406531113690 Question Type : MCQ

Correct Marks : 4

Question Label : Multiple Choice Question

The following pseudocode is executed using the "Words" dataset. What will **count** represent at the end of the execution?

```
1 count = 0
2 while(Table 1 has more rows){
3     flag1 = False, flag2 = False
4     Read the first row X in Table 1
5     if(X.PartofSpeech == "Adverb"){
6         flag1 = True
7     }
8     if(X.LetterCount <= 5){
9         flag2 = True
10    }
11    if(flag1 and flag2){
12        count = count + 1
13    }
14    Move X to Table 2
15 }
```

#### Options :

- 6406533773925. ✓ Number of words which are adverbs and have at most five letters
- 6406533773926. ✗ Number of words which are either adverbs or have at most five letters but not both
- 6406533773927. ✗ Number of words which are either adverbs or have at least five letters or both
- 6406533773928. ✗ Number of words which are adverbs and have at least five letters

**Question Number : 4 Question Id : 6406531113692 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

The following pseudocode is executed using the "**Scores**" dataset. At the end of the execution of below pseudocode, if **count2** represents the number of male students whose Chemistry marks are greater than or equal to their Mathematics marks, then select the correct code fragment for A and B.

```
1 count1 = 0
2 count2 = 0
3 while(Table 1 has more rows){
4     Read the first row X in Table 1
5     if(....A.... or ....B....){
6         count1 = count1 + 1
7     }
8     else{
9         count2 = count2 + 1
10    }
11    Move X to Table 2
12 }
```

### Options :

A: X.Gender == 'M'

6406533773933. ❌ B: X.Mathematics > X.Chemistry

A: X.Gender == 'F'

6406533773934. ❌ B: X.Mathematics < X.Chemistry

A: X.Gender == 'F'

6406533773935. ✓ B: X.Mathematics > Chemistry

A: X.Gender == 'M'

6406533773936. ❌ B: X.Mathematics < Chemistry

**Question Number : 5 Question Id : 6406531113693 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

At the end of the execution of the given procedure using the "Scores" dataset, what will A and B represent?

```
1 A = 100
2 B = 100
3 while(Table 1 has more cards){
4     Read top card X from Table 1
5     if(X.Physics <= A){
6         B = A
7         A = X.Physics
8     }
9     else{
10        if(X.Physics <= B){
11            B = X.Physics
12        }
13    }
14    Move card X to Table 2
15 }
```

**Options :**

- 6406533773937. ✗ A is the maximum Physics mark, and B is the minimum Physics mark.
- 6406533773938. ✗ A is the minimum Physics mark, and B is the maximum Physics mark.
- 6406533773939. ✗ A is the second minimum Physics mark, and B is the minimum Physics mark.
- 6406533773940. ✓ A is the minimum Physics mark, and B is the second minimum Physics mark.

**Question Number : 6 Question Id : 6406531113694 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

The following pseudocode is executed on the "Library" dataset. What is the value of **Count** after the pseudocode below is executed?

```
1 Count = 0
2 while(Table 1 has more rows){
3     Read the first row X in Table 1
4     Move X to Table 2
5     while(Table 1 has more rows){
6         Read the first row Y in Table 1
7         if	verifyPair(X, Y) {
8             Count = Count + 1
9         }
10        Move Y to Table 3
11    }
12    Move all rows from Table 3 to Table 1
13 }
14
15 Procedure verifyPair(X, Y)
16     if(X.Genre == Y.Genre and X.Language != Y.Language){
17         return True
18     }
19     else{
20         return False
21     }
22 End verifyPair
```

**Options :**

- 6406533773941. ✘ Number of book pairs that have the same Genre and Languages
- 6406533773942. ✘ Number of book pairs that have different Genres and Languages
- 6406533773943. ✓ Number of book pairs that have the same Genre but are in different languages
- 6406533773944. ✘ Number of book pairs that have different genres but are in the same language

**Question Number : 7 Question Id : 6406531113695 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

The following pseudocode is executed using the "Words" dataset. Consider that procedure **vCount** returns the number of vowels and procedure **cCount** returns the number of consonants.

```
1 count = 0
2 Q = True
3 while(Table 1 has more rows){
4     Read the first row X in Table 1
5     Move X to Table 2
6     while(Table 1 has more rows){
7         Read the first row Y in Table 1
8         Move Y to Table 3
9         if(vCount(X) != vCount(Y)){
10            Q = False
11        }
12        if(cCount(X) != cCount(Y)){
13            Q = False
14        }
15        if(Q){
16            count = count + 1
17        }
18    }
19    Move all rows of Table 3 to Table 1
20 }
```

What will **count** represent at the end of execution?

**Options :**

6406533773945. ✘ Number of pairs of words that differ in number of vowels and number of consonants

6406533773946. ✘ Number of pairs of words either having an equal number of vowels or consonants or both

6406533773947. ✓ Number of pairs of words having an equal number of vowels and consonants

6406533773948. ✘ Number of pairs of words having an equal number of vowels but not consonants

**Sub-Section Number :**

3

**Sub-Section Id :**

640653168484

**Question Shuffling Allowed :**

Yes

**Question Number : 8 Question Id : 6406531113691 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Match the following expressions in the **Column 1** with the appropriate values in **Column 2**.

Column 1	Column 2
a. $2 = 2$ or $2 > 3$	1. Invalid expression
b. $2 == 2$ and $2 > 3$	2. True
c. $2 == 2$ or $2 > 3$	3. False
d. $2 + '2'$	4. 4
e. $2 >= 2$	5. "22"

**Options :**

6406533773929. ✘ a - (2), b - (3), c - (1), d - (1), e - (2)

6406533773930. ✓ a - (1), b - (3), c - (2), d - (1), e - (2)

6406533773931. ✘ a - (2), b - (3), c - (1), d - (4), e - (2)

6406533773932. ✘ a - (1), b - (3), c - (2), d - (1), e - (1)

**Sub-Section Number :**

4

**Sub-Section Id :**

640653168485

**Question Shuffling Allowed :**

Yes

**Question Number : 9 Question Id : 6406531113696 Question Type : MSQ**

**Correct Marks : 5 Max. Selectable Options : 0**

Question Label : Multiple Select Question

The following pseudocode is executed using the "**Scores**" dataset.

```
1 A = 0, B = 0
2 while(Table 1 has more rows){
3     Read the first row X from Table 1
4     Flag = False
5     if(X.Gender == 'F' and X.Total > 250){
6         Flag = True
7     }
8     if(not Flag){
9         A = A + 1
10        if(X.Total > 250){
11            B = B + 1
12        }
13    }
14    Move X to Table 2
15 }
```

Which of the following statements is/are correct?

**Options :**

6406533773949. ❌ A represents number of male students whose total marks are at most 250.

6406533773950. ✓ B represents number of male students whose total marks are greater than 250.

6406533773951. ❌ B represents number of students whose total marks are greater than 250.

6406533773952. ❌ In line 8, if we remove **not** from **if** condition, then A represent number of male students and number of female students whose total marks are greater than 250.

## Question Number : 10 Question Id : 6406531113697 Question Type : MSQ

### Correct Marks : 5 Max. Selectable Options : 0

Question Label : Multiple Select Question

The following pseudocode is executed using the "Shopping Bills" dataset. At the end of execution, A captures the lowest price across all items purchased from "Big Bazaar". But the pseudocode may have mistakes in one or more lines. Identify all such lines (if any). Assume that all statements not listed in the options below are free of errors. It is a Multiple Select Question (MSQ).

```
1 A = 0
2 while(Pile 1 has more cards){
3     Read the top card X in Pile 1
4     if(X.shopName == "Big Bazaar"){
5         temp = findItem(X)
6         if(temp > A){
7             A = temp
8         }
9     }
10    Move X to Pile 2
11 }
12
13 Procedure findItem(Y)
14     minPrice = 0
15     while(Card Y has more items){
16         Read an item Z from ItemList of card Y
17         if(minPrice > Z.Price ){
18             minPrice = Z.Price
19         }
20         Remove Z from ItemList of card Y
21     }
22     return(minPrice)
23 End findItem
```

### Options :

6406533773953. ✓ Line 1: Incorrect initialization of A

6406533773954. ✓ Line 6: Incorrect conditional statement

6406533773955. ✓ Line 14: Incorrect initialization of minPrice

6406533773956. ❌ Line 17: Incorrect conditional statement

**Question Number : 11 Question Id : 6406531113700 Question Type : MSQ**

**Correct Marks : 5 Max. Selectable Options : 0**

**Question Label : Multiple Select Question**

The following pseudocode is executed using a dataset similar to the "Words" dataset, based on the following paragraph.

"Surrounded by nature, Susan often takes a stroll, savoring the soothing sounds of chirping birds. Rustlings in the trees suggest squirrels beginning their day, searching for sustenance. Surely, the beauty of a sunrise holds unparalleled magic."

```
1 count = 0, flag = False
2 while(Table 1 has more rows){
3     Read the first row X in Table 1
4     Move X to Table 2
5     if(1st letter of X.word == 's' and flag){
6         if(2nd letter of X.word == 'u'){
7             count = count + 1
8         }
9     }
10    if(X.word ends with full stop){
11        flag = True
12    }
13 }
```

Assume that upper case and lower case are ignored during comparison of letters.

Which of the following words will **not** be considered in the **count** at the end of execution?

**Options :**

6406533773965. ✓ surrounded

6406533773966. ✗ suggest

6406533773967. ✗ sustenance

6406533773968. ✗ surely

**Question Number : 12 Question Id : 6406531113701 Question Type : MSQ**

**Correct Marks : 5 Max. Selectable Options : 0**

**Question Label : Multiple Select Question**

The given pseudocode is executed using the "Scores" dataset. There is a hypothesis that if a student performs well overall (i.e., scores at least total 180 marks), then he/she must have performed well in all the subjects (i.e., scored at least 60 marks in each subject).

At the end of execution, **fracTrue** stores the fraction of students who satisfy this hypothesis. Choose the correct code fragment to complete the pseudocode.

```
1 countoverall = 0, countPerSub = 0
2 while(Table 1 has more rows){
3     Read the first row X in Table 1
4     if(X.Total >= 180) {
5         *****
6         * Fill the code *
7         *****
8     }
9     Move X to Table 2
10 }
11 fracTrue = countPerSub / countoverall
```

**Options :**

```
1 if(x.Physics >= 60 and x.Chemistry >= 60 and x.Mathematics >= 60){
2     countPerSub = countPerSub + 1
3     countoverall = countoverall + 1
4 }
```

6406533773969. ✘

```
1 if(x.Physics >= 60 and x.Chemistry >= 60 and x.Mathematics >= 60){
2     countPerSub = countPerSub + 1
3 }
4 countoverall = countoverall + 1
```

6406533773970. ✓

```
1 if(x.Physics >= 60 or x.Chemistry >= 60 or x.Mathematics >= 60){
2     countPerSub = countPerSub + 1
3 }
4 countoverall = countoverall + 1
```

6406533773971. ✘

```
1 if(x.Physics >= 60 and x.Chemistry >= 60 and x.Mathematics >= 60){
2     countoverall = countoverall + 1
3 }
4 countPerSub = countPerSub + 1
```

6406533773972. ✘

**Sub-Section Number :**

5

**Sub-Section Id :**

640653168486

**Question Shuffling Allowed :**

Yes

**Question Number : 13 Question Id : 6406531113698 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

**Question Label : Multiple Select Question**

The following pseudocode is executed using the "Library" dataset. Procedure **biGenre(A)** returns True if the author A has written a more number of non-fiction books than fiction books.

Choose the correct code fragment(s) to complete the pseudocode. Assume that the dataset has only two possible genres.

```
1 Procedure biGenre(A)
2     count = 0
3     while(Table 1 has more rows){
4         Read the first row X in Table 1
5         Move X to Table 2
6         *****
7         * Fill the code *
8         *****
9     }
10    if(count < 0){
11        return(True)
12    }
13    return(False)
14 End biGenre
```

**Options :**

```
1 if(X.Author == A and X.Genre == "Fiction"){
2     count = count + 1
3 }
4 else{
5     if(X.Author == A){
6         count = count - 1
7     }
8 }
```

6406533773957. ✓

```
1 if(X.Author == A and X.Genre == "Fiction"){
2     count = count + 1
3 }
4 else{
5     count = count - 1
6 }
```

6406533773958. ✗

6406533773959. ✗

```
1 if(x.Author == A){  
2     count = count + 1  
3 }  
4 if(x.Genre == "Fiction"){  
5     count = count + 1  
6 }  
7 else{  
8     count = count - 1  
9 }
```

```
1 if(x.Author == A ){  
2     if(x.Genre == "Non-Fiction"){  
3         count = count + 1  
4     }  
5     else{  
6         count = count - 1  
7     }  
8 }
```

6406533773960. ✘

**Question Number : 14 Question Id : 6406531113699 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

The following pseudocode is executed using the "Words" dataset. At the end of the execution, A is set to True if there exist a pair of words with same part of speech and same letter count. Choose the correct code fragment to complete the pseudocode.

```
1 A = False  
2 while(Table 1 has more rows){  
3     Read the first row X in Table 1  
4     Move X to Table 2  
5     while(Table 1 has more rows){  
6         Read the first row Y in Table 1  
7         *****  
8         * Fill the code *  
9         *****  
10        Move Y to Table 3  
11    }  
12    Move all rows from Table 3 to Table 1  
13 }
```

**Options :**

6406533773961. ✓

```
1 if(X.Partofspeech == Y.Partofspeech and X.LetterCount == Y.LetterCount){  
2     A = True  
3 }
```

```
1 if(X.PartofSpeech == Y.PartofSpeech or X.LetterCount == Y.LetterCount){  
2     A = True  
3 }
```

6406533773962. ✘

```
1 if(X.Partofspeech == Y.Partofspeech){  
2     if(X.LetterCount == Y.LetterCount){  
3         A = True  
4     }  
5 }  
6
```

6406533773963. ✓

```
1 if(X.Partofspeech <> Y.Partofspeech and X.LetterCount <> Y.LetterCount){  
2     A = False  
3 }  
4 else{  
5     A = True  
6 }
```

6406533773964. ✘

## Intro to Python

<b>Section Id :</b>	64065379119
<b>Section Number :</b>	2
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	15
<b>Number of Questions to be attempted :</b>	15
<b>Section Marks :</b>	45
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0

<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653168487
<b>Question Shuffling Allowed :</b>	No

**Question Number : 15 Question Id : 6406531113702 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : INTRODUCTION TO 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 :**

640653773973. ✓ YES

640653773974. ✗ NO

**Question Number : 16 Question Id : 6406531113703 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

# Useful Data

## Presentation

There are two types of blocks that you would see in all the questions:

### Code

```
for i in range(10):
    if i % 2 == 0:
        print(i)
```

### Input or Output

0  
2  
4  
6  
8

### Useful information

#### range

Sample behavior of the `range` function:

- `range(5)` corresponds to the sequence `0, 1, 2, 3, 4`
- `range(1, 5)` corresponds to the sequence `1, 2, 3, 4`
- `range(1, 1)` is the empty sequence

#### // operator

`//` is the floor division operator. `5 // 2` is `2` and *not* `2.5`

#### NAT → integer

For all NAT questions in this exam, the answer will always be an integer and not a float value. If the answer to a question is `18`, then just enter that value. Do *not* enter `18.0`

#### Options :

6406533773975. ✓ Useful Data has been mentioned above.

6406533773976. ❌ This data attachment is just for a reference & not for an evaluation.

**Sub-Section Number :**

2

**Sub-Section Id :**

640653168488

**Question Shuffling Allowed :**

Yes

**Question Number : 17 Question Id : 6406531113704 Question Type : MCQ**

**Correct Marks : 3**

### Question Label : Multiple Choice Question

What is the output of the following snippet of code?

```
L = ['Delhi', 'Mumbai', 'Chennai', 'Bengaluru']
out = []
while L != []:
    mini = len(L[0])
    city = L[0]
    for name in L:
        if len(name) < mini:
            mini = len(name)
            city = name
    out.append(city)
    # L.remove(city) removes the city from the list L
    L.remove(city)
print(out)
```

### Options :

6406533773977. ✓ ['Delhi', 'Mumbai', 'Chennai', 'Bengaluru']

6406533773978. ✗ ['Bengaluru', 'Chennai', 'Mumbai', 'Delhi']

6406533773979. ✗ ['Mumbai', 'Delhi', 'Chennai', 'Bengaluru']

6406533773980. ✗ ['Delhi', 'Chennai', 'Mumbai', 'Bengaluru']

### Question Number : 18 Question Id : 6406531113705 Question Type : MCQ

Correct Marks : 3

### Question Label : Multiple Choice Question

Write a while loop to print the first 100 powers of 3, one on each line. The  $i^{th}$  line should have the value of  $3^i$ . The output has 100 lines in total. The first five lines look like this:

```
3
9
27
81
243
```

### Options :

```
n = 1
while n < 100:
    print(3 ** n)
```

6406533773981. ✗

```
n = 1
while n < 100:
    print(3 ** n)
    n = n + 1
```

6406533773982. ✘

```
n = 1
while n <= 100:
    print(3 ** n)
    n = n + 1
```

6406533773983. ✓

```
n = 1
while n < 100:
    n = n + 1
    print(3 ** n)
```

6406533773984. ✘

**Question Number : 19 Question Id : 6406531113706 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What is the output of following snippet of code?

**Snippet-1**

```
s = 1<=2<=3
print(type(s))
```

**Options :**

```
<class 'bool'>
```

6406533773985. ✓

```
<class 'int'>
```

6406533773986. ✘

```
<class 'str'>
```

6406533773987. ✘

```
<class 'list'>
```

6406533773988. ✘

<b>Sub-Section Number :</b>	3
<b>Sub-Section Id :</b>	640653168489
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 20 Question Id : 6406531113707 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

An investor decides on an action based on the performance of a stock and the prevailing market trend. The following code accepts two string variables `stock` and `market` as inputs and prints the corresponding `action` as output.

```

1| stock = input()
2| market = input()
3|
4| if stock == 'rising':
5|     if market == 'bull':
6|         action = 'buy'
7|     else:
8|         action = 'hold'
9|
10| if stock == 'falling':
11|     action = 'sell'
12|
13| if stock == 'stable':
14|     if market == 'bull':
15|         action = 'hold'
16|     else:
17|         action = 'watch'
18|
19| print(action)

```

Which of the following statements about the code's execution are true? The options are independent of each other. That is, assume that each option corresponds to a separate execution of the code.

**Hint:** The Python interpreter processes the code from top to bottom.

**Options :**

6406533773989. ✓ If line-6 is executed, then line-8 will not be executed.

6406533773990. ✓ If line-11 is executed, then lines 14 to 17 will not be executed.

6406533773991. ✗ If line-8 is executed, the interpreter will directly jump to line-19 without even reading the remaining lines.

6406533773992. ✓ The interpreter evaluates at least three if conditions for any combinations of inputs.

**Question Number : 21 Question Id : 6406531113708 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

**Question Label : Multiple Select Question**

Select all inputs for which this code will print the value `True` to the console. The input will only contain letters.

```
word = input()
x = 0
y = 0
for char in word:
    # z is in lower case in the if-block given below
    if 'a' <= char <= 'z':
        x += 1
    # Z is in upper case in the if-block given below
    if 'A' <= char <= 'Z':
        y += 1
if x > y:
    print(True)
else:
    print(False)
```

**Options :**

6406533773993. ✓ tranquil

6406533773994. ✗ showCASE

6406533773995. ✓ caLMness

6406533773996. ✓ peaceFUL

**Sub-Section Number :**

4

**Sub-Section Id :**

640653168490

**Question Shuffling Allowed :**

Yes

**Question Number : 22 Question Id : 6406531113709 Question Type : SA**

**Correct Marks : 3**

**Question Label : Short Answer Question**

What is the output of the following snippet of code? Enter an integer as your answer.

```
str1 = "New year"
str2 = "day"
str3 = str1[:3] + " " + str2[:] #There is single space in between quote
print(len(str3))
```

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas :** PlainText

**Possible Answers :**

7

**Question Number : 23 Question Id : 6406531113710 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider the following code snippet:

```
x = 25
y = 40
if min(x, y) < 20:
    result = min(x, y)
else:
    result = x + y
print(result)
```

What will be the output of this code?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

65

**Question Number : 24 Question Id : 6406531113711 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider the following snippet of code.What will the output be?

```
val = 0
L = [9,1,5,4,2]
temp = []
for num in L:
    if num % 2 != 0:
        temp.append(num)
    else:
        val += num
print(len(temp)*val)
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

18

**Question Number : 25 Question Id : 6406531113712 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider the following snippet of code.

```
num = int(input("Enter a number"))
s_num = 1
while num != 0:
    digit = num % 10
    s_num = s_num * digit
    num //= 10
print(s_num)
```

Assume that 1234 is passed as input to the code. What will be the output?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

24

**Sub-Section Number :** 5

**Sub-Section Id :** 640653168491

**Question Shuffling Allowed :** No

**Question Id : 6406531113713 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (26 to 27)**

Question Label : Comprehension

Consider the following code block. A , B and C are Boolean variables that have already been defined.

```
if A and not (B or C):
    print(A and not C)
elif B or (A and C):
    print(B and not A)
else:
    print(not (A or B or C))
```

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 26 Question Id : 6406531113714 Question Type : MSQ**

**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following will output **True** ?

#### Options :

6406533774001. ✗ A = True, B = False, C = True

6406533774002. ✓ A = False, B = True, C = False

6406533774003. ✗ A = True, B = True, C = False

6406533774004. ✓ A = False, B = False, C = False

**Question Number : 27 Question Id : 6406531113715 Question Type : MSQ**

**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following will output **False** ?

#### Options :

6406533774005. ✓ A = False, B = False, C = True

6406533774006. ✗ A = True, B = False, C = False

6406533774007. ✓ A = True, B = True, C = True

6406533774008. ✗ A = False, B = False, C = False

**Question Id : 6406531113719 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (28 to 29)**

Question Label : Comprehension

Consider the following snippet of code.

```
a = int(input())
b = int(input())
string = 'TonyStarkIsAnIronMan'
print(string[a:b])
```

The output of this code is `Star`.

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 28 Question Id : 6406531113720 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

What is the value of  $a$ , the first input entered by the user, if it is given that the user entered a positive integer?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

4

**Question Number : 29 Question Id : 6406531113721 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

What is the value of  $b$ , the second input entered by the user, if it is given that the user entered a negative integer?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

-12

**Sub-Section Number :**

6

**Sub-Section Id :**

640653168492

**Question Shuffling Allowed :**

No

**Question Id : 6406531113716 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (30 to 31)**

Question Label : Comprehension

Consider the following snippet of code and answer the given subquestions:

```
l1 = ["a", "e", "i", "o", "u"]
l2 = ["h", "a", "p", "p", "y"]
l3 = l1
l3[0] = "A"
print(l1)
l4 = l2
l2[1] = "A"
l4[0] = "X"
print(l4)
```

**Sub questions**

**Question Number : 30 Question Id : 6406531113717 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What will be the first line of output?

**Options :**

6406533774009. ✓ ['A', 'e', 'i', 'o', 'u']

6406533774010. ✗ ['a', 'A', 'e', 'i', 'o']

6406533774011. ✗ ['X', 'a', 'p', 'p', 'y']

6406533774012. ✗ ['A']

**Question Number : 31 Question Id : 6406531113718 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What will be the second line of output?

**Options :**

6406533774013. ✗ ['A', 'e', 'i', 'o', 'u']

6406533774014. ✗ ['A', 'h', 'a', 'p', 'p', 'y']

6406533774015. ✗ ['X', 'a', 'p', 'p', 'y']

6406533774016. ✓ ['X', 'A', 'p', 'p', 'y']

**Sub-Section Number :**

7

**Sub-Section Id :**

640653168493

**Question Shuffling Allowed :**

No

**Question Id : 6406531113722 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (32 to 33)**

Question Label : Comprehension

Consider the give code and answer the given subquestions .

```
phones = {  
    1: 'iPhone', 2: 'Samsung', 3: 'OnePlus',  
    4: 'Google Pixel', 5: 'Nokia'  
}  
for key, value in sorted(phones.items()):  
    if key == 3:  
        pass  
    print(f"{key}: {value}")
```

## Sub questions

**Question Number : 32 Question Id : 6406531113723 Question Type : MCQ**

**Correct Marks : 1**

Question Label : Multiple Choice Question

What will be the output if the `pass` is replaced with `break` in the given code?

**Options :**

- 1: iPhone
- 2: Samsung

6406533774019. ✓

- 1: iPhone
- 2: Samsung
- 3: OnePlus
- 4: Google Pixel
- 5: Nokia

6406533774020. ✗

- 1: iPhone
- 2: Samsung
- 4: Google Pixel
- 5: Nokia

6406533774021. ✗

6406533774022. ✗ No output

**Question Number : 33 Question Id : 6406531113724 Question Type : MCQ**

**Correct Marks : 1**

**Question Label : Multiple Choice Question**

What will be the output if the `pass` is replaced  
with `continue` in the given code?

**Options :**

- 1: iPhone
- 2: Samsung
- 3: OnePlus
- 4: Google Pixel
- 5: Nokia

6406533774023. ❌

- 1: iPhone
- 2: Samsung
- 4: Google Pixel
- 5: Nokia

6406533774024. ✓

- 1: iPhone
- 2: Samsung

6406533774025. ❌

6406533774026. ❌ No output

## DBMS

<b>Section Id :</b>	64065379120
<b>Section Number :</b>	3
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	14
<b>Number of Questions to be attempted :</b>	14
<b>Section Marks :</b>	50
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0

<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653168494
<b>Question Shuffling Allowed :</b>	No

**Question Number : 34 Question Id : 6406531113725 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

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

6406533774027. ✓ YES

6406533774028. ✗ NO

<b>Sub-Section Number :</b>	2
<b>Sub-Section Id :</b>	640653168495
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 35 Question Id : 6406531113726 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which level of abstraction is responsible for providing data security by limiting access to specific data views?

**Options :**

6406533774029. ✗ Physical level

6406533774030. ✗ Logical level

6406533774031. ✓ View level

6406533774032. ✗ Physical level and Logical level

<b>Sub-Section Number :</b>	3
<b>Sub-Section Id :</b>	640653168496
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 36 Question Id : 6406531113731 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the relation student shown in Table 5.

roll_no	name	house_name
1	John	Nilgiri
2	Ramesh	Nilgiri
3	Dilip	Arawali
4	Suresh	Shiwalik
5	Kiran	Udaygiri
6	Vijay	Nilgiri

Table 5: Relation student

Which of the following SQL command is used to provide INSERT authorization of the table **student** to **instructor**.

**Options :**

CREATE ROLE instructor;

6406533774049. ✘ GRANT INSERT ON instructor TO student;

CREATE ROLE instructor;

6406533774050. ✘ GRANT student INSERT TO instructor;

CREATE ROLE instructor;

6406533774051. ✘ GRANT ROLE INSERT ON student TO instructor;

CREATE ROLE instructor;

6406533774052. ✓ GRANT INSERT ON student TO instructor;

**Sub-Section Number :**

4

**Sub-Section Id :**

640653168497

**Question Shuffling Allowed :**

Yes

**Question Number : 37 Question Id : 6406531113727 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the tables **Products** and **Suppliers** given below:

P_ID	P_Name	S_ID
1	Laptop	3
2	Smartphone	2
3	Tablet	3
4	Headphones	1

Table 1: Products

S_ID	S_Name
1	Sony
2	Samsung
3	Apple

Table 2: Supplier

Now consider the SQL query given below:

```
Select *  
From Products P, Supplier S  
Where P.P_ID<>S.S_ID
```

How many attributes and rows will be present in the resultant output table?

**Options :**

6406533774033. ❌ 4 attributes and 9 rows

6406533774034. ❌ 5 attributes and 8 rows

6406533774035. ❌ 4 attributes and 8 rows

6406533774036. ✓ 5 attributes and 9 rows

**Question Number : 38 Question Id : 6406531113728 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider a relational database for Formula One Racing containing the following tables.

D_ID	D_Name	T_ID	Points	Podium
1	Carlos Sainz	101	92	P1
2	Charles Leclerc	102	56	P2
3	Lando Norris	101	90	P3
4	George Russell	103	71	P4
5	Lewis Hamilton	102	95	P5
6	Max Verstappen	103	64	P1
7	Ayrton Senna	101	100	P4
8	Michael Schumacher	103	72	P2
9	Kimi Raikkonen	102	91	P5

Table 3: Drivers

T_ID	T_Name	Country
101	Scuderia Ferrari	Italy
102	Mercedes AMG	Germany
103	McLaren	UK

Table 4: Teams

Now consider the following query:

```
Select T.T_ID, T.T_Name  
From Drivers D, Teams T  
Where D.T_ID=T.T_ID and  
Points > (Select avg (Points)  
          From Drivers  
          Where Podium='P1') ;
```

The number of rows returned by the above SQL query is:

**Options :**

6406533774037. ✘ 4

6406533774038. ✓ 5

6406533774039. ✘ 9

6406533774040. ✘ 7

**Question Number : 39 Question Id : 6406531113729 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the following relations:

auto\_part(pid, pname, color)

auto\_suppliers(sid, sname, location)

catalog(pid, sid, price)

Consider the TRC expression:

$\{x \mid \exists s \in \text{auto\_suppliers} \exists c \in \text{catalog} \exists p \in \text{auto\_part}(s.\text{location} = \text{'Mumbai'} \wedge$

$c.\text{price} = 5000 \wedge x.\text{sid} = c.\text{sid} \wedge x.\text{pname} = p.\text{pname} \wedge s.\text{sid} = c.\text{sid} \wedge p.\text{pid} = c.\text{pid})\}$

Choose the correct DRC expression equivalent to the TRC expression shown above.

**Options :**

6406533774041. ✓  $\{< p, n > \mid \exists m, n, o (< m, n, o > \in \text{auto\_parts}) \wedge \exists p, q, r (< p, q, r > \in \text{auto\_suppliers} \wedge$

$r = \text{'Mumbai'}') \wedge \exists a, b, c (< a, b, c > \in \text{catalog} \wedge c = 5000 \wedge m = a \wedge p = b)\}$

6406533774042. ✗  $\{< q, n > \mid \exists m, n, o (< m, n, o > \in \text{auto\_parts}) \wedge \exists p, q, r (< p, q, r > \in \text{auto\_suppliers} \wedge$

$r = \text{'Mumbai'}') \wedge \exists a, b, c (< a, b, c > \in \text{catalog} \wedge c = 5000 \wedge m = a \wedge p = b)\}$

6406533774043. ✗  $\{< p, n > \mid \exists m, n, o (< m, n, o > \in \text{auto\_parts}) \wedge \exists p, q, r (< p, q, r > \in \text{auto\_suppliers} \wedge$

$r = \text{'Mumbai'}') \wedge \exists a, b, c (< a, b, c > \in \text{catalog} \wedge c = 5000)\}$

6406533774044. ✗  $\{< q, n > \mid \exists m, n, o (< m, n, o > \in \text{auto\_parts}) \wedge \exists p, q, r (< p, q, r > \in \text{auto\_suppliers} \wedge$

$r = \text{'Mumbai'}') \wedge \exists a, b, c (< a, b, c > \in \text{catalog} \wedge c = 5000)\}$

**Question Number : 40 Question Id : 6406531113730 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the relational schemas given below.

customer(c\_id, c\_name, contact\_no, address)

product(p\_id, p\_name, product\_type, price)

order(o\_id, c\_id, p\_id, date)

Table order having two foreign keys c\_id and p\_id.

Identify the appropriate “CREATE TABLE” statement for table order.

**Options :**

CREATE TABLE order(

```
    varchar(10) o_id primary key,
    varchar(10) c_id,
    varchar(10) p_id,
    DATE date,
    FOREIGN KEY(c_id) REFERENCES customer,
    FOREIGN KEY(p_id) REFERENCES product)
```

6406533774045. ✗

```
CREATE TABLE order(
    o_id varchar(10) primary key,
    c_id varchar(10),
    p_id varchar(10),
    date DATE,
    FOREIGN KEY(p_id) REFERENCES customer,
    FOREIGN KEY(c_id) REFERENCES product)
```

6406533774046. ❌

```
CREATE TABLE order(
    o_id varchar(10),
    c_id varchar(10) primary key,
    p_id varchar(10),
    date DATE,
    FOREIGN KEY(c_id) REFERENCES customer,
    FOREIGN KEY(p_id) REFERENCES product)
```

6406533774047. ❌

```
CREATE TABLE order(
    o_id varchar(10) primary key,
    c_id varchar(10),
    p_id varchar(10),
    date DATE,
    FOREIGN KEY(c_id) REFERENCES customer,
    FOREIGN KEY(p_id) REFERENCES product)
```

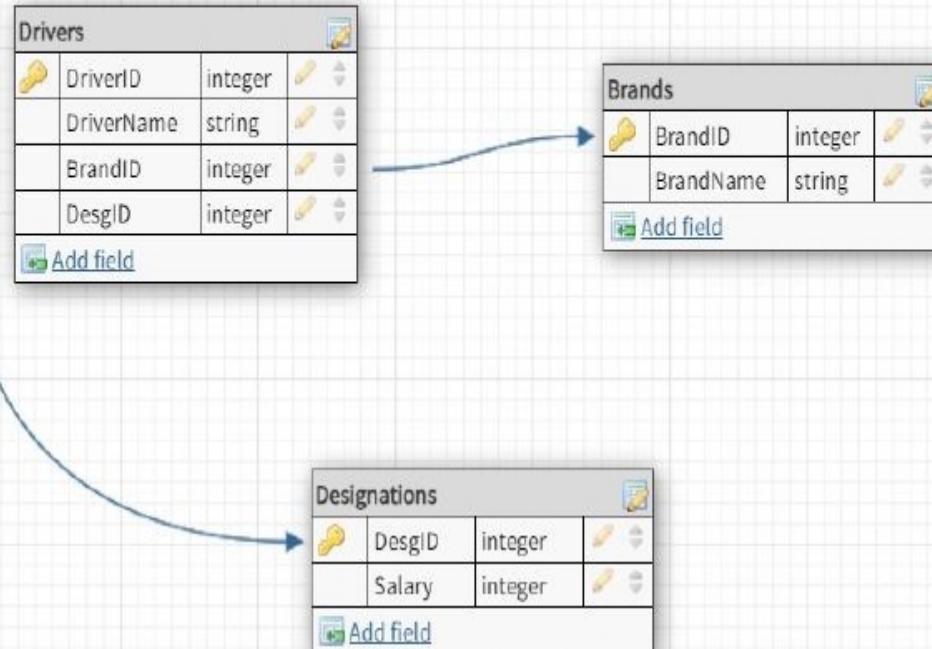
6406533774048. ✓

**Question Number : 41 Question Id : 6406531113732 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the relational schema given below:



What will be the result of the following query?

```
SELECT D.DriverName FROM Drivers D NATURAL JOIN Designations T
WHERE T.Salary > ALL (SELECT salary
FROM Designations T, Brands B, Drivers D
WHERE T.DesgID = D.DesgID AND B.BrandID = D.BrandID
AND B.BrandName = 'Mercedes')
EXCEPT
SELECT DriverName FROM Drivers D NATURAL JOIN Designations T
WHERE T.Salary < ALL (SELECT salary
FROM Designations T, Brands B, Drivers D
WHERE T.DesgID = D.DesgID AND B.BrandID = D.BrandID
AND B.BrandName = 'Ferrari')
```

**Options :**

6406533774053. ✓ Names of all the drivers whose salary is greater than all Mercedes drivers but not less than all Ferrari drivers

6406533774054. ✗ Names of all the drivers whose salary is less than all Mercedes drivers but not greater than all Ferrari drivers

6406533774055. ✗ Names of all the drivers whose salary is greater than all Mercedes drivers as well as all Ferrari drivers

6406533774056. ✗ Names of all the drivers whose salary is less than all Mercedes drivers as well as all Ferrari drivers

**Sub-Section Number :**

5

**Sub-Section Id :**

640653168498

**Question Shuffling Allowed :**

Yes

**Question Number : 42 Question Id : 6406531113733 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the following relations:

$\text{product}(\underline{\text{prod\_id}}, \text{prod\_name}, \text{category})$

$\text{order}(\underline{\text{order\_id}}, \text{prod\_id}, \text{order\_date})$

Choose the Relational Algebra expression(s) that are not equivalent to the following expression:

$$\Pi_{\text{prod\_id}, \text{prod\_name}}(\sigma_{\text{category}='Electronics' \wedge \text{order\_date} > '2025-01-01'}(\text{product} \bowtie \text{order}))$$

**Options :**

6406533774057. ✓  $\Pi_{\text{prod\_id}, \text{prod\_name}}((\sigma_{\text{category}='Electronics'}(\text{product})) \bowtie (\sigma_{\text{order\_date} > '2025-01-01'}(\text{order})))$

6406533774058. ✗  $\Pi_{\text{prod\_id}, \text{prod\_name}}((\sigma_{\text{category}='Electronics'}(\text{product})) \bowtie (\sigma_{\text{order\_date} > '2025-01-01'}(\text{order})))$

6406533774059. ✗  $\Pi_{\text{prod\_id}, \text{prod\_name}}(\sigma_{\text{category}='Electronics'}(\sigma_{\text{order\_date} > '2025-01-01'}(\text{product} \bowtie \text{order})))$

6406533774060. ✓  $\Pi_{\text{prod\_id}, \text{prod\_name}}((\sigma_{\text{category}='Electronics'} \wedge \text{order\_date} > '2025-01-01')(\text{order}) \bowtie \text{product})$

**Question Number : 43 Question Id : 6406531113734 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the ER Diagram as shown below:

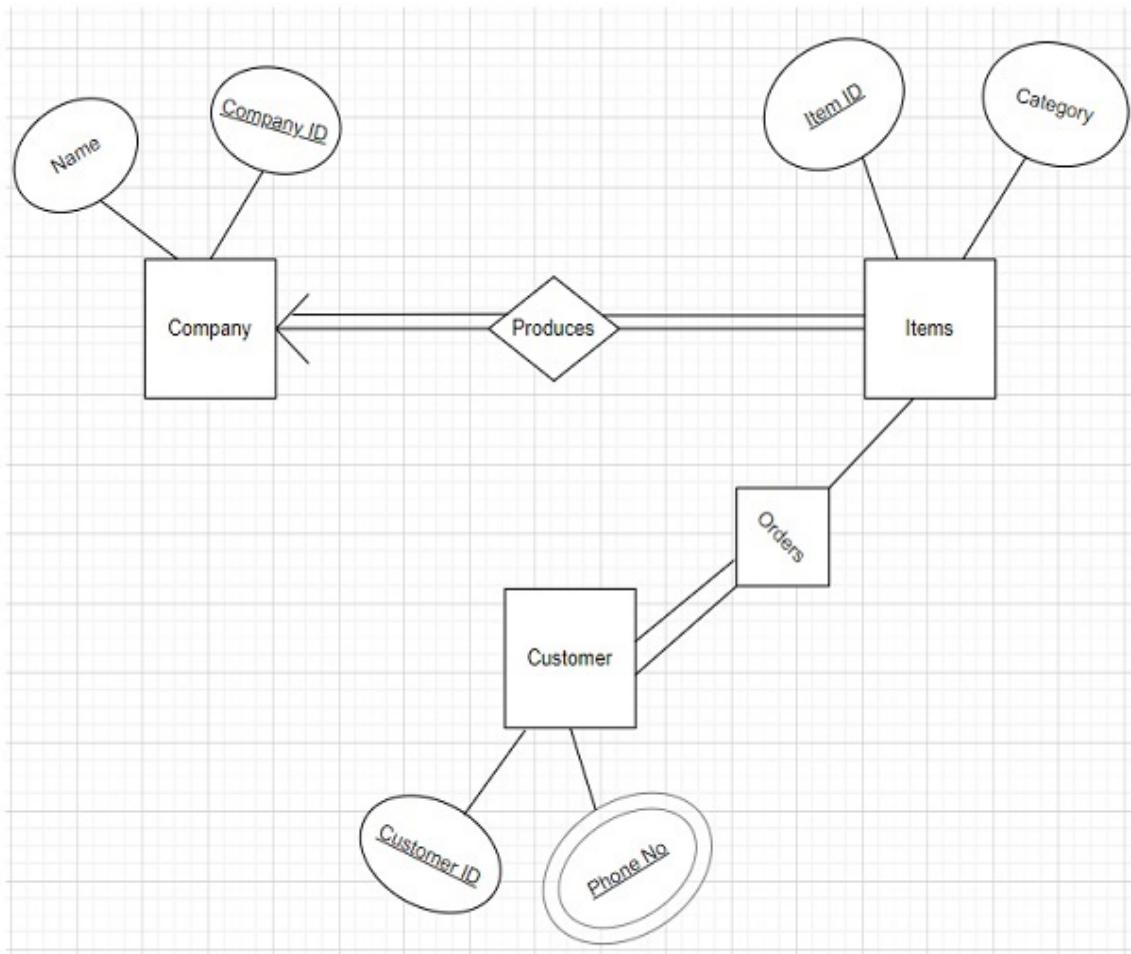


Figure 1: ER Diagram

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

**Options :**

- 6406533774061. ✓ Every company must have produced at least one item
- 6406533774062. ✗ An item can be produced by more than one company
- 6406533774063. ✓ Every customer must have bought at least one item
- 6406533774064. ✓ An item can be bought by more than one customer

**Question Number : 44 Question Id : 6406531113735 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the following Students table

student_id	name	grade	marks
1001	Alice	A	85
1002	Bob	B	70
1003	Charlie	A	90
1004	David	B	60
1005	Eve	A	95

Figure 1: Students

Choose the correct SQL query to calculate the average marks scored by students in each grade and sort the result by average marks in descending order.

**Options :**

```
SELECT grade, AVG(marks) AS average_marks  
FROM Students  
ORDER BY average_marks DESC
```

6406533774065. ✘ GROUP BY marks

```
SELECT grade, AVG(marks) AS average_marks  
FROM Students  
GROUP BY grade
```

6406533774066. ✓ ORDER BY AVG(marks) DESC

```
SELECT grade, AVG(marks) AS average_marks  
FROM Students  
GROUP BY grade
```

6406533774067. ✓ ORDER BY average\_marks DESC

```
SELECT grade, AVG(marks) AS average_marks  
FROM Students  
ORDER BY average_marks DESC
```

6406533774068. ✘ GROUP BY grade

**Sub-Section Number :**

6

**Sub-Section Id :**

640653168499

**Question Shuffling Allowed :**

Yes

**Question Number : 45 Question Id : 6406531113736 Question Type : SA**

**Correct Marks : 4**

Question Label : Short Answer Question

Consider relations Book and Author shown in Table 6 and Table 7

BookID	Title	AuthorID	Genre
1	Harry Potter and the Sorcerer's Stone	101	Fantasy
2	Pride and Prejudice	103	Fiction
3	The Great Gatsby	104	Fiction
4	The chamber of secrets	101	Adventure
5	The Catcher in the Rye	105	Fiction
6	1984	101	Dystopian

Table 6: Book Table

AuthorID	Name
101	J.K. Rowling
102	F. Scott Fitzgerald
103	Jane Austen
104	Herman Melville

Table 7: Author Table

How many rows will be in the output of below query?

```
SELECT *
FROM Book LEFT OUTER JOIN Author
ON Book.AuthorID = Author.AuthorID
WHERE Genre LIKE 'F%';
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

4

**Question Number : 46 Question Id : 6406531113737 Question Type : SA**

**Correct Marks : 4**

Question Label : Short Answer Question

Consider the tables student and course as shown below.

ID	name	dept_name
21f11	Ram	CS
21f12	Rakesh	ME
21f13	Pranav	EE
21f14	Rajib	CS
21f15	Vikash	BT

Table 8: student

course_id	title	dept_name
C001	DBMS	CS
C002	CAD	ME
C003	Digital	EE
C004	PDSA	CS

Table 9: course

How many rows are returned by the below query?

```
(SELECT ID FROM student, course  
EXCEPT ALL  
SELECT ID FROM student)  
EXCEPT  
SELECT ID FROM student
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

0

**Sub-Section Number :** 7

**Sub-Section Id :** 640653168500

**Question Shuffling Allowed :** No

**Question Id :** 6406531113738 **Question Type :** COMPREHENSION **Sub Question Shuffling**

**Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

**Question Numbers :** (47 to 48)

Question Label : Comprehension

Consider the following scenario and answer the given subquestions

A startup company is building an online learning platform that hosts courses on various subjects. In this platform, students can enroll in multiple courses, and each course can be taught by one or more instructors. The company wants to design the database schema to manage the core entities: Student, Instructor, Course, and Enrollment.

## **Sub questions**

**Question Number : 47 Question Id : 6406531113739 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

In the Enrollment table, which of the following is a typical way to handle the primary key?

**Options :**

- 6406533774071. ❌ Use an auto-increment column (e.g., EnrollmentID) as the primary key.
- 6406533774072. ✓ Use a composite primary key consisting of StudentID and CourseID.
- 6406533774073. ❌ There is no need to have a primary key for the Enrollment table.
- 6406533774074. ❌ Use a primary key consisting of StudentID.

**Question Number : 48 Question Id : 6406531113740 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

In a typical design, what is the relationship between the Student table and the Enrollment table?

**Options :**

- 6406533774075. ❌ One-to-One
- 6406533774076. ❌ One-to-Many
- 6406533774077. ❌ Many-to-Many
- 6406533774078. ✓ Many-to-One

## **PDSA**

<b>Section Id :</b>	64065379121
<b>Section Number :</b>	4
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	17
<b>Number of Questions to be attempted :</b>	17
<b>Section Marks :</b>	50
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1

**Sub-Section Id :**

640653168501

**Question Shuffling Allowed :**

No

**Question Number : 49 Question Id : 6406531113741 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 :**

6406533774079. ✓ YES

6406533774080. ✗ NO

**Sub-Section Number :**

2

**Sub-Section Id :**

640653168502

**Question Shuffling Allowed :**

Yes

**Question Number : 50 Question Id : 6406531113742 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following recursive Python function.

```
1 | def fun(D, s1, s2):
2 |     if s1 < s2:
3 |         D[s1], D[s2] = D[s2], D[s1]
4 |         fun(D, s1+1, s2-1)
```

Suppose the function `fun()` is applied to the list `D = [1, 2, 3, 4, 5, 6]` with the call `fun(D, 1, 3)`. What will the list `D` look like after the function is executed?

**Options :**

6406533774081. ✓ [1, 4, 3, 2, 5, 6]

6406533774082. ✗ [6, 5, 4, 3, 2, 1]

6406533774083. ✗ [1, 3, 2, 4, 5, 6]

6406533774084. ✗ [1, 2, 3, 4, 5, 6]

**Question Number : 51 Question Id : 6406531113743 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

$$f_1(n) = 3n^2 + 2n$$

$$f_2(n) = 3n + (\log n)^2$$

$$f_3(n) = \log \log n$$

$$f_4(n) = 10 \log n$$

$$f_5(n) = 3n \log n$$

Arrange the above functions in increasing order of asymptotic complexity.

**Options :**

6406533774085. ✘  $f_3(n), f_4(n), f_2(n), f_1(n), f_5(n)$

6406533774086. ✘  $f_3(n), f_2(n), f_1(n), f_5(n), f_4(n)$

6406533774087. ✘  $f_4(n), f_3(n), f_2(n), f_1(n), f_5(n)$

6406533774088. ✓  $f_3(n), f_4(n), f_2(n), f_5(n), f_1(n)$

**Question Number : 52 Question Id : 6406531113744 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What does the following code compute and what is its time complexity?

```
1 def fun(a, n):
2     result = 1
3     while n > 0:
4         if n % 2 == 1:
5             result *= a
6         a *= a
7         n //= 2
8     return result
```

**Options :**

6406533774089. ✘ Computes  $a!$  with time complexity  $O(\log n)$ .

6406533774090. ✘ Computes  $a^n$  with time complexity  $O(n)$ .

6406533774091. ✓ Computes  $a^n$  with time complexity  $O(\log n)$ .

6406533774092. ✘ Computes  $a^1 + a^2 + \dots + a^n$  with time complexity  $O(n)$ .

**Question Number : 53 Question Id : 6406531113745 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following Implementation of Selection sort.

```
1 def selectionSort(L):
2     n = len(L)
3     if n < 1:
4         return(L)
5     for i in range(n):
6         minpos = i
7         for j in range(i+1, n):
8             if L[j] < L[minpos]: #Comparision
9                 minpos = j
10            (L[i], L[minpos]) = (L[minpos], L[i])
11    return(L)
```

Which of the following statements is **true** about the number of comparisons made during the sorting process?

**Options :**

6406533774093. ❌ The number of comparisons is the minimum when the input list is in ascending order.

6406533774094. ❌ The number of comparisons is the maximum when the input list is in descending order.

6406533774095. ✓ The number of comparisons is the same irrespective of the order of the elements in the input list.

6406533774096. ❌ The number of comparisons depends on the number of swaps made during the process.

**Question Number : 54 Question Id : 6406531113746 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following implementation of Insertion sort.

```
1 def insertionsort(L):
2     n = len(L)
3     for i in range(1, n):
4         key = L[i]
5         j = i - 1
6         while j >= 0 and L[j] > key: #Comparision
7             L[j + 1] = L[j] #shift
8             j -= 1
9         L[j + 1] = key
10    return L
```

Which of the following is **true** about the number of shifts made during the sorting process?

**Options :**

- 6406533774097. ✘ The number of shifts is always equal to the number of comparisons.
- 6406533774098. ✓ The number of shifts is minimum when the input list is in ascending order.
- 6406533774099. ✘ The number of shifts is minimum when the input list is in descending order.
- 6406533774100. ✘ The number of shifts is independent of the order of the elements in the input list.

**Question Number : 55 Question Id : 6406531113747 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What is the time complexity for the worst case behaviour of **Merge Sort** ?

**Options :**

6406533774101. ✘  $O(n)$

6406533774102. ✘  $O(n^2 \log n)$

6406533774103. ✓  $O(n \log n)$

6406533774104. ✘  $O(n^2)$

**Question Number : 56 Question Id : 6406531113748 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider that **Quick sort** is applied to a list of  $n$  distinct elements that is already sorted in the required sorting order. What will be the Worst case time complexity of Quick sort if the pivot is taken to be

I) Median element (Consider that finding median takes  $O(n)$  time)

II) Last element

Choose the correct option corresponding to the correct pair of complexities for both pivots.

**Options :**

6406533774105. ✘ I :  $O(n^2)$  and II :  $O(n^2)$

6406533774106. ✘ I :  $O(n^2)$  and II :  $O(n)$

6406533774107. ✘ I :  $O(n \log n)$  and II :  $O(n \log n)$

6406533774108. ✓ I :  $O(n \log n)$  and II :  $O(n^2)$

**Question Number : 57 Question Id : 6406531113750 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following statements:

1. A stack can be used to check whether a word is a palindrome
2. A stack can be used to check if parentheses in an expression are balanced.
3. A stack used to manage print jobs in a printer spooler.

Choose the correct option regarding the given statements.

**Note:** A palindrome is a word that reads the same forwards and backwards. e.g: radar

**Options :**

6406533774113. ✘ Statement 1 and Statement 3 are true

6406533774114. ✘ Statement 2 and Statement 3 are true

6406533774115. ✓ Statement 1 and Statement 2 are true

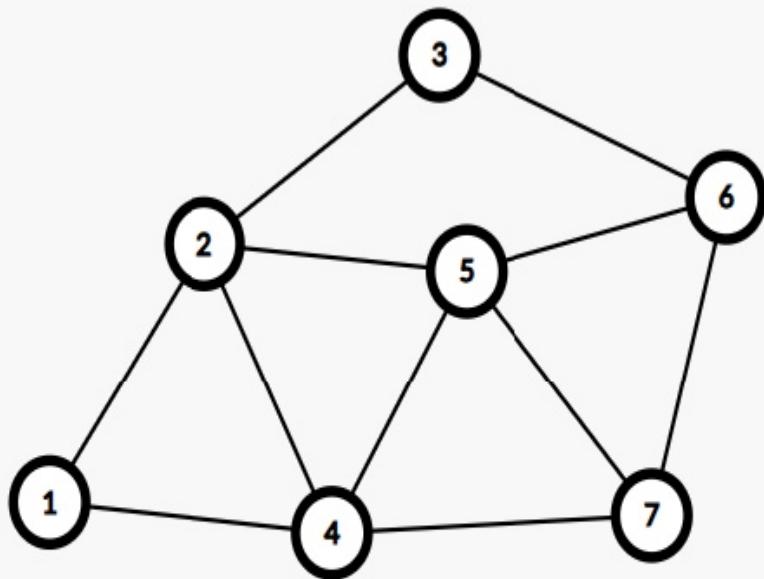
6406533774116. ✘ All statements are true

**Question Number : 58 Question Id : 6406531113751 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following graph.



Which of the following vertex sequence is correct **DFS traversals** on the graph starting from the node 2?

**Note:** When a node has multiple neighbours, assume that DFS visits the numerically smaller valued node first.

**Options :**

6406533774117. ✘ 2, 1, 4, 3, 7, 6, 5

6406533774118. ✓ 2, 1, 4, 5, 6, 3, 7

6406533774119. ✘ 2, 1, 4, 5, 6, 7, 3

6406533774120. ✘ 2, 1, 6, 7, 5, 4, 3

**Sub-Section Number :**

3

**Sub-Section Id :**

640653168503

**Question Shuffling Allowed :**

Yes

**Question Number : 59 Question Id : 6406531113749 Question Type : MCQ**

**Correct Marks : 4**

**Question Label : Multiple Choice Question**

Consider the following code. Assume `S` is a stack and `Q` is a queue. `Push` and `Pop` operations are usual stack operations, `Enqueue` and `Dequeue` are usual queue operations.

```
1 L = ['A', 'B', 'C', 'D', 'E', 'F']
2 for i in range(6):
3     if i % 2 == 0:
4         Q.Enqueue(L[i])
5     else:
6         S.Push(L[i])
7
8 for i in range(3):
9     v = Q.Dequeue()
10    S.Push(v)
11
12 for i in range(2):
13     v = S.Pop()
14     Q.Enqueue(v)
15
16 x = Q.Dequeue()
17 y = S.Pop()
18 print(x, y)
```

What would be the output of the given code?

**Options :**

6406533774109. ✓ E A

6406533774110. ✗ C B

6406533774111. ✗ C A

6406533774112. ✗ E B

**Sub-Section Number :**

4

**Sub-Section Id :**

640653168504

**Question Shuffling Allowed :**

Yes

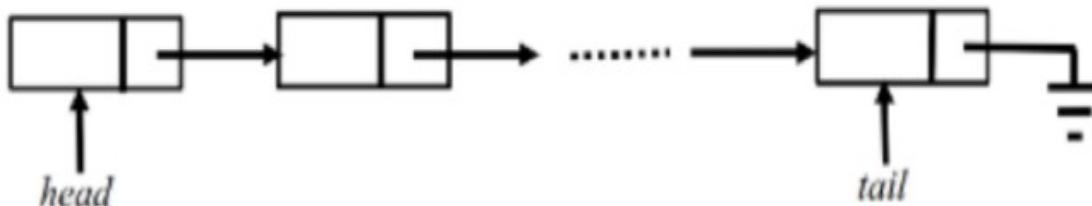
**Question Number : 60 Question Id : 6406531113752 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

```
1 class Node:  
2     def __init__(self, data):  
3         self.data = data  
4         self.next = None
```

Consider an implementation of a singly linked list where each node is created using the given class `Node`. Suppose it has a `head` pointer that points to the first node of the linked list and a `tail` pointer that points to the last element of the linked list.



Which of the following operations can be implemented in  $O(1)$  time with the given representation of the linked list?

**Options :**

- 6406533774121. ✓ Insertion of the new node at the front of the linked list.
- 6406533774122. ✓ Insertion of the new node at the end of the linked list.
- 6406533774123. ✓ Deletion of the first node of the linked list.
- 6406533774124. ✗ Deletion of the last node of the linked list.
- 6406533774125. ✗ Search for any element in the linked list

**Question Number : 61 Question Id : 6406531113753 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following is/are possible degree sequence(s) of vertices of a connected undirected graph with six vertices?

**Note:** Degree sequence is a series of positive integers  $a_1, a_2, \dots, a_n$  where each  $a_i$  is the degree of the  $i^{\text{th}}$  vertex of the graph.

**Options :**

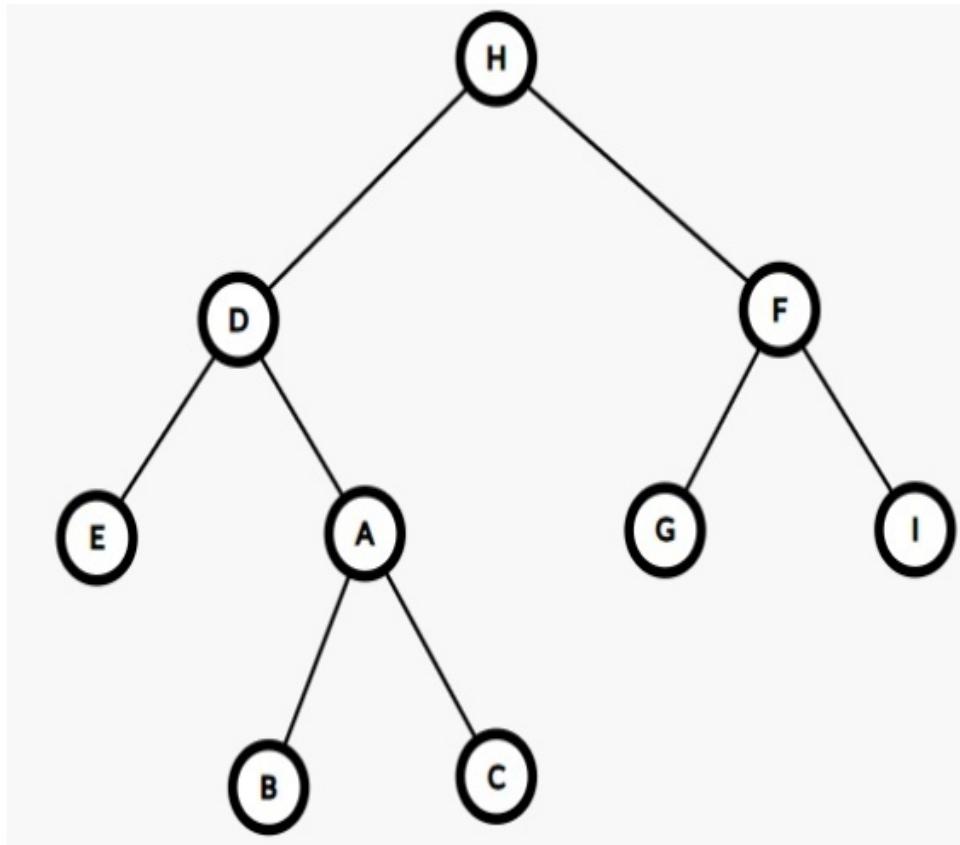
- 6406533774126. ✗ 1, 1, 1, 1, 1, 1
- 6406533774127. ✓ 2, 2, 2, 2, 2, 2
- 6406533774128. ✓ 1, 1, 2, 2, 3, 5
- 6406533774129. ✗ 1, 2, 2, 2, 3, 3

**Question Number : 62 Question Id : 6406531113754 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

**Question Label : Multiple Select Question**

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



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

**Options :**

6406533774130. ❌ (G, C)

6406533774131. ✓ (D, B)

6406533774132. ✓ (H, C)

6406533774133. ❌ (E, A)

6406533774134. ❌ (F, A)

**Sub-Section Number :**

5

**Sub-Section Id :**

640653168505

**Question Shuffling Allowed :**

Yes

**Question Number : 63 Question Id : 6406531113755 Question Type : SA**

**Correct Marks : 3**

**Question Label : Short Answer Question**

Linear probing is an open addressing scheme in computer programming for resolving hash collisions in hash tables. Linear probing takes the original hash index and increments the value by 1 until a free slot is found.

A hash table contains 11 buckets (index 0 to 10) and uses linear probing to resolve collisions. The key values are integers and the hash function used is `key mod 11`. If key values 43, 12, 67, 102, 38 and 89 are inserted into the hash table in the given order, in what index location would the key value 89 be inserted ?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

4

**Question Number :** 64 **Question Id :** 6406531113756 **Question Type :** SA

**Correct Marks :** 3

Question Label : Short Answer Question

Consider an **undirected graph**  $G$  with 55 edges with the least number of vertices possible. What will be the number of vertices in graph  $G$ ?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

11

**Sub-Section Number :** 6

**Sub-Section Id :** 640653168506

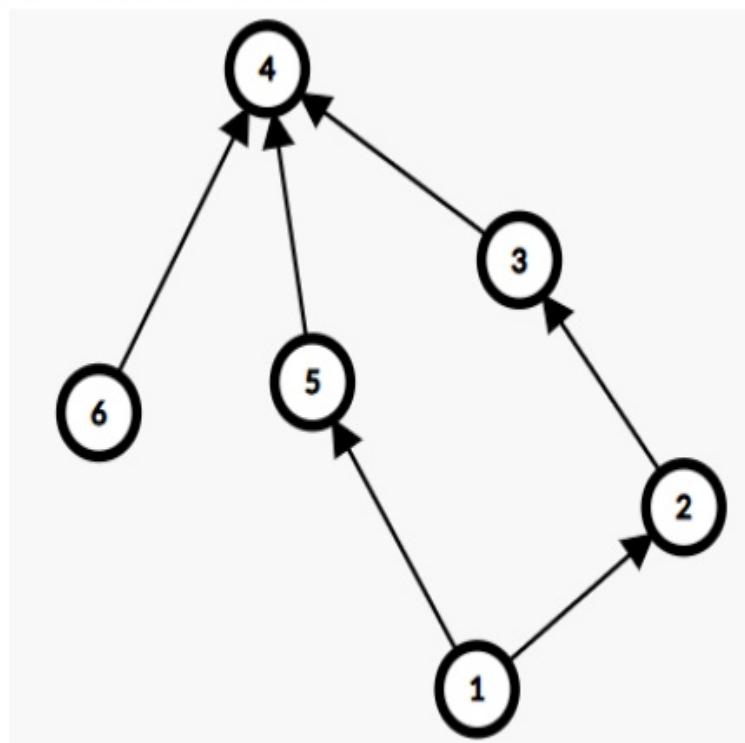
**Question Shuffling Allowed :** Yes

**Question Number :** 65 **Question Id :** 6406531113757 **Question Type :** SA

**Correct Marks :** 4

Question Label : Short Answer Question

Consider the following graph.



The number of distinct topological orderings possible that **start with vertex 1** for the given DAG is \_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

12

## Appdev1

<b>Section Id :</b>	64065379122
<b>Section Number :</b>	5
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	16
<b>Number of Questions to be attempted :</b>	16
<b>Section Marks :</b>	50
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0

**Section Minimum Duration :** 0  
**Section Time In :** Minutes  
**Maximum Instruction Time :** 0  
**Sub-Section Number :** 1  
**Sub-Section Id :** 640653168507  
**Question Shuffling Allowed :** No

**Question Number : 66 Question Id : 6406531113758 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MODERN APPLICATION DEVELOPMENT I (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 :**

6406533774138. ✓ YES

6406533774139. ✗ NO

**Sub-Section Number :** 2

**Sub-Section Id :** 640653168508

**Question Shuffling Allowed :** Yes

**Question Number : 67 Question Id : 6406531113759 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following is the correct way of calling an external CSS file using HTML?

**Options :**

6406533774140. ✗  

```
<head>
<link url="stylesheet" type="text/css" href="mystyle.css">
</head>
```

6406533774141. ✓  

```
<head>
<link rel="stylesheet" type="text/css" href="mystyle.css">
</head>
```

6406533774142. ✗  

```
<head>
<link href="stylesheet" type="text/css" file="mystyle.css">
</head>
```

```
<head>
<link url="stylesheet" type="text/css" file="mystyle.css">
</head>
```

6406533774143. ✘

**Question Number : 68 Question Id : 6406531113760 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which command would you use to get detailed information about the HTTP request and response, including headers, and to help debug the HTTP request when using curl?

**Options :**

6406533774144. ✘ curl -i <URL>

6406533774145. ✓ curl -v <URL>

6406533774146. ✘ curl --headers <URL>

6406533774147. ✘ curl -X GET <URL>

**Question Number : 69 Question Id : 6406531113761 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Read the statements given below carefully and select the correct option.

**Statement 1:** If an element that belongs to two different classes is styled externally using both the classes, then for the same attribute, it will acquire styling from the latest class in order.

**Statement 2:** If an element having an ID and a class is styled externally using both its ID and the class, then for the same attribute, it will acquire styling from the ID selector.

**Options :**

6406533774148. ✓ Both statements 1 and 2 are correct

6406533774149. ✘ Both statements 1 and 2 are incorrect

6406533774150. ✘ Statement 1 is correct but statement 2 is incorrect

6406533774151. ✘ Statement 2 is correct but statement 1 is incorrect

**Sub-Section Number :**

3

**Sub-Section Id :**

640653168509

**Question Shuffling Allowed :**

Yes

**Question Number : 70 Question Id : 6406531113762 Question Type : MSQ**

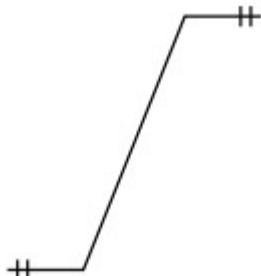
**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

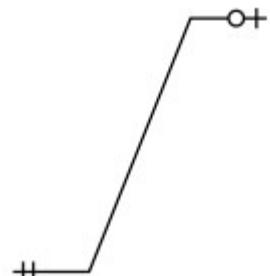
Which of the following options represents a one-to-one relationship in the Entity-Relationship Diagram?

**Options :**

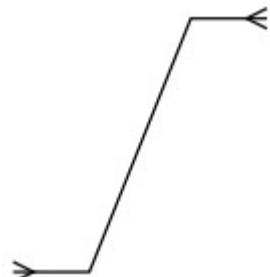
6406533774152. ✓



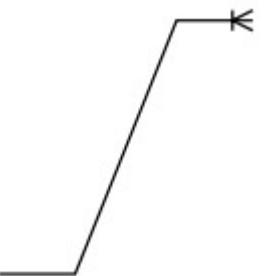
6406533774153. ✓



6406533774154. ✗



6406533774155. ✗



**Sub-Section Number :**

4

**Sub-Section Id :**

640653168510

**Question Shuffling Allowed :**

Yes

**Question Number : 71 Question Id : 6406531113763 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following HTML document:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <style>
        #container {
            border-style: dashed;
            background-color: red;
        }
        .content {
            border-style: solid;
            border-color: green;
            background-color: orange;
        }
        div {
            width: 250px;
            border: 3px dotted black;
            border-color: yellow;
        }
    </style>
</head>
<body>
    <div id="container" class="content" style="background-color: yellow;">
        <h2>Welcome to Web Dev</h2>
    </div>
</body>
</html>
```

How will the browser render the above HTML document?

Options :

6406533774156. ✓

Welcome to Web Dev

6406533774157. ✗

Welcome to Web Dev

6406533774158. ✗

Welcome to Web Dev

6406533774159. ✗

## Welcome to Web Dev

**Question Number : 72 Question Id : 6406531113764 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Document</title>
    <style>
        div {
            color: blue;
        }
        #s1 {
            color: yellow;
        }
        .s2{
            color: green;
        }
        h3{
            color: red;
        }
    </style>
</head>
<body>
    <div class="s2" id="s1"><h3>IITM Online BS Degree Program</h3></div>
</body>
</html>
```

What is the colour of the printed text "IITM Online BS Degree Program"?

**Options :**

6406533774160. ✘ BLUE

6406533774161. ✘ YELLOW

6406533774162. ✘ GREEN

6406533774163. ✓ RED

**Question Number : 73 Question Id : 6406531113765 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the template code and Python code given below:

Template code: "output.html"

```
<!DOCTYPE html>
<html lang="en">
<head>
</head>
<body>
    <ol>
        {%for p in products%}
            {%if "i" in p.name|string %}
                <li>{{p.id}}, {{p.name}}, {{p.qty}}, {{p.price}}</li>
            {%endif%}
        {%endfor%}
    </ol>
</body>
</html>
```

Python code: "main.py"

```
from jinja2 import Template

products = [
    {"id": "101", "name": "Food", "qty": 78, "price": 100},
    {"id": "102", "name": "Electrical", "qty": 4, "price": 16},
    {"id": "103", "name": "Stationary", "qty": 7, "price": 14},
    {"id": "104", "name": "Electronics", "qty": 10, "price": 145},
]

with open("output.html") as r:
    t = Template(r.read())
    print(t.render(products=products))
```

What will the output of the above Python code be?

Options :

```
<!DOCTYPE html>
<html lang="en">
<head>
</head>
<body>
    <ol>
        <li>101, Food, 78, 100</li>
        <li>103, Stationary, 7, 14</li>
    </ol>
</body>
</html>
```

6406533774164. \*

6406533774165. ✓

```
<!DOCTYPE html>
<html lang="en">
<head>
</head>
<body>
    <ol>
        <li>102, Electrical, 4, 16</li>
        <li>103, Stationary, 7, 14</li>
        <li>104, Electronics, 10, 145</li>
    </ol>
</body>
</html>
```

```
<!DOCTYPE html>
<html lang="en">
<head>
</head>
<body>
    <ol>
        <li>103, Stationary, 7, 14</li>
    </ol>
</body>
</html>
```

6406533774166. \*

```
<!DOCTYPE html>
<html lang="en">
<head>
</head>
<body>
    <ol>
        <li>102, Electrical, 4, 16</li>
        <li>104, Electronics, 10, 145</li>
    </ol>
</body>
</html>
```

6406533774167. \*

**Question Number : 74 Question Id : 6406531113766 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following Python code snippet:

Python code: "main.py"

```
import sys
movie_ratings = {
    "Kalki": [5, 1, 2, 1, 1],
    "Jailer": [7, 3, 1, 2, 1],
    "Leo": [4, 3, 2, 2, 1],
}

def do_something(movie_name):
    avg_ratings = {}
    for movie in movie_ratings:
        if movie == movie_name:
            avg_ratings[movie] = sum(movie_ratings[movie]) /
len(movie_ratings[movie])
    return avg_ratings
return "Movie not found"

args = sys.argv
print(do_something(args[1]))
```

The above file will result in the output as “**2.8**”, for which of the following command line input?

**Options :**

- 6406533774168. ✘ python main.py Kalki
- 6406533774169. ✘ python main.py Leo
- 6406533774170. ✘ python main.py Pushpa2
- 6406533774171. ✓ python main.py Jailer

**Question Number : 75 Question Id : 6406531113767 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider two python files, mad1.py and mad2.py with following code snippets.

File1: mad1.py

```
import sys
import mad2
print('Welcome' + ' ' + sys.argv[1])
```

File2: mad2.py

```
import sys
print('Welcome' + ' ' + sys.argv[0])
```

What is the output of the following command “python mad1.py mad2.py MAD-I MAD-II”?

**Options :**

Welcome MAD-I.py  
6406533774172. ✘ Welcome MAD-II.py

Welcome mad2.py  
6406533774173. ✘ Welcome mad1.py

Welcome mad1.py  
6406533774174. ✓ Welcome mad2.py

Welcome MAD-II.py  
6406533774175. ✘ Welcome MAD-I.py

**Sub-Section Number :**

5

**Sub-Section Id :**

640653168511

**Question Shuffling Allowed :**

Yes

**Question Number : 76 Question Id : 6406531113768 Question Type : MSQ****Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Based on the provided latency and response size information, which of the following statements is/are correct?

(Assume the speed of light in cable as  $2 \times 10^8 \text{ m/s}$  for all the options and ms is a millisecond )

**Options :**

The speed of light in a cable is approximately  $2 \times 10^8 \text{ m/s}$ , resulting in a latency of 6406533774176. ✓ approximately 5 ms(millisecond) for a 1000 km distance.

For a data centre located 2000 km away, a one-way request will take approximately 10 ms, to 6406533774177. ✓ reach the server, assuming the speed of light in the cable.

The round-trip latency for communication with a data centre 2000 km away is approximately 6406533774178. ✘ 50ms.

If a response size is 1 KB, a maximum of 50 requests per second can be handled 6406533774179. ✓ considering a round-trip latency of 20ms.

**Question Number : 77 Question Id : 6406531113769 Question Type : MSQ****Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the following two tables in an SQLite database:

Table: **Gifts**

GiftID	GiftName	Price
1	Teddy Bear	250
2	Coffee Mug	150
3	Keychain	100
4	Notebook	180
5	Wall Clock	300

Table: **Reviews**

ReviewID	GiftID	Rating
1	1	4.2
2	2	4.5
3	3	3.9
4	4	4.7
5	5	4.0

Which of the following SQL queries correctly retrieves a list of **unique gift names** with a **price less than 200 rupees** and a **rating above 4?** (Note: Displaying the rating in the result is optional, but duplicate gift names should not appear.)

**Options :**

6406533774180. ✘ 

```
SELECT GiftName, Price
FROM Gifts,Reviews
WHERE Price < 200 AND Rating > 4;
```

6406533774181. ✓ 

```
SELECT g.GiftName, g.Price
FROM Gifts g
JOIN Reviews r ON g.GiftID = r.GiftID
WHERE g.Price < 200 AND r.Rating > 4;
```

6406533774182. ✘ 

```
SELECT g.GiftName, g.Price, r.Rating
FROM Gifts, Reviews
WHERE g.Price < 200
AND r.Rating > 4;
```

```

SELECT g.GiftName, g.Price, r.Rating
FROM Gifts g, Reviews r
WHERE g.GiftID = r.GiftID
AND g.Price < 200
AND r.Rating > 4;

```

6406533774183. ✓

<b>Sub-Section Number :</b>	6
<b>Sub-Section Id :</b>	640653168512
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 78 Question Id : 6406531113770 Question Type : MCQ**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

A server S requests to retrieve data from two data centers  $DC_1$  and  $DC_2$ , which are located at distances of  $D_1$  and  $D_2$  meters respectively from the server S. The speed of data travelling through the medium that connects S with  $DC_1$  is  $m_1$  m/sec and that connects S with  $DC_2$  is  $m_2$  m/sec. With the given media for data transfer between  $S \rightarrow DC_1$  and  $S \rightarrow DC_2$ , it takes an additional 200 milliseconds for the data to reach S from  $DC_2$  than it takes from  $DC_1$  if the complete response is ready only when the data is available to S from both the datacenters. Figure out the value of  $m_2$  (in m/sec) in terms of  $D_1$ ,  $D_2$  and  $m_1$ . [Note: The data centers send responses only when they receive a request from the server]

**Options :**

6406533774184. ✘ 
$$m_2 = \frac{D_2 m_1}{D_1 - 0.2m_1}$$

6406533774185. ✘ 
$$m_2 = \frac{D_2 m_1}{D_1 + 0.2m_1}$$

6406533774186. ✘ 
$$m_2 = \frac{2D_2 m_1}{2D_1 - 0.2m_1}$$

6406533774187. ✓ 
$$m_2 = \frac{2D_2 m_1}{2D_1 + 0.2m_1}$$

**Question Number : 79 Question Id : 6406531113771 Question Type : MCQ**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider two fictitious addressing systems, IPv5 and IPv8, used to store the IP address of a machine. Following are the forms of storing addresses for each system.

**IPv5:** It is a 45-bit long address denoted by 5 sets of 3-digit octal numbers separated by a hyphen (-).

e.g. xxx - xxx - xxx - xxx - xxx

**IPv8:** It is a 64-bit long address denoted by 4 sets of 4-bit hexadecimal numbers separated by colon (:)

e.g. xxxx:xxxx:xxxx:xxxx

How would an IPv5 address, 145-123-010-235-453 be represented in IPv8 format based on information given above?

**Options :**

6406533774188. ✘ 0000:3B2B:9821:0652

6406533774189. ✘ 3B2B:9821:0652:0000

6406533774190. ✓ 0000:0652:9821:3B2B

6406533774191. ✘ 0652:9821:3B2B:0000

**Question Number : 80 Question Id : 6406531113772 Question Type : MCQ**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the following code:

```
import pyhtml as html

table = {'table': [[1,2,3],[4,5,6]]}

def f_table(ctx):
    template_str = html.html(
        html.head(
            html.title('Title')
        ),
        html.body(
            html.table(
                (html.tr(
                    [html.td(cell) for cell in row]
                ) for row in ctx['table'])
            )
        )
    )
    return (template_str)

template = f_table(table)
print(template.render())
```

What will the output of the above PyHTML code be?

**Options :**

```
<!DOCTYPE html>
<html>
  <head>
    <title>Title</title>
  </head>
  <body>
    <table>
      <tr>
        <td>1</td>
        <td>2</td>
        <td>3</td>
      </tr>
      <tr>
        <td>4</td>
        <td>5</td>
        <td>6</td>
      </tr>
    </table>
  </body>
</html>
```

6406533774192. ✓

6406533774193. ✗

```
<!DOCTYPE html>
<html>
  <head>
    <title>Title</title>
  </head>
  <body>
    <table>
      <tr>
        <td>1</td>
        <td>2</td>
        <td>3</td>
        <td>4</td>
        <td>5</td>
        <td>6</td>
      </tr>
    </table>
  </body>
</html>
```

6406533774194. ❌ `AttributeError: module 'pyhtml' has no attribute 'html'.`

6406533774195. ❌ None of these

**Sub-Section Number :**

7

**Sub-Section Id :**

640653168513

**Question Shuffling Allowed :**

No

**Question Id : 6406531113773 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (81 to 82)**

Question Label : Comprehension

app.py

```
import sys
from string import Template as T1
from jinja2 import Template as T2

temp = "The book title is $title and it costs {{price}}."
if sys.argv[1] == 'jinja 2':
    temp = T1(temp)
    out = temp.substitute({'title': 'Python Basics', 'price': '$20'})
elif sys.argv[1] == 'string':
    temp = T2(temp)
    out = temp.render({'title': 'Python Basics', 'price': '$20'})
else:
    out = 'Invalid input'
print(out)
```

Based on the above program, answer the given subquestions.

### Sub questions

**Question Number : 81 Question Id : 6406531113774 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What will be the output of the given Python code snippet on the terminal for the command `python app.py string` ?

**Options :**

6406533774196. ✘ The book title is Python Basics and it costs \$20.

6406533774197. ✓ The book title is \$title and it costs \$20.

6406533774198. ✘ The book title is Python Basics and it costs {{price}}.

6406533774199. ✘ The book title is \$title and it costs {{price}}.

**Question Number : 82 Question Id : 6406531113775 Question Type : MCQ**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

What will be the output of the given Python code snippet on the terminal for the command `python app.py jinja 2` ?

**Options :**

6406533774200. ✘ The book title is Python Basics and it costs \$20.

6406533774201. ✘ The book title is \$title and it costs \$20.

6406533774202. ✘

The book title is Python Basics and it costs {{price}}.

6406533774203. ✓ Invalid input

## MLF

<b>Section Id :</b>	64065379123
<b>Section Number :</b>	6
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	13
<b>Number of Questions to be attempted :</b>	13
<b>Section Marks :</b>	40
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653168514
<b>Question Shuffling Allowed :</b>	No

**Question Number : 83 Question Id : 6406531113776 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

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

6406533774204. ✖ YES

6406533774205. ✓ NO

**Sub-Section Number :**

2

**Sub-Section Id :**

640653168515

**Question Shuffling Allowed :**

Yes

**Question Number : 84 Question Id : 6406531113777 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the function  $f(x, y) = \sin(xy)$ . Let  $L(x, y)$  be the linear approximation of  $f(x, y)$  around the point  $(\frac{\pi}{2}, 0)$ . What is the value of  $L(\frac{\pi}{2} + 0.1, 0.1)$ ?

hint: Use the approximation of  $\pi = 3.14$

**Options :**

6406533774206. ✗ 0.162

6406533774207. ✗ 0.257

6406533774208. ✓ 0.157

6406533774209. ✗ 1.57

**Question Number : 85 Question Id : 6406531113778 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the matrix  $M$  given by:

$$M = \begin{bmatrix} 1 & 2 \\ 3 & 6 \end{bmatrix}$$

Which of the following options is true?

**Options :**

6406533774210. ✗ Eigenvectors corresponding to the two different eigenvalues of  $M$  are orthogonal.

6406533774211. ✗ The matrix  $M$  is not diagonalizable.

6406533774212. ✗ The eigenvalues of  $M$  are 4 and 1

6406533774213. ✓ The rank of  $M$  is 1.

**Question Number : 86 Question Id : 6406531113779 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

The directional derivative of a scalar function  $f(x, y)$  at a point  $(x_0, y_0)$  in the direction of a unit vector  $u$  represents:

**Options :**

6406533774214. ✓

The rate of change of  $f$  in the direction of  $u$  at  $(x_0, y_0)$ .

6406533774215. ✖ The magnitude of the gradient vector  $\nabla f$  at  $(x_0, y_0)$ .

6406533774216. ✖ The maximum value of the gradient at  $(x_0, y_0)$ .

6406533774217. ✖ The angle between the vector  $u$  and  $\nabla f$ .

**Question Number : 87 Question Id : 6406531113780 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following is the best second-order polynomial that fits the dataset by the least sum of squares method?

$$\min_{\theta_0, \theta_1, \theta_2} \sum_{i=1}^3 (y_i - (\theta_0 + \theta_1 x_i + \theta_2 x_i^2))^2$$

x	1	0	-1
y	-1	1	1

**Options :**

6406533774218. ✖  $2 - \frac{1}{2}x + \frac{5}{2}x^2$

6406533774219. ✓  $2 - \frac{1}{2}x - \frac{5}{2}x^2$

6406533774220. ✖  $2 + \frac{1}{2}x - \frac{5}{2}x^2$

6406533774221. ✖  $2 + \frac{1}{2}x + \frac{5}{2}x^2$

**Sub-Section Number :**

3

**Sub-Section Id :**

640653168516

**Question Shuffling Allowed :**

Yes

**Question Number : 88 Question Id : 6406531113781 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following options is/are true?

**Options :**

6406533774222. ✓  $\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$  is orthogonal to the vectors  $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$  and  $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$ .

6406533774223. ✗ For a matrix  $A$ , vectors of column space of  $A$  are perpendicular to the vectors of null space of  $A$ .

6406533774224. ✗ Length of the vector,  $a = \begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}$  is 3.

6406533774225. ✓  $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$  and  $\begin{bmatrix} 1 \\ 1 \\ -1 \end{bmatrix}$  are orthogonal vectors.

**Question Number : 89 Question Id : 6406531113782 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following options is/are true when the vector  $\begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}$  projected onto the vector  $\begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$ ?

**Options :**

6406533774226. ✗ The projection matrix is  $\frac{1}{2} \begin{bmatrix} -1 & -1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

6406533774227. ✓ The projection matrix is  $\frac{1}{2} \begin{bmatrix} 1 & -1 & 0 \\ -1 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

6406533774228. ✓ Projected vector is  $\frac{1}{2} \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$

Projected vector is  $\frac{1}{2} \begin{bmatrix} 1 \\ -1 \\ 0 \end{bmatrix}$

6406533774229. ✘

**Question Number : 90 Question Id : 6406531113784 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following statements is/are correct?

**Options :**

6406533774234. ✘  $f(x) = \ln(x)$  is continuous and differentiable in the domain  $[0, \infty)$ .

6406533774235. ✓  $f(x) = e^x$  is continuous and differentiable for all  $x \in \mathbb{R}$ .

6406533774236. ✓  $f(x) = \sqrt{x}$  is continuous but not differentiable at  $x = 0$ .

6406533774237. ✓  $f(x) = \frac{1}{x}$  is continuous and differentiable for all  $x \neq 0$ .

**Sub-Section Number :**

4

**Sub-Section Id :**

640653168517

**Question Shuffling Allowed :**

Yes

**Question Number : 91 Question Id : 6406531113783 Question Type : MSQ**

**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider a matrix

$$A = \begin{bmatrix} 2 & 5 \\ 6 & 15 \end{bmatrix}.$$

Which of the following options is/are true?

**Options :**

6406533774230. ✓ Null space of  $A$  is span  $\left\{ \begin{bmatrix} -5 \\ 2 \end{bmatrix} \right\}$

6406533774231. ✓ Column space of  $A$  is span  $\left\{ \begin{bmatrix} 1 \\ 3 \end{bmatrix} \right\}$

6406533774232. ✓ Left null space of  $A$  is span  $\left\{ \begin{bmatrix} -3 \\ 1 \end{bmatrix} \right\}$

Row space of  $A$  is span  $\left\{ \begin{bmatrix} 2 \\ -5 \end{bmatrix} \right\}$   
6406533774233. \*

**Sub-Section Number :** 5  
**Sub-Section Id :** 640653168518  
**Question Shuffling Allowed :** Yes

**Question Number : 92 Question Id : 6406531113785 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

Consider a matrix  $A_{20 \times 25}$ . If the nullity of the matrix is 10, then find the rank of the matrix.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

15

**Sub-Section Number :** 6  
**Sub-Section Id :** 640653168519  
**Question Shuffling Allowed :** Yes

**Question Number : 93 Question Id : 6406531113786 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

If  $f(x, y, z) = \sin(xy) + e^{yz} + xz^2$ , what is the length of the gradient at the point,  $(1, 0, 2)$ ? Enter the answer correct to two decimal places.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

6.37 to 6.43

**Sub-Section Number :** 7  
**Sub-Section Id :** 640653168520  
**Question Shuffling Allowed :** No

**Question Id : 6406531113787 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (94 to 95)**

**Question Label : Comprehension**

A bank wants to predict whether a customer will default on a loan using a classification model. The bank collects data from past customers, which includes the following features:

- $x_1$ : Credit score (scaled between 0 and 1)
- $x_2$ : Monthly income (in \$1000s)
- $x_3$ : Number of late payments in the past year

The target variable  $y$  represents whether the customer defaulted (1 for default, 0 for no default). The data is provided in the table below:

x	y
[0.9, 5, 1]	0
[0.4, 3, 5]	1
[0.8, 4, 2]	0
[0.2, 2, 7]	1
[0.7, 6, 0]	0

The bank uses the following linear combination to compute  $z$ :

$$z = 0.5x_1 + 0.3x_2 - 0.2x_3$$

The step function  $u(z)$  is used to classify the outcome:

$$u(z) = \begin{cases} 1 & \text{if } z \geq 1.5 \\ 0 & \text{otherwise} \end{cases}$$

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 94 Question Id : 6406531113788 Question Type : MCQ**

**Correct Marks : 3**

**Question Label : Multiple Choice Question**

For the input  $x = [0.9, 5, 1]$ , what will be the predicted output  $u(z)$ ?

**Options :**

6406533774240. ✘ 0

6406533774241. ✓ 1

6406533774242. ✘ 1.75

6406533774243. ✘ Cannot be determined

**Question Number : 95 Question Id : 6406531113789 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

If the threshold in the step function is changed to  $z \geq 1.0$ , what will happen to the misclassification rate?

**Options :**

6406533774244. ✓ Increase

6406533774245. ✗ Decrease

6406533774246. ✗ Remain same

6406533774247. ✗ Cannot be determined

**Question Id : 6406531113790 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (96 to 97)**

Question Label : Comprehension

Consider a  $3 \times 3$  matrix  $B$  given by

$$B = (-1) \begin{bmatrix} -4 & 3 & 0 \\ -2 & 1 & 0 \\ -1 & 1 & -1 \end{bmatrix}.$$

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 96 Question Id : 6406531113791 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

If  $B$  is diagonalizable, what is the invertible matrix  $P$  such that  $B = PDP^{-1}$ ?

**Options :**

$$\begin{bmatrix} 4 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

6406533774248. ✗

$$\begin{bmatrix} 3 & 2 & 1 \\ 2 & 1 & 1 \\ 1 & 0 & 1 \end{bmatrix}$$

6406533774249. ✗

$$\begin{bmatrix} 1 & 1 & 1 \\ 2 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

6406533774250. ✗

6406533774251. ✓  $\begin{bmatrix} 3 & 1 & 0 \\ 2 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$

6406533774252. ✗  $B$  is not diagonalizable.

**Question Number : 97 Question Id : 6406531113792 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

If  $B$  is diagonalizable, which of the following is a diagonal matrix  $D$  such that  $B = PDP^{-1}$ ? Use the matrix  $P$  obtained in the previous question.

**Options :**

6406533774253. ✓  $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

6406533774254. ✗  $\begin{bmatrix} 4 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

6406533774255. ✗  $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

6406533774256. ✗  $\begin{bmatrix} 2 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

6406533774257. ✗  $B$  is not diagonalizable.

## Java

**Section Id :** 64065379124

**Section Number :** 7

**Section type :** Online

**Mandatory or Optional :** Mandatory

**Number of Questions :** 16

**Number of Questions to be attempted :** 16

<b>Section Marks :</b>	100
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653168521
<b>Question Shuffling Allowed :</b>	No

**Question Number : 98 Question Id : 6406531113793 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : PROGRAMMING CONCEPTS USING JAVA (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 :**

6406533774258. ✓ YES

6406533774259. ✗ NO

<b>Sub-Section Number :</b>	2
<b>Sub-Section Id :</b>	640653168522
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 99 Question Id : 6406531113794 Question Type : MCQ**

**Correct Marks : 6**

Question Label : Multiple Choice Question

Consider the code given below. How many activation records are created while executing this code?

```
class ClassOne{
    public void methodOne(){
        // ...
    }
    public void methodTwo(){
        // ...
        methodOne();
        // ...
    }
    public void methodThree(){
        // ...
        methodTwo();
        // ...
    }
}
class ClassTwo{
    public static void main(String[] args){
        // ...
        ClassOne c = new ClassOne();
        c.methodThree();
    }
}
```

**Options :**

6406533774260. ✓ 4

6406533774261. ✗ 3

6406533774262. ✗ 5

6406533774263. ✗ 2

**Question Number : 100 Question Id : 6406531113795 Question Type : MCQ**

**Correct Marks : 6**

Question Label : Multiple Choice Question

Consider the statements given below.

Statement 1: Programmer is an object with methods `writeCode()` and `debugCode()`

Statement 2: SeniorProgrammer is an object with methods `writeCode()`, `debugCode()`, and `reviewCode()`

Identify the INCORRECT option regarding subtyping with respect to Programmer objects and SeniorProgrammer objects.

**Options :**

6406533774264. ✗ SeniorProgrammer is a valid subtype of Programmer because it has all methods of Programmer and additional functionality.

6406533774265. ✗ Programmer is not a valid subtype of SeniorProgrammer because it lacks the method `reviewCode()`

6406533774266. ❌ Subtyping allows SeniorProgrammer to be used wherever a Programmer is expected.

6406533774267. ✓ Subtyping allows Programmer to be used wherever a SeniorProgrammer is expected.

**Question Number : 101 Question Id : 6406531113796 Question Type : MCQ**

**Correct Marks : 6**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
public class NumberEvaluation {  
    public static void main(String[] args) {  
        int number = 10;  
  
        do {  
            number--;  
        } while (number > 5);  
  
        switch (number) {  
            case 5:  
                System.out.println("Low");  
                break;  
            case 6:  
                System.out.println("Medium");  
                break;  
            default:  
                if (number > 6) {  
                    System.out.println("High");  
                } else {  
                    System.out.println("Unknown");  
                }  
                break;  
        }  
    }  
}
```

What will the output be?

**Options :**

6406533774268. ✓ Low

6406533774269. ❌ Medium

6406533774270. ❌ High

6406533774271. ❌ Unknown

**Question Number : 102 Question Id : 6406531113802 Question Type : MCQ**

**Correct Marks : 6**

### Question Label : Multiple Choice Question

Consider the code given below.

```
class Fruits {  
    public Fruits() {  
        System.out.println("Fruit created!");  
    }  
    public void display() {  
        System.out.println("Fruits!");  
    }  
}  
class Grapes extends Fruits {  
    public Grapes() {  
        super();  
        System.out.println("Grape created!");  
    }  
    public void display() {  
        System.out.println("Grapes!");  
    }  
}  
public class Example {  
    public static void main(String[] args) {  
        Fruits a = new Grapes();  
        a.display();  
    }  
}
```

Choose the correct option.

#### Options :

This code generates the output:

Fruit created!  
Grape created!

6406533774292. ✘ Fruits!

This code generates the output:

Fruit created!  
Grape created!

6406533774293. ✓ Grapes!

This code generates the output:

Grape created!

6406533774294. ✘ Grapes!

This code generates the output:

Grape created!  
Fruits!

6406533774295. ✘ Fruits!

**Question Number : 103 Question Id : 6406531113804 Question Type : MCQ**

**Correct Marks : 6**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
interface Animal {  
    default void sound() {  
        System.out.println("Animal making sound");  
    }  
    void eat();  
}  
interface Mammal extends Animal {  
    default void sound() {  
        System.out.println("Mammal making sound");  
    }  
}  
class Dog implements Mammal {  
    public void eat() {  
        System.out.println("Dog eating");  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        Animal obj = new Dog(); // LINE 1  
        obj.sound(); // LINE 2  
        obj.eat();  
    }  
}
```

Choose the correct option.

**Options :**

This code generates the output:

Mammal making sound

6406533774300. ✘ Dog eating

This code generates the output:

Animal making sound

6406533774301. ✘ Dog eating

LINE 1 generates compilation error because a variable of type Animal cannot

6406533774302. ✓ refer to an object of type Dog.

LINE 2 generates runtime error because there is ambiguity in which sound() method is being invoked.  
6406533774303. ❌

<b>Sub-Section Number :</b>	3
<b>Sub-Section Id :</b>	640653168523
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 104 Question Id : 6406531113797 Question Type : MCQ**

**Correct Marks : 7**

Question Label : Multiple Choice Question

Consider the code given below that checks whether two players are the same. Method equals is overridden to compare two Player objects as follows.

If two players have the same playerID and teamName, then they are said to be equal.

```
class Player {  
    private String playerID;  
    private String teamName;  
  
    // Constructor to initialize instance variables  
  
    public boolean equals(Object obj) {  
        //CODE BLOCK  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        Player p1 = new Player("004", "Red");  
        Player p2 = new Car("004", "Red");  
        if (p1.equals(p2))  
            System.out.println("p1 and p2 are same");  
        else  
            System.out.println("p1 and p2 are different");  
    }  
}
```

Choose the correct option to fill in place of CODE BLOCK so that the output is:  
p1 and p2 are same

**Options :**

```
if(obj instanceof Player) {  
    if(this.playerID == obj.playerID && this.teamName == obj.teamName)  
        return true;  
}
```

6406533774272. ❌ return false;

6406533774273. ✓

```
if(obj instanceof Player) {  
    Player p = (Player) obj;  
    if(this.playerID == p.playerID && this.teamName == p.teamName)  
        return true;  
}  
return false;  
  
        if(this.playerID == obj.playerID && this.teamName == obj.teamName)  
            return true;  
6406533774274. ✘ return false;
```

```
if(obj instanceof Player) {  
    Player p = obj;  
    if(this.playerID == p.playerID && this.teamName == p.teamName)  
        return true;  
}  
6406533774275. ✘ return false;
```

### Question Number : 105 Question Id : 6406531113798 Question Type : MCQ

Correct Marks : 7

Question Label : Multiple Choice Question

Consider the Java code given below.

```
interface Vehicle {  
    default void drive() {  
        System.out.println("Vehicle is driving");  
    }  
}  
interface Fuel {  
    default void refuel() {  
        System.out.println("Vehicle is refueling");  
    }  
}  
class Car implements Vehicle, Fuel {  
    public void drive() {  
        System.out.println("Car is driving smoothly");  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        Vehicle v1 = new Car();  
        v1.drive();  
        v1.refuel(); // LINE 1  
    }  
}
```

Choose the correct option.

**Options :**

This program generates the output:

Car is driving smoothly

6406533774276. ✘ Vehicle is refueling

This program generates the output:

Vehicle is driving

6406533774277. ✘ Vehicle is refueling

This program generates compiler error because neither is class Car declared as

6406533774278. ✘ abstract nor does it override method refuel().

LINE 1 generates compiler error because v1 of type Vehicle cannot invoke

6406533774279. ✓ method refuel()

**Question Number : 106 Question Id : 6406531113799 Question Type : MCQ**

**Correct Marks : 7**

Question Label : Multiple Choice Question

Consider the Java code given below.

```

class Book{
    String name;
    String[] authors;

    public Book(String nm, String[] a){
        name = nm;
        authors = a;
    }
    public Book(Book b){
        this.name = b.name;
        this.authors = b.authors;
    }
}
public class Test{
    public static void main(String[] args){
        String[] authors = {"Tagore", "Narayan", "Vikram"};
        Book b1 = new Book("Gita", authors );
        Book b2 = new Book(b1);
        Book b3 = b1;
        b2.name = "Nirmala";
        b2.authors[0] = "Laxmana";
        System.out.println(b1.name + ", " + b1.authors[0]);
        System.out.println(b2.name + ", " + b2.authors[0]);
        System.out.println(b3.name + ", " + b3.authors[0]);
    }
}

```

What will the output be?

**Options :**

- Gita, Laxmana
- Nirmala, Laxmana
- Gita, Laxmana

6406533774280. ✓

- Gita, Tagore
- Nirmala, Laxmana

6406533774281. ✗ Gita, Tagore

- Nirmala, Tagore
- Nirmala, Laxmana

6406533774282. ✗ Gita, Tagore

- Nirmala, Tagore
- Nirmala, Laxmana

6406533774283. ✗ Nirmala, Tagore

**Question Number : 107 Question Id : 6406531113800 Question Type : MCQ**

**Correct Marks : 7**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
class Appliance {  
    public void turnOn() {  
        System.out.println("Turn on appliance");  
    }  
}  
  
class Fan extends Appliance {  
    public void turnOn() {  
        System.out.println("Turn on fan");  
    }  
    public void turnOn(int speed) {  
        System.out.println("Set fan speed to: " + speed);  
    }  
}  
  
class SmartFan extends Fan {  
    public void turnOn() {  
        super.turnOn();  
        System.out.println("Turn on smart fan with default settings");  
    }  
}  
  
public class Test {  
    public static void main(String[] args) {  
        Fan obj = new SmartFan(); // LINE 1  
        obj.turnOn(); // LINE 2  
        obj.turnOn(3); // LINE 3  
    }  
}
```

Choose the correct option.

**Options :**

The program generates output:

Turn on fan

Turn on smart fan with default settings

6406533774284. ✓ Set fan speed to: 3

LINE 1 generates compilation error because a variable of type `SmartFan` cannot

6406533774285. ❌ refer to an object of type `Appliance`.

LINE 2 generates run time error because there is ambiguity in which `turnOn()`

6406533774286. ❌ method is being invoked.

The program generates output:

Turn on fan

6406533774287. ❌ Set fan speed to: 3

**Question Number : 108 Question Id : 6406531113803 Question Type : MCQ**

**Correct Marks : 7**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
class BankAccount {  
    private int accountId;  
    private static double interestRate = 3.5;  
    public BankAccount(int accId) {  
        accountId = accId;  
    }  
    public final double calculateInterest() {  
        return interestRate * 0.01;  
    }  
}  
class SavingsAccount extends BankAccount {  
    public SavingsAccount(int accountId) {  
        super(accountId);  
    }  
    public final double calculateInterest() { // LINE 1  
        return (interestRate + 0.5) * 0.01; // LINE 2  
    }  
}  
public class BankTest {  
    public static void main(String[] args) {  
        SavingsAccount s1 = new BankAccount(505); // LINE 3  
        BankAccount b1 = new SavingsAccount(501); // LINE 4  
        System.out.println(b1.calculateInterest());  
        System.out.println(s1.calculateInterest());  
    }  
}
```

Which of the following statements is **FALSE**?

**Options :**

LINE 1 generates compilation error because the method `calculateInterest()`

6406533774296. ❌ cannot be overridden.

LINE 2 generates compilation error because instance variable `interestRate`

6406533774297. ❌ cannot be accessed in class `SavingsAccount`.

LINE 3 generates compilation error because a variable of type SavingsAccount  
6406533774298. ❌ cannot refer to an object of type BankAccount.

LINE 4 generates compilation error because a variable of type BankAccount  
6406533774299. ✓ cannot refer to an object of type SavingsAccount.

### Question Number : 109 Question Id : 6406531113806 Question Type : MCQ

#### Correct Marks : 7

Question Label : Multiple Choice Question

Consider the Java code given below.

```
interface Flyable {  
    default void fly() {  
        System.out.println("Flyable: Flying");  
    }  
    void takeOff();  
}  
----- CODE BLOCK -----  
class Sparrow extends Bird {  
    public void takeOff() {  
        System.out.println("Sparrow taking off");  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        Flyable obj = new Sparrow();  
        obj.fly();  
        obj.takeOff();  
    }  
}
```

Identify the correct option to fill in place of CODE BLOCK, such that the output is:

Bird: Flying high  
Sparrow taking off

#### Options :

```
class Bird implements Flyable{  
    public void fly() {  
        System.out.println("Bird: Flying high");  
    }  
}
```

6406533774308. ❌ }

6406533774309. ✓

```
abstract class Bird implements Flyable{
    public void fly() {
        System.out.println("Bird: Flying high");
    }
}
```

```
interface Bird implements Flyable{
    public void fly() {
        System.out.println("Bird: Flying high");
    }
}
```

6406533774310. ✘ }

```
interface Bird extends Flyable{
    public void fly() {
        System.out.println("Bird: Flying high");
    }
}
```

6406533774311. ✘ }

**Question Number : 110 Question Id : 6406531113807 Question Type : MCQ**

**Correct Marks : 7**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
interface OrderCallback {  
    void onOrderReady(String dish);  
}  
class Waitstaff implements OrderCallback {  
    public void orderDish(String dish) {  
        Chef c = new Chef(this); // LINE 1  
        c.prepareDish(dish);  
    }  
    public void onOrderReady(String dish) {  
        System.out.println("Waitstaff: " + dish + " served!");  
    }  
}  
class Chef {  
    private OrderCallback callback;  
    public Chef(OrderCallback cb) {  
        callback = cb;  
    }  
    public void prepareDish(String dish) {  
        System.out.println("Chef: Preparing " + dish + "...");  
        System.out.println("Chef: " + dish + " is ready.");  
        callback.onOrderReady(dish); // LINE 2  
    }  
}  
  
public class Restaurant {  
    public static void main(String[] args) {  
        Waitstaff s1 = new Waitstaff();  
        s1.orderDish("pasta");  
    }  
}
```

Choose the correct option.

**Options :**

This program generates compiler error at LINE 1

Reason: An object of `Chef` cannot be created inside method `Waitstaff`

6406533774312. ❌ because it uses an object of `OrderCallback` in its constructor.

This program generates the output:

Chef: Preparing pasta...

Chef: pasta is ready.

followed by runtime error

Reason: A method inside class `Waitstaff` is invoking method `prepareDish`

6406533774313. ❌ inside class `Chef`, whereas `chef` is invoking another method in class `Waitstaff`.

This program generates compiler error at LINE 2

Reason: A method inside class Waitstaff is invoking method `prepareDish` inside class Chef, whereas `chef` is invoking another method in class Waitstaff.

6406533774314. ❌

This program generates the output:

Chef: Preparing pasta...

Chef: pasta is ready.

6406533774315. ✓ Waitstaff: pasta served!

**Question Number : 111 Question Id : 6406531113808 Question Type : MCQ**

**Correct Marks : 7**

Question Label : Multiple Choice Question

Consider the code given below.

```

interface PlaylistIterator {
    public boolean hasNextSong();
    public Object getNextSong();
}
abstract class Song {
    public abstract void play();
}
class SongPlaylist {
    public SongPlaylist() {
        private final int count = 3;
        private Track[] songs = {new Track("Song A"), new Track("Song B"),
                                new Track("Song C")};
    }
    private class Track extends Song {
        private String title;
        public Track(String title) {
            this.title = title;
        }
        public void play() {
            System.out.println("Playing: " + title);
        }
    }
    private class PlaylistIter implements PlaylistIterator {
        private int currentIndex;
        public PlaylistIter() {
            // Constructor
        }
        public boolean hasNextSong() {
            // Check if there is a next song
        }
        public Object getNextSong() {
            // Return the next song
        }
    }
    public PlaylistIterator getIterator() {
        return new PlaylistIter();
    }
}
public class PlaylistTest {
    public static void main(String[] args) {
        SongPlaylist playlist = new SongPlaylist();
        PlaylistIterator iter = playlist.getIterator();
        while (iter.hasNext()){
            -----; //LINE 1
        }
    }
}

```

Identify the appropriate statement to fill in the blank at LINE 1, such that the output is:

Playing: Song A  
 Playing: Song B  
 Playing: Song C

#### Options :

6406533774316. ✓ ((Song)iter.getNext()).play()

6406533774317. ✘ ((Track)iter.get\_next()).play()

6406533774318. ✘ ((SongList)iter.get\_next()).play()

6406533774319. ✘ iter.get\_next().play();

**Sub-Section Number :** 4

**Sub-Section Id :** 640653168524

**Question Shuffling Allowed :** Yes

**Question Number : 112 Question Id : 6406531113801 Question Type : MSQ**

**Correct Marks : 7 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the Java program below.

```
class Appliance {  
    public void turnOn() {  
        System.out.println("Appliance is turned on");  
    }  
}  
class WashingMachine extends Appliance {  
    public void turnOn() {  
        System.out.println("Washing machine is turned on");  
    }  
    public void startWashCycle() {  
        System.out.println("Wash cycle starts");  
    }  
}  
public class TestAppliance {  
    public static void main(String[] args) {  
        Appliance obj = new WashingMachine();  
        obj.turnOn();  
        -----// LINE 1  
    }  
}
```

Identify the correct option(s) to fill in the blank at LINE 1, such that the output is:

Washing machine is turned on  
Wash cycle starts

**Options :**

6406533774288. ✘ obj.startWashCycle();

6406533774289. ✘ WashingMachine.startWashCycle();

```
if(obj instanceof WashingMachine){  
    WashingMachine wm = (WashingMachine)obj;  
    wm.startWashCycle();  
6406533774290. ✓ }  
6406533774291. ✓ ((WashingMachine)obj).startWashCycle();
```

**Question Number : 113 Question Id : 6406531113805 Question Type : MSQ**

**Correct Marks : 7 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the Java code given below. Identify the correct option(s) to fill in the blank at LINE 1, such that the output is: Not eligible for Insurance Claim

```
interface ClaimEligibility {  
    void printEligibility();  
}  
class Insurance {  
    private int age;  
    public Insurance(int a) {  
        age = a;  
    }  
    public ClaimEligibility checkEligibility() {  
        if (age > 25)  
            return new EligibleForClaim();  
        return new NotEligibleForClaim();  
    }  
    private class EligibleForClaim implements ClaimEligibility {  
        public void printEligibility() {  
            System.out.println("Eligible for Insurance Claim");  
        }  
    }  
    private class NotEligibleForClaim implements ClaimEligibility {  
        public void printEligibility() {  
            System.out.println("Not eligible for Insurance Claim");  
        }  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        Insurance ins1 = new Insurance(20);  
        ----- // LINE 1  
    }  
}
```

**Options :**

ClaimEligibility c1 = ins1.checkEligibility();  
6406533774304. ✓ c1.printEligibility();

6406533774305. ✓ ins1.checkEligibility().printEligibility();

6406533774306. ✗ ins1.printEligibility();

6406533774307. ✗ ins1.EligibleForClaim.printEligibility();

## Appdev2

<b>Section Id :</b>	64065379125
<b>Section Number :</b>	8
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	17
<b>Number of Questions to be attempted :</b>	17
<b>Section Marks :</b>	50
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653168525
<b>Question Shuffling Allowed :</b>	No

**Question Number : 114 Question Id : 6406531113809 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MODERN APPLICATION DEVELOPMENT II (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 :**

6406533774320. ✓ YES

6406533774321. ✗ NO

**Sub-Section Number :** 2

**Sub-Section Id :** 640653168526

**Question Shuffling Allowed :** Yes

**Question Number : 115 Question Id : 6406531113810 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following statements is true regarding “v-if” and “v-show” directives in VueJS?

**Options :**

6406533774322. ✓ The “v-if” directive adds/removes elements from the DOM, while v-show only toggles visibility using CSS.

6406533774323. ✗ The “v-show” directive adds/removes elements from the DOM, while v-if only toggles visibility using CSS.

6406533774324. ✗ Both the “v-if” and “v-show” directives add/remove elements from the DOM.

6406533774325. ✗ Both the “v-if” and “v-show” directives toggle visibility using CSS.

**Question Number : 116 Question Id : 6406531113811 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Consider the below JavaScript program.

```
let x = 5;
(function () {
  console.log(x);
  let x = 10;
})();
```

What will be the output of the above program?

**Options :**

6406533774326. ✗ 5

6406533774327. ✗ 10

6406533774328. ✗ undefined

6406533774329. ✓ Reference Error

6406533774330. ✘ null

**Question Number : 117 Question Id : 6406531113812 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

What is the output of this code?

```
console.log(myVar);
console.log(myFunc());

var myVar = "hello";
function myFunc() {
    return "world";
}
```

**Options :**

6406533774331. ✘ hello, world

6406533774332. ✓ undefined, world

6406533774333. ✘ ReferenceError

6406533774334. ✘ undefined, undefined

**Question Number : 118 Question Id : 6406531113813 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following statements is **true** about the let, const, and var keywords in JavaScript?

**Options :**

6406533774335. ✘ var is block-scoped, while let and const are function-scoped.

6406533774336. ✓ const variables must always be initialized at the time of declaration.

6406533774337. ✘ Variables declared with let and const are hoisted and initialized with undefined.

6406533774338. ✘ let, const, and var have identical scoping rules.

**Sub-Section Number :** 3

**Sub-Section Id :** 640653168527

**Question Shuffling Allowed :** Yes

**Question Number : 119 Question Id : 6406531113814 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the below JavaScript program.

```
function outer() {  
    let count = 0;  
    return function inner() {  
        return ++count;  
    };  
}  
  
const counter1 = outer();  
const counter2 = outer();  
  
console.log(counter1());  
console.log(counter1());  
console.log(counter2());
```

What will be the output of the above program?

**Options :**

6406533774339. ✘ 1

2

3

6406533774340. ✘ 1

1

1

6406533774341. ✓ 1

2

1

6406533774342. ✘ 0

1

0

6406533774343. ✘ 0

1

1

**Question Number : 120 Question Id : 6406531113815 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the 4 JavaScript code snippets given below.

Code Snippet 1:

```
let x = 10;  
const y;
```

Code Snippet 2:

```
let { a: b } = undefined;
```

Code Snippet 3:

```
const arr = [1, 2];  
arr = [3, 4];
```

Code Snippet 4:

```
const a = 10, b = 20;  
(() => { return a + b; })();
```

Which of the above JavaScript code snippet(s) will throw an error?

**Options :**

6406533774344. ❌ 1 and 2

6406533774345. ✓ 1, 2 and 3

6406533774346. ❌ 2, 3 and 4

6406533774347. ❌ All 4

**Question Number : 121 Question Id : 6406531113816 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the below VueJS application.

```
<div id="app">
  <p>{{ counter }}</p>
  <button @click="updateCounter">Click Me</button>
</div>

<script>
new Vue({
  el: '#app',
  data: {
    counter: 1,
  },
  methods: {
    updateCounter() {
      this.counter *= 2;
    },
  },
});</script>
```

What will the “p” tag display when the button with the text “Click Me” is clicked three times?

**Options :**

6406533774348. ✘ 1

6406533774349. ✘ 4

6406533774350. ✓ 8

6406533774351. ✘ 16

**Question Number : 122 Question Id : 6406531113817 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following JavaScript code snippet shown below.

```
let length = 5;

function countLen(item){
  console.log(this.length);
}

const data = [countLen, "Apple", length]

data[0]('Script')
```

What will be output on browser's console for the above JavaScript code?

**Options :**

6406533774352. ✘ 6

6406533774353. ✘ 5

6406533774354. ✘ 4

6406533774355. ✓ 3

**Question Number : 123 Question Id : 6406531113818 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following JavaScript code snippet shown below.

```
var value = 50;

const mainObj = {
    value: 42,
    getValue: function() {
        return this.value;
    }
};

const nextObj = {
    value: 100
};

const getValue1 = mainObj.getValue.bind()(nextObj);
const getValue2 = mainObj.getValue.bind(nextObj)();

console.log(getValue1);
console.log(getValue2);
```

What will be output on browser's console for the above JavaScript code?

**Options :**

50

6406533774356. ✘ 100

42

50

6406533774357. ✘

100

100

6406533774358. ✘

6406533774359. ✓

*undefined*

**100**

*undefined*

**50**

6406533774360. ❌

**Question Number : 124 Question Id : 6406531113819 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following JavaScript code

```
let Tree = {  
    name: "Oak",  
    size: 5,  
    description: function (size) {  
        return `A ${this.size > 10 ? 'large' : 'medium'} ${this.name} tree.`;  
    }  
}  
  
const willow = {  
    name: 'Willow'  
};  
  
const returnedString = Tree.description.call(willow, 15);  
  
console.log(returnedString)
```

What will be the output of the code?

**Options :**

6406533774361. ❌ A large Oak tree

6406533774362. ❌ A medium Oak tree

6406533774363. ❌ A large Willow tree

6406533774364. ✓ A medium Willow tree

**Question Number : 125 Question Id : 6406531113820 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following HTML with relevant Vue CDN link attached.

```
<div id="app">
  <div :class="{ active: isActive, 'text-danger': hasError }">
    {{ message }}
  </div>
</div>

<script>
  new Vue({
    el: '#app',
    data: {
      message: 'Hello!',
      isActive: true,
      hasError: false
    }
  })
</script>
```

Given the Vue.js application above, which classes will be applied to the div containing the message?

**Options :**

- 6406533774365. ✓ Only 'active'
- 6406533774366. ✗ 'text-danger' and 'active'
- 6406533774367. ✗ No classes
- 6406533774368. ✗ Only 'text-danger'

**Sub-Section Number :** 4

**Sub-Section Id :** 640653168528

**Question Shuffling Allowed :** Yes

**Question Number : 126 Question Id : 6406531113822 Question Type : MCQ**

**Correct Marks : 4.5**

**Question Label : Multiple Choice Question**

Consider the following Vue2 app and the index file given below.

#### index.html

```
<body>
  <div id="app">
    <h4>{{ state }}</h4>
  </div>
  <script
    src="https://cdn.jsdelivr.net/npm/vue@2.7.16/dist/vue.js">
  </script>
  <script src="./script.js"></script>
</body>
</html>
```

#### script.js

```
const app = new Vue({
  el: '#app',
  data: {
    terminal: ['3', '2', '1'],
    curr_status: ["arrived", "departed", "delayed"]
  },
  computed: {
    state: () => {
      return `The flight 103 has ${this.curr_status[1]} from terminal
${this.terminal[2]}.`
    }
  }
})
```

What will be the output on the browser?

#### Options :

- 6406533774374. ✖ The flight 103 has departed from terminal 1.
- 6406533774375. ✖ The flight 103 has arrived from terminal 2.
- 6406533774376. ✖ The flight 103 has delayed from terminal 3.
- 6406533774377. ✖ The flight 103 has from terminal.
- 6406533774378. ✓ ReferenceError

**Question Number : 127 Question Id : 6406531113823 Question Type : MCQ**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the following Vue App and the HTML document given below.

index.html

```
<body>
  <div id="app">
    <my-comp>
      <h3>Exploring Vue JS</h3>
      <template v-slot:ongoing>
        <h3>Learning App Dev 2</h3>
      </template>
    </my-comp>
  </div>
  <script src="./script.js"></script>
</body>
```

script.js

```
const MyComp = {
  name: 'my-comp',
  props: ['tech'],
  template : `<div class="container">
    <slot name="complete"><h3>Learned DBMS</h3></slot>
    <slot name="ongoing"></slot>
    <slot>Exploring Frontend</slot>
  </div>`
}

const app = new Vue({
  el: '#app',
  components: {
    MyComp
  }
})
```

What will be rendered on the browser for code setup given above?

**Options :**

6406533774379. ✘ Learning App Dev 2

Exploring Vue JS

6406533774380. ✘ Learning App Dev 2

Exploring Frontend

6406533774381. ✘ Learned DBMS

Learning App Dev 2

Exploring Frontend

6406533774382. ✓ Learned DBMS

Learning App Dev 2

Exploring Vue JS

**Question Number : 128 Question Id : 6406531113824 Question Type : MCQ**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the following HTML with relevant Vue CDN link attached.

```
<div id="app1">
  {{ messageA }}
</div>
<div id="app2">
  {{ messageB }}
</div>

<script>
  const vm1 = new Vue({
    el: '#app1',
    data: {
      messageA: 'Hello from App 1'
    }
  })

  const vm2 = new Vue({
    el: '#app2',
    data: {
      messageB: 'Hello from App 2'
    }
  })

  vm1.messageA = 'Updated App 1';
</script>
```

After the code execution above, what will be displayed on the page?

**Options :**

6406533774383. ✓ "Updated App 1" and "Hello from App 2"

6406533774384. ✗ "Hello from App 1" and "Hello from App 2"

6406533774385. ✗ "Updated App 1" and blank second div

6406533774386. ✗ Both divs will be blank

**Question Number : 129 Question Id : 6406531113825 Question Type : MCQ**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the following HTML with relevant Vue CDN attached.

```

<div id="app">
    <input v-model.number="price" type="number">
    <input v-model.number="quantity" type="number">
    <p>Total: {{ total }}</p>
    <p>Last Updated By: {{ lastUpdatedBy }}</p>
</div>

<script>
new Vue({
    el: '#app',
    data: {
        price: 10,
        quantity: 1,
        total: 10,
        lastUpdatedBy: 'initial'
    },
    watch: {
        price: {
            handler(newVal) {
                this.total = newVal * this.quantity;
                this.lastUpdatedBy = 'price';
            }
        },
        quantity: {
            handler(newVal) {
                this.total = this.price * newVal;
                this.lastUpdatedBy = 'quantity';
            }
        }
    }
})
</script>

```

If the user changes the price to 20 and then immediately changes the quantity to 2, what will be the final values of total and lastUpdatedBy?

#### Options :

6406533774387. ✗ total: 20, lastUpdatedBy: "price"

6406533774388. ✓ total: 40, lastUpdatedBy: "quantity"

6406533774389. ✗ total: 20, lastUpdatedBy: "quantity"

6406533774390. ✗ total: 40, lastUpdatedBy: "price"

**Sub-Section Number :** 5

**Sub-Section Id :** 640653168529

**Question Shuffling Allowed :** Yes

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the following JavaScript Code.

```
class Person {  
    constructor(name) {  
        this.name = name;  
    }  
  
    greet() {  
        console.log(`Hello, my name is ${this.name}`);  
    }  
  
    static identify() {  
        console.log("I am a Person class");  
    }  
}  
  
const john = new Person("John");
```

Which of the following expression(s) will cause an error?

**Options :**

6406533774369. ❌ john.greet();

6406533774370. ✓ Person.greet();

6406533774371. ✓ john.identify();

6406533774372. ❌ Person.identify();

6406533774373. ❌ console.log(john.name);

**MLT**

**Section Id :** 64065379126

**Section Number :** 9

**Section type :** Online

**Mandatory or Optional :** Mandatory

**Number of Questions :** 13

**Number of Questions to be attempted :** 13

<b>Section Marks :</b>	40
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653168530
<b>Question Shuffling Allowed :</b>	No

**Question Number : 131 Question Id : 6406531113826 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MACHINE LEARNING TECHNIQUES (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 :**

6406533774391. ✓ YES

6406533774392. ✗ NO

<b>Sub-Section Number :</b>	2
<b>Sub-Section Id :</b>	640653168531
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 132 Question Id : 6406531113827 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

For the Lloyd's algorithm, what would be the correct relationship among the following three quantities?

- (1)  $\sum_{i=1}^n \|x_i - \mu_{z_i}^t\|^2$ ,
- (2)  $\sum_{i=1}^n \|x_i - \mu_{z_i}^{t+1}\|^2$ ,
- (3)  $\sum_{i=1}^n \|x_i - \mu_{z_i}^{t+1}\|^2$

where  $\mu_{z_i}^t$  and  $\mu_{z_i}^{t+1}$  refer to means of cluster  $z_i$  in iterations,  $t$  and  $t+1$  respectively, and  $\mu_{z_i}^{t+1}$  refer to the mean of the cluster  $z_i$  where  $x_i$  is going to move in the next iteration, i.e.,  $(t+1)$ -th iteration.

**Options :**

6406533774393. ❌ (1) > (2) > (3)

6406533774394. ❌ (1) < (2) < (3)

6406533774395. ✓ (3) < (1) < (2)

6406533774396. ❌ (2) < (3) < (1)

**Sub-Section Number :**

3

**Sub-Section Id :**

640653168532

**Question Shuffling Allowed :**

Yes

**Question Number : 133 Question Id : 6406531113828 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

$K$ -means clustering is run on a dataset of 100 points with  $K = 3$ . If you know that the points  $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$  and  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$  are a part of the same cluster  $C1$ , then which of the following points will definitely lie in  $C1$ ?

**Options :**

6406533774397. ❌  $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$

6406533774398. ❌  $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$

6406533774399. ✓  $\begin{bmatrix} 0.2 \\ 1 \end{bmatrix}$

6406533774400. ❌  $\begin{bmatrix} 0 \\ 0 \end{bmatrix}$

**Question Number : 134 Question Id : 6406531113829 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Let  $x_1, x_2, \dots, x_n$  be  $d$ -dimensional data points ( $d > n$ ) and  $X$  be the matrix of shape  $d \times n$  containing the data points. The  $k^{\text{th}}$  largest eigenvalue and corresponding unit eigenvector of  $X^T X$  is  $\lambda$  and  $\alpha_k$ , respectively. What will be the projection of  $x_i$  on the  $k^{\text{th}}$  principal component?

**Options :**

6406533774401. ❌  $x_i^T \alpha_k$

6406533774402. ❌  $\frac{x_i^T \alpha_k}{\sqrt{n\lambda}}$

6406533774403. ✓  $\frac{x_i^T X \alpha_k}{\sqrt{\lambda}}$

6406533774404. ❌  $x_i^T X \alpha_k$

**Sub-Section Number :**

4

**Sub-Section Id :**

640653168533

**Question Shuffling Allowed :**

Yes

**Question Number : 135 Question Id : 6406531113830 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following matrices are appropriate matrix  $K = X^T X$  for some data matrix  $X$ ? Choose the most appropriate answer.

**Options :**

6406533774405. ✓ 
$$K = \begin{bmatrix} 4 & 1 & 2 \\ 1 & 5 & 3 \\ 2 & 3 & 6 \end{bmatrix}$$

6406533774406. ❌ 
$$K = \begin{bmatrix} -2 & -1 & 0 \\ -1 & -3 & -1 \\ 0 & -1 & -1 \end{bmatrix}$$

6406533774407. ❌

$$K = \begin{bmatrix} 1 & -2 & 1 \\ 2 & 5 & -2 \\ 1 & -2 & 2 \end{bmatrix}$$

$$K = \begin{bmatrix} 3 & 1 & 0 \\ 1 & 4 & 1 \\ 0 & 1 & 5 \end{bmatrix}$$

6406533774408. ✓

**Sub-Section Number :**

5

**Sub-Section Id :**

640653168534

**Question Shuffling Allowed :**

Yes

**Question Number : 136 Question Id : 6406531113831 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following statements is/are true?

**Options :**

6406533774409. ✓  $k : \mathbb{R}^2 \times \mathbb{R}^2 \rightarrow \mathbb{R}$ ,  $k(x_1, x_2) = (x_1^T x_2)^3$  is a valid kernel.

6406533774410. ✓  $k : \mathbb{R}^n \times \mathbb{R}^n \rightarrow \mathbb{R}$ ,  $k(x_1, x_2) = e^{-\|x_1 - x_2\|^2}$  is a valid kernel.

6406533774411. ✓ The trace of  $XX^T$  is equal to the trace of  $X^T X$ .

6406533774412. ✗ Eigenvectors of  $XX^T$  are the same as eigenvectors of  $X^T X$ .

**Sub-Section Number :**

6

**Sub-Section Id :**

640653168535

**Question Shuffling Allowed :**

Yes

**Question Number : 137 Question Id : 6406531113832 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

Let  $X$  be a data matrix of shape  $(d, n)$  for a centered dataset. The first principal component of the dataset is given as

$$\left[ \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2} \right]^T.$$

What will be the scalar proxy of the point  $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$  onto the first principal component?

Enter the answer correct to two decimal places.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

4.92 to 4.98

**Question Number : 138 Question Id : 6406531113833 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider a dataset that has 1000 samples, where each sample belongs to  $\mathbb{R}^{20}$ . PCA is run on this dataset and the top 5 principal components are retained, the rest being discarded. If it takes one unit of memory to store a real number, find the percentage decrease in storage space of the dataset by moving to its compressed representation. Enter your answer correct to two decimal places.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

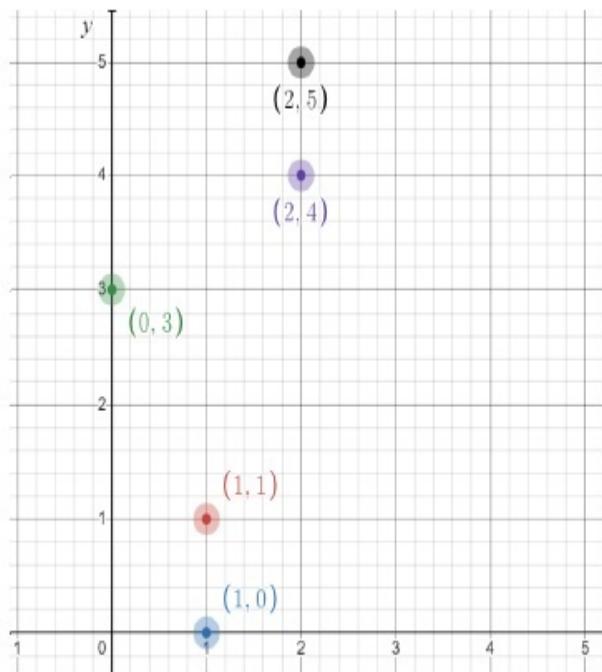
74 to 75

**Question Number : 139 Question Id : 6406531113834 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

$K$ -means++ algorithm was run on the following dataset with  $K = 2$ . If we



use the point  $(1, 1)$  as the first cluster mean, then find the probability of the point that has the least chance of being chosen as the second cluster mean. Enter the answer correct to two decimal places. Use Euclidean distance to calculate the distance.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

0.07 to 0.11

**Question Number : 140 Question Id : 6406531113835 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

Suppose you toss a coin four times and observe no heads. You then give the coin to your friend, who tosses it until the first head occurs. Your friend tosses the coin a total of five times. Let  $p$  denote the probability that the coin comes up heads. Find the maximum likelihood estimate of  $p$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

0.10 to 0.12

**Sub-Section Number :**

7

**Sub-Section Id :**

640653168536

**Question Shuffling Allowed :**

Yes

**Question Number : 141 Question Id : 6406531113836 Question Type : SA**

**Correct Marks : 4**

**Question Label : Short Answer Question**

Suppose we fit a Gaussian Mixture Model with  $K = 2$  for the following dataset:

$$D = \{x_1 = 1, x_2 = 3, x_3 = 2, x_4 = 5\}.$$

At the beginning of the  $t$ -th time step of the EM algorithm, we have  $\theta^{(t)}$  as follows:

$$\pi_1 = 0.5, \quad \pi_2 = 0.5$$

$$\mu_1 = 1, \quad \mu_2 = 3$$

$$\sigma_1^2 = 1, \quad \sigma_2^2 = 1$$

What is the probability that  $x_1$  belongs to the first component? Enter the answer correct to two decimal places.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

0.86 to 0.90

**Sub-Section Number :** 8

**Sub-Section Id :** 640653168537

**Question Shuffling Allowed :** No

**Question Id : 6406531113837 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (142 to 143)**

**Question Label : Comprehension**

Consider the following dataset consisting of four points, all of which are collinear:

$$S = \left\{ \begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 3 \\ 6 \end{bmatrix}, \begin{bmatrix} 5 \\ 10 \end{bmatrix} \right\}$$

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 142 Question Id : 6406531113838 Question Type : MCQ**

**Correct Marks : 2**

**Question Label : Multiple Choice Question**

Among the vectors given below, choose a representative that has unit length.

**Options :**

$$\begin{bmatrix} \frac{1}{3} \\ \frac{2}{3} \\ \frac{2}{3} \end{bmatrix}$$

6406533774418. ✘

$$\begin{bmatrix} \frac{1}{\sqrt{5}} \\ \frac{2}{\sqrt{5}} \\ \frac{2}{\sqrt{5}} \end{bmatrix}$$

6406533774419. ✓

$$\begin{bmatrix} \frac{3}{\sqrt{5}} \\ \frac{6}{\sqrt{5}} \end{bmatrix}$$

6406533774420. ✘

$$\begin{bmatrix} \frac{3}{5} \\ \frac{4}{5} \end{bmatrix}$$

6406533774421. ✘

**Question Number : 143 Question Id : 6406531113839 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

If standard PCA is performed on this dataset, what is the variance along the first principal component? Enter the answer correct to two decimal places.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

43 to 44

**Sub-Section Number :** 9

**Sub-Section Id :** 640653168538

**Question Shuffling Allowed :** No

**Question Id : 6406531113840 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (144 to 145)**

Question Label : Comprehension

Suppose that 100 items are sampled from a manufacturing process and 10 are found to be defective. Let  $p$  denote the proportion of defective items. Assume that the prior distribution for  $p$  is Beta(1, 1).

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 144 Question Id : 6406531113841 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Select the correct options from the following:

**Options :**

6406533774423. ❌ Posterior distribution for  $p$  is Beta(91, 11).

6406533774424. ✓ Posterior distribution for  $p$  is Beta(11, 91).

6406533774425. ❌ Posterior distribution for  $p$  is Bernoulli(0.1).

6406533774426. ❌ Posterior distribution for  $p$  is Bernoulli(0.9).

**Question Number : 145 Question Id : 6406531113842 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

Find the posterior mean. Enter the answer correct to two decimal places.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

0.10 to 0.11

## MLP

<b>Section Id :</b>	64065379127
<b>Section Number :</b>	10
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	13
<b>Number of Questions to be attempted :</b>	13
<b>Section Marks :</b>	40
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No

<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653168539
<b>Question Shuffling Allowed :</b>	No

**Question Number : 146 Question Id : 6406531113843 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MACHINE LEARNING PRACTICE (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 :**

6406533774428. ✓ YES

6406533774429. ✗ NO

<b>Sub-Section Number :</b>	2
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<b>Sub-Section Id :</b>	640653168540
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<b>Question Shuffling Allowed :</b>	Yes
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**Question Number : 147 Question Id : 6406531113844 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

What is the primary risk of not performing a train-test split in a machine learning workflow?

**Options :**

6406533774430. ✗ The training time will increase.

6406533774431. ✓ The model might overfit the training data and perform poorly on new data.

6406533774432. ✗ The dataset may become unbalanced.

6406533774433. ✗ The model may fail to converge.

**Question Number : 148 Question Id : 6406531113845 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Why is data preprocessing necessary before using it for model building?

**Options :**

6406533774434. ❌ The data may contain outliers or missing values due to errors in data collection.
6406533774435. ❌ Features may have different scales, affecting model performance.
6406533774436. ❌ The dataset may include non-numerical features that need to be converted to numerical representations.
6406533774437. ✓ All of these

**Question Number : 149 Question Id : 6406531113848 Question Type : MCQ****Correct Marks : 2**

Question Label : Multiple Choice Question

What is the purpose of the `tol` parameter in the `fit` method of the stochastic regressor?

```
from sklearn.linear_model import SGDRegressor
from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error
from sklearn.datasets import load_breast_cancer

X,y = load_breast_cancer(return_X_y=True)

model = SGDRegressor(early_stopping=True,
                     validation_fraction=0.2,
                     tol=0.001,
                     n_iter_no_change=5)

X_train, X_test, y_train, y_test = train_test_split(X, y,
                                                    test_size=0.2,
                                                    random_state=42)

model.fit(X_train, y_train)
y_pred = model.predict(X_test)
mse = mean_squared_error(y_test, y_pred)
```

**Options :**

6406533774445. ✓ It specifies the tolerance level for early stopping based on the change in the validation error.
6406533774446. ❌ It controls the learning rate of the stochastic regressor during training.
6406533774447. ❌ It determines the maximum number of iterations for the training process.
6406533774448. ❌ It defines the fraction of the validation set used for early stopping.

**Question Number : 150 Question Id : 6406531113849 Question Type : MCQ****Correct Marks : 2**

Question Label : Multiple Choice Question

Suppose we want to transform features in a dataset using polynomial transformation. The `sklearn` API provides the functionality in which of the following modules?

**Options :**

- 6406533774449. ✘ sklearn.dataset
- 6406533774450. ✘ sklearn.model\_selection
- 6406533774451. ✓ sklearn.preprocessing
- 6406533774452. ✘ sklearn.featureSelection
- 6406533774453. ✘ sklearn.featureExtraction

**Sub-Section Number :**

3

**Sub-Section Id :**

640653168541

**Question Shuffling Allowed :**

Yes

**Question Number : 151 Question Id : 6406531113846 Question Type : MCQ****Correct Marks : 3**

Question Label : Multiple Choice Question

For a dataset with 1000 data points and 100 features, the following code will generate how many models during execution?

Note: X is the feature matrix and y is the target vector.

```
from sklearn.model_selection import cross_val_score
from sklearn.model_selection import LeaveOneOut
from sklearn.linear_model import linear_regression
lin_reg = linear_regression()
looocv = LeaveOneOut()
score = cross_val_score(lin_reg, X, y, cv=looocv)
```

**Options :**

- 6406533774438. ✓ 1000
- 6406533774439. ✘ 100
- 6406533774440. ✘ 99
- 6406533774441. ✘ 999

**Question Number : 152 Question Id : 6406531113847 Question Type : MCQ****Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following code:

```
import numpy as np
from sklearn.linear_model import LinearRegression
X = np.array([[1, 1], [1, 2], [2, 2], [2, 3], [2, 1], [3, 3]])
#  $y = 1 * x_0 + 2 * x_1 + 3$ 
y = np.dot(X, np.array([1, 2])) + 3

reg1 = LinearRegression(fit_intercept = False).fit(X, y)
s1 = reg1.score(X, y)

reg2 = LinearRegression(fit_intercept = True).fit(X, y)
s2 = reg2.score(X, y)
```

Which of the following is more likely to be true?

**Options :**

6406533774442. ✘ s1 = s2

6406533774443. ✓ s1 < s2

6406533774444. ✘ s1 > s2

**Sub-Section Number :**

4

**Sub-Section Id :**

640653168542

**Question Shuffling Allowed :**

Yes

**Question Number : 153 Question Id : 6406531113850 Question Type : MSQ**

**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Given the following code snippet, which statement is true regarding the use of LabelEncoder?

```
from sklearn.preprocessing import LabelEncoder

data = ["cat", "dog", "fish", "cat", "bird", "dog", "bird"]

encoder = LabelEncoder()
encoded_data = encoder.fit_transform(data)

print(encoded_data)
```

**Options :**

6406533774454. ✓ encoded\_data will contain only the values 0, 1, 2, and 3.

If ["elephant"] is passed to encoder.transform(), it will be successfully transformed to an

6406533774455. ✘ integer.

6406533774456. ✘ LabelEncoder assigns higher integer values to more frequently occurring labels.

6406533774457. ✓ After calling encoder.inverse\_transform([2]), the result will be "dog".

**Question Number : 154 Question Id : 6406531113851 Question Type : MSQ**

**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following Evaluation metrics can be used in a regression problem?

**Options :**

6406533774458. ✓ Mean Squared Error

6406533774459. ✘ Accuracy

6406533774460. ✘ F1-Score

6406533774461. ✓ Mean Absolute Error

6406533774462. ✘ credit score

6406533774463. ✘ CGPA

**Sub-Section Number :**

5

**Sub-Section Id :**

640653168543

**Question Shuffling Allowed :**

Yes

**Question Number : 155 Question Id : 6406531113852 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

What will be the output of the following code:

```
import numpy as np
from sklearn.impute import SimpleImputer
imputer = SimpleImputer(missing_values = -1, strategy ='median')
data = np.array([[1, 2, 3], [6, 0, -1], [3, -1, 4]])
data_imputed = imputer.fit_transform(data)
print(data_imputed[1,2])
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3.5

**Sub-Section Number :**

6

**Sub-Section Id :**

640653168544

**Question Shuffling Allowed :**

Yes

**Question Number : 156 Question Id : 6406531113853 Question Type : SA**

**Correct Marks : 3**

**Question Label : Short Answer Question**

For LinearRegression with equation  $Y = W_0X_0 + W_1X_1 + W_2X_2$  and given that  $W_2 = 2 * W_1$ .

What will be the value of the  $W_2$  for the below code if the model doesn't make any error?

(Write the answer correct upto one decimal)

Where  $X_1$  and  $X_2$  are column1 and column2 respectively and  $W_1$  and  $W_2$  are weights associated to the respected columns while fitting

```
from sklearn.linear_model import LinearRegression
X_train = [[1,2], [2,4], [3,6], [4,8]]
y_train = [1,2,3,4]
reg = LinearRegression(fit_intercept=False) #intercept=0
reg.fit(X_train,y_train)
print(reg.coef_[1])
```

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

0.4

**Sub-Section Number :**

7

**Sub-Section Id :**

640653168545

**Question Shuffling Allowed :**

No

**Question Id : 6406531113854 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (157 to 162)**

**Question Label : Comprehension**

Consider the given Table 1: Banking data for the given subquestions stored as pandas dataframe in variable df

```

>>> import pandas as pd
>>> df = pd.read_csv('dataset.csv')
>>> print(df)

```

Age	Job	Marital	Education	Balance	Housing	Contact
21	unemployed	married	secondary	77387	no	telephone
49	management	married	tertiary	2037	no	nan
72	self-employed	married	tertiary	132	no	cellular
31	blue-collar	married	secondary	298	yes	nan
28	admin	single	secondary	2831	yes	nan
39	technician	single	secondary	15	yes	cellular
32	blue-collar	married	primary	131	yes	nan
59	management	married	tertiary	5314	no	cellular
27	technician	single	secondary	155	yes	cellular
47	blue-collar	married	primary	259	no	cellular

Table 1: Banking Data

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 157 Question Id : 6406531113855 Question Type : MSQ**

**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the columns in the banking data are nominal features?

### Options :

6406533774466. ✓ Job

6406533774467. ✓ Marital

6406533774468. ✗ Education

6406533774469. ✓ Housing

6406533774470. ✓ Contact

**Question Number : 158 Question Id : 6406531113856 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct option to find the number of null values (represented as nan) present in the Contact column

### Options :

6406533774471. ✓ df["Contact"].isnull().sum()

6406533774472. ✗ df["Contact"].isnull.sum()

6406533774473. ✗ df["Contact"].sum().isnull()

6406533774474. ✘ df[ "Contact" ].sum().isnull

**Question Number : 159 Question Id : 6406531113857 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

In **Contact** column which of the following statistical measures can be used to replace nan values?

**Options :**

6406533774475. ✘ Mean

6406533774476. ✘ Median

6406533774477. ✓ Mode

6406533774478. ✘ Variance

**Question Number : 160 Question Id : 6406531113858 Question Type : MSQ**

**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following options can be used to compute the median of the **Balance** column for each category in the **Marital** feature?

**Options :**

6406533774479. ✓ df.pivot\_table(values='Balance', index='Marital', aggfunc="median")

6406533774480. ✘ df.groupby('Marital').mean()

6406533774481. ✘ df.apply('Marital').agg({'Balance': 'median'})

6406533774482. ✓ df.groupby('Marital').agg({'Balance': 'median'})

**Question Number : 161 Question Id : 6406531113859 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

What will be the value of the following code:

`print(df[ "Age" ].median())`

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

35.5

**Question Number : 162 Question Id : 6406531113860 Question Type : MCQ****Correct Marks : 1**

Question Label : Multiple Choice Question

What will be the value of the following code:

```
df_new = df["Age"] + df["Balance"]
print(df_new[4])
```

**Options :**

6406533774484. ✘ secondary

6406533774485. ✘ 329

6406533774486. ✓ 2859

6406533774487. ✘ Error: Datatype not matching

**Sub-Section Number :**

8

**Sub-Section Id :**

640653168546

**Question Shuffling Allowed :**

No

**Question Id : 6406531113861 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix****Question Numbers : (163 to 166)**

Question Label : Comprehension

Consider the Following codeblock for the given subquestions.

```
import pandas as pd
import numpy as np
from sklearn.preprocessing import OneHotEncoder, StandardScaler
from sklearn.compose import ColumnTransformer

data = {"fruits": ['apple','orange', 'banana', 'orange', 'apple'],
        "price": [10,20,5,20,10],
        "color": ['red', 'orange', 'yellow', 'orange', 'red']}
df = pd.DataFrame(data)

transformers = [
    ('Ohe', OneHotEncoder(), [0,2]),
    ('scaler', StandardScaler(), [1])
]
ct = ColumnTransformer(transformers = transformers)

transformed_df = ct.fit_transform(df)
```

Based on the above data, answer the given subquestions.

## Sub questions

**Question Number : 163 Question Id : 6406531113862 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

What will be the output of the following code ?

```
print(transformed_df.shape)
```

**Options :**

6406533774488. ✘ (7,5)

6406533774489. ✘ (3,5)

6406533774490. ✘ (5,3)

6406533774491. ✓ (5,7)

**Question Number : 164 Question Id : 6406531113863 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

What will be the output of the following code ?

```
print(ct.transformers_[1][1].mean_)
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

13

**Question Number : 165 Question Id : 6406531113864 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

What will be the output of the following code ?

```
print(ct.transformers_[1][1].var_)
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

**Question Number : 166 Question Id : 6406531113865 Question Type : MCQ**

**Correct Marks : 2**

**Question Label : Multiple Choice Question**

What will be the output of the following code ?

```
df_new = pd.DataFrame([['orange',22,'orange']], columns=['fruits','price','color'])
print(ct.transform(df_new))
```

**Options :**

6406533774494. ✘ [[2, 0, 0.61]]

6406533774495. ✘ [[0, 0, 1, 0, 0, 1, 1.50]]

6406533774496. ✘ [[0, 1, 0, 0, 1, 0, 0.25]]

6406533774497. ✓ [[0, 0, 1, 1, 0, 0, 1.50]]

6406533774498. ✘ [[0, 0, 1, 1, 0, 0, 0.25]]

## Maths1

<b>Section Id :</b>	64065379128
<b>Section Number :</b>	11
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	14
<b>Number of Questions to be attempted :</b>	14
<b>Section Marks :</b>	50
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1

**Sub-Section Id :**

640653168547

**Question Shuffling Allowed :**

No

**Question Number : 167 Question Id : 6406531113866 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : MATHEMATICS FOR DATA SCIENCE I (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 :**

6406533774499. ✓ YES

6406533774500. ✗ NO

**Question Number : 168 Question Id : 6406531113867 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**Instructions:**

- There are some questions which have functions with discrete valued domains (such as day, month, year etc).
- For NAT type questions, enter only one right answer even if you get multiple answers for that particular question.
- Notations:
  - $\mathbb{R}$ = Set of real numbers
  - $\mathbb{Q}$ = Set of rational numbers
  - $\mathbb{Z}$ = Set of integers
  - $\mathbb{N}$ = Set of natural numbers
- The set of natural numbers includes 0.

**Options :**

6406533774501. ✓ Instructions has been mentioned above.

6406533774502. ✗ This Instructions is just for a reference & not for an evaluation.

**Sub-Section Number :**

2

**Sub-Section Id :**

640653168548

**Question Shuffling Allowed :**

Yes

**Question Number : 169 Question Id : 6406531113868 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

The Cartesian product  $A \times A$  has 9 elements. Two of the elements of the Cartesian product are (1, 3) and (3, 7). Find the sum of all the elements in set A.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

11

**Sub-Section Number :** 3

**Sub-Section Id :** 640653168549

**Question Shuffling Allowed :** Yes

**Question Number : 170 Question Id : 6406531113869 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Let  $X$  be the set of natural numbers divisible by 100,  $Y$  be the set of natural numbers divisible by 25, and  $Z$  be the set of natural numbers that are perfect squares. Now consider the following Venn diagram.

[Note: A, B, C, D, E, F, and G are the regions marked in the following Venn diagram (a region in the Venn diagram can be empty)]

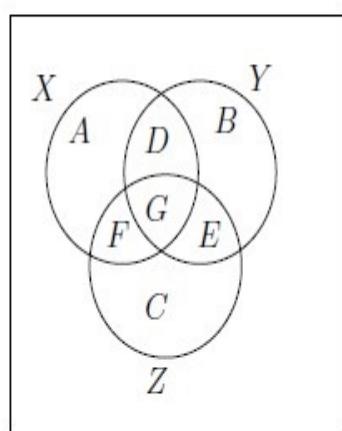


Figure M1-1

Which of the following options is (are) correct?

**Options :**

6406533774504. ✓ 625 is in E.

6406533774505. ✗ G is an empty set.

6406533774506. ✓ A and F are empty set.

6406533774507. ✘ 25 is in F.

<b>Sub-Section Number :</b>	4
<b>Sub-Section Id :</b>	640653168550
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 171 Question Id : 6406531113870 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following option(s) is(are) true for relation,

$$R_1 = \{(x, y) : x, y \in \mathbb{R}, x^2 + y^2 = 1\}$$

**Options :**

6406533774508. ✘  $R_1$  is a reflexive relation.

6406533774509. ✓  $R_1$  is a symmetric relation.

6406533774510. ✘  $R_1$  is a transitive relation.

6406533774511. ✘  $R_1$  is an equivalence relation.

**Question Number : 172 Question Id : 6406531113871 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following relations is/are one-one function?

**Options :**

6406533774512. ✘  $R_1 = \{(x, y) \mid x, y \in \mathbb{R}, x + y > 2\}$

6406533774513. ✘  $R_2 = \{(x, y) \mid x, y \in \mathbb{R}, x > y\}$

6406533774514. ✓  $R_3 = \{(x, y) \mid x, y \in \mathbb{R}, x + y = 12\}$

6406533774515. ✘  $R_4 = \{(x, y) \mid x, y \in \mathbb{R}, y = x^2\}$

<b>Sub-Section Number :</b>	5
<b>Sub-Section Id :</b>	640653168551
<b>Question Shuffling Allowed :</b>	No

**Question Id : 6406531113872 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (173 to 174)**

Question Label : Comprehension

Suppose that  $L_1$  and  $L_2$  are lines in the plane, with the  $x$ -intercepts of  $L_1$  and  $L_2$  are 2 and  $-1$ , respectively, and that the respective  $y$ -intercepts are  $-3$  and  $2$ .

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 173 Question Id : 6406531113873 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the point where  $L_1$  and  $L_2$  intersect.

**Options :**

6406533774516. ✘ (10, 18)

6406533774517. ✘ (5, 8)

6406533774518. ✓ (-10,-18)

6406533774519. ✘ (6, 6)

**Question Number : 174 Question Id : 6406531113874 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

If  $\theta$  is the angle between  $L_1$  and  $L_2$ , then

$\tan \theta$  is equal to

**Options :**

6406533774520. ✓  $\frac{1}{8}$

6406533774521. ✘  $\frac{1}{6}$

6406533774522. ✘  $\frac{3}{8}$

6406533774523. ✘  $\frac{1}{4}$

**Sub-Section Id :** 640653168552

**Question Shuffling Allowed :** No

**Question Id : 6406531113875 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (175 to 176)**

**Question Label :** Comprehension

Consider two triangles  $ABC$  and  $PAB$  with coordinates  $A(4, 3)$ ,  $B(2, 2)$ ,  $C(8, 3)$  and  $P(t, t^2)$ . The area of triangle  $ABC$  is 4 times the area of the triangle  $PAB$ .

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 175 Question Id : 6406531113876 Question Type : SA**

**Correct Marks : 3**

**Question Label :** Short Answer Question

What is the area of the triangle  $ABC$ ?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Question Number : 176 Question Id : 6406531113877 Question Type : MCQ**

**Correct Marks : 3**

**Question Label :** Multiple Choice Question

Choose all the possible options for  $P$ .

**Options :**

640653774525. ✘ (0, 0)

640653774526. ✘ (2, 4)

640653774527. ✘ (-2, 4)

640653774528. ✓ (-1, 1)

**Sub-Section Number :** 7

**Sub-Section Id :** 640653168553

**Question Shuffling Allowed :** Yes

**Question Number : 177 Question Id : 6406531113878 Question Type : SA**

**Correct Marks : 4**

**Question Label : Short Answer Question**

Radhika has been tracking her monthly expenses and the corresponding number of outings she has with friends. Here's a table with two rows representing the amount spent on entertainment and the corresponding number of outings. Let's consider  $y$  to be the amount spent and  $x$  to be the corresponding number of outings. She fitted a best-fit line to her data and obtained the equation  $y = 4x + 2$ . What is the value of SSE (Sum of Squared Errors) in relation to the best-fit line?

Amount spent	6	14	24	29	39	45
Number of outings	1	3	5	7	9	11

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

7

**Question Number : 178 Question Id : 6406531113880 Question Type : SA****Correct Marks : 4**

Question Label : Short Answer Question

If  $x + a$  is one of the factors of  $p(x) = kx^2 + kax + 5x + 15$ , then find the value of  $a$ .

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

3

**Sub-Section Number :** 8**Sub-Section Id :** 640653168554**Question Shuffling Allowed :** Yes**Question Number : 179 Question Id : 6406531113879 Question Type : MSQ****Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Let  $l$  be the equation of line which passes through the point  $(1, 9)$  and parallel to  $y = 7x + 6$ .

Then which of the following are correct.

**Options :**6406533774530. ✓ The slope of  $l$  is 7.

6406533774531. ✘ The  $y$ -intercept of  $l$  is 3.

6406533774532. ✓ The equation of line  $l$  is  $y = 7x + 2$ .

6406533774533. ✘ The  $x$ -intercept of  $l$  is  $\frac{1}{6}$ .

**Sub-Section Number :**

9

**Sub-Section Id :**

640653168555

**Question Shuffling Allowed :**

Yes

**Question Number : 180 Question Id : 6406531113881 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Aman and Prakash want to solve a quadratic equation. Aman made a mistake in writing down the constant term and ended up in getting roots as 3 and 4. Prakash made a mistake in writing down the coefficient of  $x$  and got the roots as 2 and 3. Consider the leading coefficient to be 1 in all cases. The correct roots of the quadratic equation are:

**Options :**

6406533774535. ✘ 1 and 5

6406533774536. ✘ 2 and 6

6406533774537. ✓ 1 and 6

6406533774538. ✘ 2 and 5

**Question Number : 181 Question Id : 6406531113882 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider two polynomials  $p(x) = x^4 + 3x^3 - 9x + 8$  and  $q(x) = (x^2 + x)(x + 3)$ . Let  $r(x)$  be the remainder obtained when  $p(x)$  is divided by  $q(x)$ . Let  $l(x)$  be the line that passes through the  $y$ -intercept and the minimum point in the graph of  $r(x)$ , for reference follow the Figure: M1Q1-1.

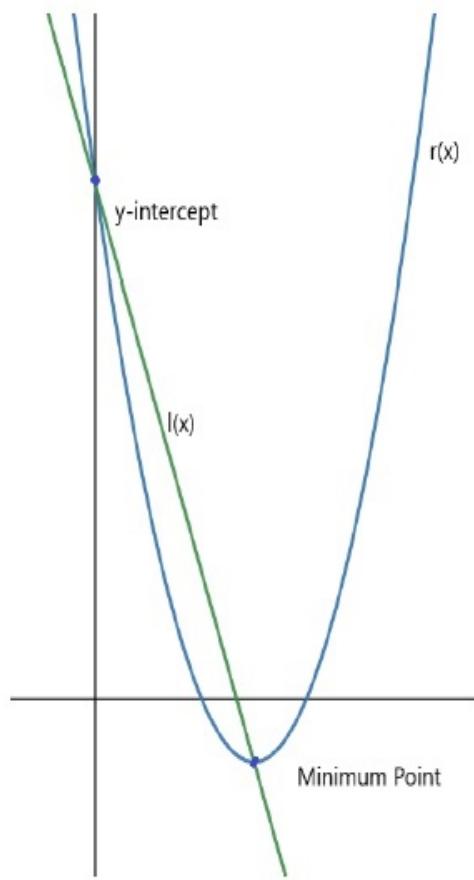


Figure: M1Q1-1

Which of the following options is/are true?

**Options :**

6406533774539. ❌  $r(x) = -16x^2 + 4x - 8$

6406533774540. ✓  $l(x) \equiv y = -3x + 8$

6406533774541. ❌  $l(x) \equiv y = -2x + 8$

6406533774542. ❌ The  $p(x)$  has at most 4 turning points.

**Sub-Section Number :**

10

**Sub-Section Id :**

640653168556

**Question Shuffling Allowed :**

No

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (182 to 183)**

Question Label : Comprehension

Consider the three polynomials

- $p(x) = 4x^5 + 9x^4 + b_1x^2 + c_1$ .
- $q(x) = -5x^4 + 8x^2 + b_2x + c_2$ .
- $s(x) = x^7 + 72x^5 + b_3x^3 + c_2x^2 + d_3x + e_3$ .

Use this information to answer the given sub-questions.

### **Sub questions**

**Question Number : 182 Question Id : 6406531113884 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Which of the following options is/are true ?

**Options :**

If  $r_1(x)$  is the obtained remainder when  $q(x)$  divides  $p(x) + q(x)$ , then the maximum possible degree of  $r_1(x)$  is 5.

6406533774543. \*

If  $r_2(x)$  is the obtained remainder when  $p(x)$  divides  $s(x)$ , then the maximum possible degree of  $r_2(x)$  is 2.

6406533774544. \*

If  $t_1(x)$  is the obtained quotient when  $q(x)$  divides  $p(x)$ , then the possible degree of  $t_1(x)$  is 1.

6406533774545. ✓

If  $t_2(x)$  is the obtained quotient when  $p(x)$  divides  $s(x)$ , then the possible degree of  $t_2(x)$  is 3.

6406533774546. \*

**Question Number : 183 Question Id : 6406531113885 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following options is / are true ?

**Options :**

6406533774547. ✓  $q(x) \rightarrow -\infty$  as  $x \rightarrow \infty$ .

6406533774548. ✓  $p(x) \rightarrow \infty$  as  $x \rightarrow \infty$ .

6406533774549. ✗  $q(x) \rightarrow \infty$  as  $x \rightarrow \infty$ .

6406533774550. ✗  $s(x) \rightarrow -\infty$  as  $x \rightarrow \infty$ .

## Maths2

Section Id :	64065379129
Section Number :	12
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	10
Number of Questions to be attempted :	10
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 :	640653168557
Question Shuffling Allowed :	No

Question Number : 184 Question Id : 6406531113886 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : MATHEMATICS FOR DATA SCIENCE II (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 :**

6406533774551. ✓ YES

6406533774552. ✘ NO

**Sub-Section Number :**

2

**Sub-Section Id :**

640653168558

**Question Shuffling Allowed :**

Yes

**Question Number : 185 Question Id : 6406531113887 Question Type : MCQ**

**Correct Marks : 6**

**Question Label : Multiple Choice Question**

Let  $v_1, v_2, v_3$  be linearly independent vectors in  $\mathbb{R}^3$ . Let  $A \in M_{3 \times 3}(\mathbb{R})$  be a matrix such that  $v_1 - v_2, v_2 - v_3, v_1 + v_3$  are the columns of  $A$ . Let  $B \in M_{3 \times 3}(\mathbb{R})$  be a matrix such that  $v_1 + v_2 + v_3, 2v_1 + 3v_2, 2v_3 - v_2$  are the columns of  $B$ . Which of the following options is correct:

**Options :**

6406533774553. ✘ The  $\text{rank}(A)$  is 2.

6406533774554. ✓  $A$  is an invertible matrix.

6406533774555. ✘  $\text{rank}(A) = \text{rank}(B)$ .

6406533774556. ✘ The system of linear equations  $Bx = 0$  has a unique solution.

**Sub-Section Number :**

3

**Sub-Section Id :**

640653168559

**Question Shuffling Allowed :**

Yes

**Question Number : 186 Question Id : 6406531113888 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

**Question Label : Multiple Select Question**

Let  $A$  be an  $m \times n$  matrix. Choose the operations that are valid only when  $m = n$ .

**Options :**

6406533774557. ✘  $A + A$

6406533774558. ✓  $A^2$

6406533774559. ✓  $\det(A)$

6406533774560. \*  $cA$ , where  $c$  is a real number.

<b>Sub-Section Number :</b>	4
<b>Sub-Section Id :</b>	640653168560
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 187 Question Id : 6406531113889 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

Find the number of  $2 \times 2$  scalar matrices with determinant equal to 4.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

<b>Sub-Section Number :</b>	5
<b>Sub-Section Id :</b>	640653168561
<b>Question Shuffling Allowed :</b>	No

**Question Id : 6406531113890 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (188 to 189)**

Question Label : Comprehension

Consider the system of equations whose matrix representation is  $Ax = b$ , where

$$A = \begin{bmatrix} 2 & 6 \\ k^2 & 12 \end{bmatrix}, \quad x = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}, \quad b = \begin{bmatrix} k \\ 4 \end{bmatrix},$$

for some  $k \in \mathbb{R}$ .

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 188 Question Id : 6406531113891 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following conditions is equivalent to having no solutions for the given system of equations.

**Options :**

6406533774562. ✘  $k^2 \neq 4$

6406533774563. ✘  $k = 2$

6406533774564. ✓  $k = -2$

**Question Number : 189 Question Id : 6406531113892 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following conditions is equivalent to having a unique solution for the given system of equations.

**Options :**

6406533774565. ✓  $k^2 \neq 4$

6406533774566. ✘  $k = 2$

6406533774567. ✘  $k = -2$

**Question Id : 6406531113893 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (190 to 191)**

Question Label : Comprehension

Let  $A \in M_{3 \times 4}(\mathbb{R})$  be a matrix with row vectors  $v_1, v_2$  and  $v_3$ . Suppose  $v_1$  and  $v_2$  are two linearly independent rows of  $A$  and  $v_1 + v_2 + v_3 = 0$ .

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 190 Question Id : 6406531113894 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

Find the row rank of  $A$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Question Number : 191 Question Id : 6406531113895 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

Find the number of dependent variables for the system  $Ax = 0$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Sub-Section Number :**

6

**Sub-Section Id :**

640653168562

**Question Shuffling Allowed :**

No

**Question Id : 6406531113896 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (192 to 194)**

Question Label : Comprehension

Consider a system of equations for which the coefficient matrix is given by

$$A = \begin{bmatrix} 1 & 0 & 3 \\ -2 & 4 & 0 \end{bmatrix}.$$

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 192 Question Id : 6406531113897 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

There is a vector  $b \in \mathbb{R}^2$  such that the system  
of equations given by  $Ax = b$  has a unique  
solution.

**Options :**

6406533774570. ✘ True

6406533774571. ✓ False

**Question Number : 193 Question Id : 6406531113898 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

If  $(\alpha, \beta, 2)$  is a solution to the system of equations given by  $Ax = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$ , then find the value of  $\alpha$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

-5

**Question Number :** 194 **Question Id :** 6406531113899 **Question Type :** SA

**Correct Marks : 2**

Question Label : Short Answer Question

If  $(\alpha, \beta, 2)$  is a solution to the system of equations given by  $Ax = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$ , then find the value of  $\beta$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

-3

**Question Id :** 6406531113900 **Question Type :** COMPREHENSION Sub Question Shuffling

**Allowed :** No Group Comprehension Questions : No Question Pattern Type : NonMatrix

**Question Numbers :** (195 to 196)

Question Label : Comprehension

Consider the following subspaces of  $M_{2 \times 2}(\mathbb{R})$  with the usual addition and scalar multiplication.

$$W_1 = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} \mid a + d = 0 \right\} \quad W_2 = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} \mid a + b = 0, c + d = 0 \right\}$$

Now consider the following matrices:

$$B_1 = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, B_2 = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}, B_3 = \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}, B_4 = \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix},$$
$$B_5 = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}, B_6 = \begin{bmatrix} 1 & -1 \\ 0 & 0 \end{bmatrix}, B_7 = \begin{bmatrix} 0 & 0 \\ 1 & -1 \end{bmatrix}$$

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 195 Question Id : 6406531113901 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct set of matrices that forms a basis for  $W_1$ .

### Options :

6406533774574. ✘  $\{B_1, B_2, B_3, B_4\}$

6406533774575. ✘  $\{B_1, B_2, B_3\}$

6406533774576. ✓  $\{B_2, B_3, B_5\}$

6406533774577. ✘  $\{B_1, B_2, B_3, B_5\}$

**Question Number : 196 Question Id : 6406531113902 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Choose all the correct sets of matrices that span  $W_2$ .

### Options :

6406533774578. ✓  $\{B_1, B_2, B_3, B_4\}$

6406533774579. ✓  $\{B_5, B_6, B_7\}$

6406533774580. ✓  $\{B_6, B_7\}$

6406533774581. ✗  $\{B_2, B_3, B_5\}$

**Sub-Section Number :**

7

**Sub-Section Id :**

640653168563

**Question Shuffling Allowed :**

No

**Question Id : 6406531113903 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (197 to 199)**

Question Label : Comprehension

Suppose  $W_1$  and  $W_2$  are subspaces of  $\mathbb{R}^3$  defined as follows:

$$W_1 = \{(0, y, z) \mid y, z \in \mathbb{R}\}$$

$$W_2 = \{(x, y, z) \in \mathbb{R}^3 \mid x + y + z = 0\}$$

with usual addition and scalar multiplication. Based on the above data, answer the given sub-questions.

### Sub questions

**Question Number : 197 Question Id : 6406531113904 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following options represents

$W_1 \cap W_2$ ? (One or more options may be correct.)

### Options :

6406533774582. ✓  $\{\alpha(0, 1, -1) + \beta(0, -1, 1) \mid \alpha, \beta \in \mathbb{R}\}$

6406533774583. ✗  $Span\{(0, 1, -1), (0, -1, -1)\}$

6406533774584. ✓  $Span\{(0, 1, -1)\}$

6406533774585. ✗  $\{\alpha(2, -1, -1) + \beta(0, 1, 1) \mid \alpha, \beta \in \mathbb{R}\}$

**Question Number : 198 Question Id : 6406531113905 Question Type : SA**

**Correct Marks : 2**

**Question Label :** Short Answer Question

What is the dimension of  $W_1 \cap W_2$ ?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Number :** 199 **Question Id :** 6406531113906 **Question Type :** MCQ

**Correct Marks :** 2

Question Label : Multiple Choice Question

Which of the following option is true?

**Options :**

6406533774587. ✘  $W_1 \cup W_2$  is a subspace of dimension 3.

6406533774588. ✘  $W_1 \cup W_2$  is a subspace of dimension 2.

6406533774589. ✘  $W_1 \cup W_2$  is a subspace of dimension 1.

6406533774590. ✓  $W_1 \cup W_2$  is not a subspace.

**Sub-Section Number :** 8

**Sub-Section Id :** 640653168564

**Question Shuffling Allowed :** No

**Question Id :** 6406531113907 **Question Type :** COMPREHENSION **Sub Question Shuffling**

**Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

**Question Numbers :** (200 to 201)

Question Label : Comprehension

Consider the matrices

$$A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & \alpha \end{bmatrix}, \quad B = \begin{bmatrix} \beta - 2 & 0 & 1 \\ 0 & 1 & 0 \\ 6 & 6 & \beta - 1 \end{bmatrix},$$

where  $\alpha, \beta \in \mathbb{R}$ .

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 200 Question Id : 6406531113908 Question Type : MSQ**

**Correct Marks : 6 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following conditions are sufficient to deduce  $\det(AB) = 0$ .

**Options :**

6406533774591. ✓  $\alpha = 1$

6406533774592. ✗  $\alpha = 2$

6406533774593. ✓  $\beta = 4$

6406533774594. ✗  $\beta = 1$

**Question Number : 201 Question Id : 6406531113909 Question Type : SA**

**Correct Marks : 4**

Question Label : Short Answer Question

For  $\alpha = 3$  and  $\beta = 0$ , find the value of

$\det(-B^T A^2 B^{-1})$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

-4

## Statistics2

<b>Section Id :</b>	64065379130
<b>Section Number :</b>	13
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	12
<b>Number of Questions to be attempted :</b>	12
<b>Section Marks :</b>	40
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0

<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653168565
<b>Question Shuffling Allowed :</b>	No

**Question Number : 202 Question Id : 6406531113910 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : STATISTICS FOR DATA SCIENCE II (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 :**

6406533774596. ✓ YES

6406533774597. ✗ NO

**Question Number : 203 Question Id : 6406531113911 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

Discrete random variables:

Distribution	PMF ( $f_X(k)$ )	CDF ( $F_X(x)$ )	$E[X]$	$\text{Var}(X)$
Uniform( $A$ ) $A = \{a, a+1, \dots, b\}$	$\frac{1}{n}, \quad x = k$ $n = b - a + 1$ $k = a, a+1, \dots, b$	$\begin{cases} 0 & x < 0 \\ \frac{k-a+1}{n} & k \leq x < k+1 \\ & k = a, a+1, \dots, b-1, b \\ 1 & x \geq n \end{cases}$	$\frac{a+b}{2}$	$\frac{n^2-1}{12}$
Bernoulli( $p$ )	$\begin{cases} p & x = 1 \\ 1-p & x = 0 \end{cases}$	$\begin{cases} 0 & x < 0 \\ 1-p & 0 \leq x < 1 \\ 1 & x \geq 1 \end{cases}$	$p$	$p(1-p)$
Binomial( $n, p$ )	${}^n C_k p^k (1-p)^{n-k}, \quad k = 0, 1, \dots, n$	$\begin{cases} 0 & x < 0 \\ \sum_{i=0}^k {}^n C_i p^i (1-p)^{n-i} & k \leq x < k+1 \\ & k = 0, 1, \dots, n \\ 1 & x \geq n \end{cases}$	$np$	$np(1-p)$
Geometric( $p$ )	$(1-p)^{k-1} p, \quad k = 1, \dots, \infty$	$\begin{cases} 0 & x < 0 \\ 1 - (1-p)^k & k \leq x < k+1 \\ & k = 1, \dots, \infty \end{cases}$	$\frac{1}{p}$	$\frac{1-p}{p^2}$
Poisson( $\lambda$ )	$\frac{e^{-\lambda} \lambda^k}{k!}, \quad k = 0, 1, \dots, \infty$	$\begin{cases} 0 & x < 0 \\ e^{-\lambda} \sum_{i=0}^k \frac{\lambda^i}{i!} & k \leq x < k+1 \\ & k = 0, 1, \dots, \infty \end{cases}$	$\lambda$	$\lambda$

## Continuous random variables:

Distribution	PDF ( $f_X(k)$ )	CDF ( $F_X(x)$ )	$E[X]$	$\text{Var}(X)$
Uniform $[a, b]$	$\frac{1}{b-a}, a \leq x \leq b$	$\begin{cases} 0 & x \leq a \\ \frac{x-a}{b-a} & a < x < b \\ 1 & x \geq b \end{cases}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Exp( $\lambda$ )	$\lambda e^{-\lambda x}, x > 0$	$\begin{cases} 0 & x \leq 0 \\ 1 - e^{-\lambda x} & x > 0 \end{cases}$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$
Normal( $\mu, \sigma^2$ )	$\frac{1}{\sigma\sqrt{2\pi}} \exp\left(\frac{-(x-\mu)^2}{2\sigma^2}\right), -\infty < x < \infty$	No closed form	$\mu$	$\sigma^2$
Gamma( $\alpha, \beta$ )	$\frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}, x > 0$		$\frac{\alpha}{\beta}$	$\frac{\alpha}{\beta^2}$
Beta( $\alpha, \beta$ )	$\frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1} (1-x)^{\beta-1}$ $0 < x < 1$		$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$

1. **Markov's inequality:** Let  $X$  be a discrete random variable taking non-negative values with a finite mean  $\mu$ . Then,

$$P(X \geq c) \leq \frac{\mu}{c}$$

2. **Chebyshev's inequality:** Let  $X$  be a discrete random variable with a finite mean  $\mu$  and a finite variance  $\sigma^2$ . Then,

$$P(|X - \mu| \geq k\sigma) \leq \frac{1}{k^2}$$

### Options :

6406533774598. ✓ Useful Data has been mentioned above.

6406533774599. ❌ This data attachment is just for a reference & not for an evaluation.

**Sub-Section Number :**

2

**Sub-Section Id :**

640653168566

**Question Shuffling Allowed :**

Yes

**Question Number : 204 Question Id : 6406531113912 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Find the value of  $x$  for which the random variables  $X$  and  $Y$  are independent.

$\backslash$	$X$	0	1
$Y$			
0	$2x$	$\frac{1}{2} - 2x$	
1	$\frac{1}{2} - 2x$	$2x$	

**Options :**

6406533774600. ✘  $x = \frac{1}{4}$

6406533774601. ✓  $x = \frac{1}{8}$

6406533774602. ✘  $x = \frac{1}{2}$

6406533774603. ✘ Insufficient Information.

**Question Number : 205 Question Id : 6406531113913 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

From a well shuffled deck of 52 cards, four cards are randomly selected without replacement.

Let the random variable  $X$  represent the number of queens drawn, and let  $Y$

represent the number of red cards drawn. Find  $P(X = 2 | Y = 2)$ .

**Options :**

6406533774604. ✘  $\frac{(^2C_2) \times (^{24}C_2)}{(^{52}C_4)}$

6406533774605. ✘  $\frac{(^{26}C_2) \times (^{26}C_2)}{(^{52}C_4)}$

6406533774606. ✓  $\frac{(^2C_2) \times (^{24}C_2)}{(^{26}C_2) \times (^{26}C_2)}$

$$\frac{(^4C_2) \times (^{26}C_2)}{(^{26}C_2) \times (^{26}C_2)}$$

6406533774607. \*

<b>Sub-Section Number :</b>	3
<b>Sub-Section Id :</b>	640653168567
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 206 Question Id : 6406531113914 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

A call center analyst monitors the number of calls received at the centre daily. Let  $X$  denote the number of calls received in a day. Using Markov's inequality, the analyst determines an upper bound of 0.48 on the probability of receiving more than 249 calls. Calculate the mean of  $X$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

120

**Question Number : 207 Question Id : 6406531113915 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

The probability density function of a random variable  $X$  is given as

$$f_X(x) = \begin{cases} c, & 0 \leq x < \frac{1}{4}, \\ 2c, & \frac{1}{4} \leq x < \frac{3}{4}, \\ 3c, & \frac{3}{4} \leq x < 1, \\ 0, & \text{otherwise.} \end{cases}$$

Find the value of  $c$ . Enter the answer correct to one decimal place.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

0.5

<b>Sub-Section Number :</b>	4
<b>Sub-Section Id :</b>	640653168568
<b>Question Shuffling Allowed :</b>	No

**Question Id : 6406531113916 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (208 to 209)**

Question Label : Comprehension

A six-sided biased die is used in a game. The probability of getting one is  $3p$  and the probability of getting 2, 3, 4, 5, 6 is  $p$  each.

The rules of the game are as follows:

- If face 3 appears, player wins ₹100.
- If face 6 appears, player wins ₹170.
- If face 4 appears, player losses ₹160.

Based on the given information, answer the sub-questions.

### **Sub questions**

**Question Number : 208 Question Id : 6406531113917 Question Type : MCQ**

**Correct Marks : 1**

Question Label : Multiple Choice Question

What is the value of  $p$ ?

**Options :**

6406533774610. ✘  $\frac{1}{3}$

6406533774611. ✘  $\frac{1}{6}$

6406533774612. ✘  $\frac{1}{7}$

6406533774613. ✓  $\frac{1}{8}$

**Question Number : 209 Question Id : 6406531113918 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

Find the expected amount of money to be gain. Enter the answer correct to two decimal places.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

13.72 to 13.78

**Sub-Section Number :** 5

**Sub-Section Id :** 640653168569

**Question Shuffling Allowed :** No

**Question Id :** 6406531113919 **Question Type :** COMPREHENSION **Sub Question Shuffling**

**Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

**Question Numbers :** (210 to 211)

Question Label : Comprehension

Let  $X \sim \text{Uniform}\{1, 2, 3, 4, 5, 6\}$  and  $Y \sim \text{Uniform}\{1, 2, 3, 4, 5, 6\}$  be independent random variables. Define two new random variables  $Z$  and  $W$  such that  $Z = XY$  and  $W = 1 - X$ , respectively.

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number :** 210 **Question Id :** 6406531113920 **Question Type :** SA

**Correct Marks :** 2

Question Label : Short Answer Question

Find  $\text{Var}(W)$ . Enter the answer correct to two decimal places.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

2.89 to 2.95

**Question Number :** 211 **Question Id :** 6406531113921 **Question Type :** SA

**Correct Marks :** 3

Question Label : Short Answer Question

What is the value of  $E(Z + W)$ ? Enter the answer correct to two decimal places.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

9.72 to 9.78

**Question Id : 6406531113922 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (212 to 213)**

Question Label : Comprehension

The joint PMF of two discrete random variables  $X$  and  $Y$  is

$$f_{XY}(x, y) = \begin{cases} \frac{x^2 + y^2}{30}, & x, y \in \{0, 1, 2\}, \\ 0, & \text{otherwise} \end{cases}$$

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 212 Question Id : 6406531113923 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Identify the correct joint PMF table of  $X$  and  $Y$ .

**Options :**

$X \backslash Y$	0	1	2
0	0	$\frac{1}{30}$	$\frac{4}{30}$
1	$\frac{5}{30}$	$\frac{2}{30}$	$\frac{1}{30}$
2	$\frac{5}{30}$	$\frac{8}{30}$	$\frac{4}{30}$

6406533774617. ✘

6406533774618. ✓

$\backslash$	$X$	0	1	2
$Y$	0	$\frac{1}{30}$	$\frac{4}{30}$	
	1	$\frac{1}{30}$	$\frac{2}{30}$	$\frac{5}{30}$
	2	$\frac{4}{30}$	$\frac{5}{30}$	$\frac{8}{30}$

$\backslash$	$X$	0	1	2
$Y$	0	$\frac{1}{30}$	$\frac{2}{15}$	
	1	$\frac{1}{30}$	$\frac{2}{15}$	$\frac{1}{30}$
	2	$\frac{2}{30}$	$\frac{3}{6}$	$\frac{2}{30}$

6406533774619. ✳

$\backslash$	$X$	0	1	2
$Y$	0	$\frac{1}{30}$	$\frac{1}{15}$	
	1	$\frac{1}{30}$	$\frac{1}{15}$	$\frac{1}{10}$
	2	$\frac{1}{15}$	$\frac{1}{10}$	$\frac{2}{15}$

6406533774620. ✳

**Question Number : 213 Question Id : 6406531113924 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

What is the marginal distribution of  $X$ ?

**Options :**

6406533774621. ✓  $\frac{3x^2 + 5}{30}$ ;  $x = 0, 1, 2$

6406533774622. ✳

$$\frac{3x^2 + 5}{10}; x = 0, 1, 2$$

6406533774623. ✘  $\frac{x^2 + 6}{30}; x = 0, 1, 2$

6406533774624. ✘  $\frac{x^2 + 6}{10}; x = 0, 1, 2$

**Question Id : 6406531113925 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Question Numbers : (214 to 215)**

Question Label : Comprehension

Let  $X$  and  $Y$  denote the number of customers arriving at two different service counters (Counter 1 and Counter 2) in a bank during a one-hour interval. The random variables  $X$  and  $Y$  follow Poisson distributions with mean arrival rates of 15 customers per hour at Counter 1 and 25 customers per hour at Counter 2, respectively. Assume that  $X$  and  $Y$  are independent.

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 214 Question Id : 6406531113926 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

If  $Z$  represents the combined total number of customers arriving at both counters during a one-hour interval, then determine the PMF of  $Z$ .

**Options :**

6406533774625. ✘  $f_Z(z) = \frac{e^{-25} z^{25}}{z!}$

6406533774626. ✘  $f_Z(z) = \frac{e^{-40} 40^z}{40!}$

6406533774627. ✘  $f_Z(z) = \frac{e^{-15} z^{15}}{15!}$

6406533774628. ✓  $f_Z(z) = \frac{e^{-40} 40^z}{z!}$

**Question Number : 215 Question Id : 6406531113927 Question Type : MSQ**

**Correct Marks : 2 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following option(s) is/are correct?

**Options :**

$$(X|Z = 50) \sim \text{Binomial}\left(50, \frac{15}{40}\right)$$

6406533774629. ✓

$$(X|Z = 50) \sim \text{Binomial}\left(50, \frac{1}{2}\right)$$

6406533774630. ✘

$$P(X = 20 | Z = 50) = \binom{50}{20} \left(\frac{5}{8}\right)^{20} \left(\frac{3}{8}\right)^{30}$$

6406533774631. ✘

$$P(X = 20 | Z = 50) = \binom{50}{20} \left(\frac{3}{8}\right)^{20} \left(\frac{5}{8}\right)^{30}$$

6406533774632. ✓

**Question Id : 6406531113928 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (216 to 218)**

Question Label : Comprehension

The PDF of a random variable  $X$  is given as

$$f_X(x) = \begin{cases} ae^{-3x}, & x \geq 0, \\ 0, & \text{otherwise.} \end{cases}$$

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 216 Question Id : 6406531113929 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

Find the value of  $a$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas : PlainText**

**Possible Answers :**

3

**Question Number : 217 Question Id : 6406531113930 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

What is the CDF of  $X$ ?

**Options :**

$$F_X(x) = \begin{cases} e^{-3x}, & x \geq 0, \\ 0, & \text{otherwise.} \end{cases}$$

6406533774634. ✘

$$F_X(x) = \begin{cases} 1 - e^{-3x}, & x \geq 0, \\ 0, & \text{otherwise.} \end{cases}$$

6406533774635. ✓

$$F_X(x) = \begin{cases} e^{3x}, & x \geq 0, \\ 0, & \text{otherwise.} \end{cases}$$

6406533774636. ✘

$$F_X(x) = \begin{cases} 1 - e^{3x}, & x \geq 0, \\ 0, & \text{otherwise.} \end{cases}$$

6406533774637. ✘

**Question Number : 218 Question Id : 6406531113931 Question Type : MCQ**

**Correct Marks : 2**

Question Label : Multiple Choice Question

What is the value of  $P(-4 < X \leq 6)$ ?

**Options :**

6406533774638. ✘  $e^{-12} - e^{-18}$

6406533774639. ✓  $1 - e^{-18}$

6406533774640. ✘  $e^{-18} - e^{-12}$

6406533774641. ✘  $e^{-12}$

**Question Id : 6406531113932 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (219 to 220)**

Question Label : Comprehension

A factory manufactures a batch of 5 light bulbs every hour. Let  $X$  denote the number of defective bulbs in a batch. The probability mass function (PMF) of  $X$  is given by:

$$f_X(x) = \begin{cases} \frac{5-x}{15}, & \text{for } x = 0, 1, 2, 3, 4, 5 \\ 0, & \text{otherwise.} \end{cases}$$

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 219 Question Id : 6406531113933 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

Find the probability that the factory will produce at most 3 defective light bulbs in a batch of 5 light bulbs. Enter the answer correct to two decimal places.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

0.90 to 0.96

**Question Number : 220 Question Id : 6406531113934 Question Type : SA**

**Correct Marks : 3**

Question Label : Short Answer Question

Find the value of  $P(X \leq 4 | X > 1)$ .

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

# Business Analytics

Section Id :	64065379131
Section Number :	14
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	7
Number of Questions to be attempted :	7
Section Marks :	20
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 :	640653168570
Question Shuffling Allowed :	No

**Question Number : 221 Question Id : 6406531113935 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : BUSINESS ANALYTICS (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 :**

6406533774644. ✓ YES

6406533774645. ✘ NO

Sub-Section Number :	2
Sub-Section Id :	640653168571
Question Shuffling Allowed :	Yes

**Question Number : 222 Question Id : 6406531113936 Question Type : MCQ**

**Correct Marks : 1**

Question Label : Multiple Choice Question

You are given a data of size 1000, which is centred at 50 and has a variance of 25. The median, mode, max and min values are 40, 22, 75 and 1 respectively. Then

**Options :**

6406533774646. ✓ The data is right-tailed

6406533774647. ✗ The data is left-tailed

6406533774648. ✗ The data is symmetric

6406533774649. ✗ None of these

**Sub-Section Number :**

3

**Sub-Section Id :**

640653168572

**Question Shuffling Allowed :**

Yes

**Question Number : 223 Question Id : 6406531113937 Question Type : MSQ**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

When is a "Pie Chart" the best visualisation option for presenting data (choose all that is/are applicable)?

**Options :**

6406533774650. ✗ When the outliers in the data need to be shown

6406533774651. ✗ When trends in the data need to be shown

6406533774652. ✗ When relationship between variables need to be shown

6406533774653. ✓ None of these

**Sub-Section Number :**

4

**Sub-Section Id :**

640653168573

**Question Shuffling Allowed :**

No

**Question Id : 6406531113947 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (224 to 228)**

Question Label : Comprehension

(The following comprehension is purely imaginary)

A restaurant ("Milo's Kitchen") has data pertaining to customers ordering three types of starters "Paneer Tikka (PT)", "Baby Corn Manchurian (BCM)" and "Masala Papad (MP)".

For simplicity assume that the orders for starters is mutually exclusive and that a customer does not order more than one starter. Moreover, the customers who order these starters are predominantly one of the three types of eaters, "Roti Eaters", "Poori Eaters" or "Rice Eaters" (*Note: customers can be "other eaters" as well. Hence, the list is not exhaustive*). From past footfall data, it is seen that 25% of the customer's order "BCM" and another 40% order "PT".

The remaining customers order "MP". It is observed that,

- a. Of the people ordering "BCM", 30% are "Roti Eaters" and 60% are "Poori Eaters".
- b. For "PT" orders, it is observed that 40% are "Rice Eaters", 20% are "Poori Eaters" and another 20% are "Roti Eaters".
- c. 50% of the customers who order "MP" are "Rice Eaters" and 40% are "Poori Eaters"
- d. "BCM" is never ordered by "Rice Eaters" and "MP" is never opted for by "Roti Eaters"

Assuming any other necessary mutual exclusiveness, and answer the given sub questions.

### **Sub questions**

**Question Number : 224 Question Id : 6406531113948 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

If 1,000 customers come to the restaurant, how many will/may be "Rice Eaters"? (*Note: Enter the answer rounded to two decimal places. For example, if the answer is "10.235", then enter it as "10.24". DO NOT ENTER PERCENTAGE VALUES*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

335

**Question Number : 225 Question Id : 6406531113949 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

If 4,000 customers had visited the shop on 10th December 2024, then how many "BCMs" will you expect to serve? (*Note: Enter the answer rounded to two decimal places. For example, if the answer is "10.235", then enter it as "10.24". DO NOT ENTER PERCENTAGE VALUES*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1000

**Question Number : 226 Question Id : 6406531113950 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

Milo's Kitchen is planning spend money on purchasing a refrigerator (for "Paneer" and "Baby Corn" storage). If the 600 "Poori Eaters" are expected to arrive, then what is the expected revenue generated from them if the restaurant charges Rs. 350 per PT order, Rs. 250 per BCM order and Rs. 80 per MP order? (*Note: Enter the answer "in Rupees" rounded to two decimal places. For example, if the answer is "Rs. 10.235", then enter it as "10.24". DO NOT ENTER ANY SYMBOLS OR LETTERS*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

46020

**Question Number : 227 Question Id : 6406531113951 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

If a total of 10,000 customers visit Milo's Kitchen in a month, how many (in Total) will you expect to be non-Rice Eater, Non-Poori Eater and Non-Roti Eater? (*Note: Enter the answer rounded to two decimal places. For example, if the answer is "10.235", then enter it as "10.24". DO NOT ENTER PERCENTAGE VALUES*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1400

**Question Number : 228 Question Id : 6406531113952 Question Type : MCQ**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Recently, the owner found a CCTV footage of a customer stealing a starter (but was not able to see which starter was stolen). The owner was sure that the food stealing customer **was not a "Rice Eater", "Poori Eater" or "Roti Eater"**. Then which starter would the owner suspect the stealing customer to have stolen?

**Options :**

6406533774677. ✓ PT

6406533774678. ✗ BCM

6406533774679. ✗ MP

6406533774680. ✗ None of these as Milo's Kitchen owner does not have a working CCTV (P.S: This is not an answer so don't choose this option. Just relax, think and answer the question)

**Question Id : 6406531113953 Question Type : COMPREHENSION Sub Question Shuffling****Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix****Question Numbers : (229 to 232)**

Question Label : Comprehension

Say, Table 1 specifies the blood sugar level (in mg/dL) for the male and female patients who visit a hospital. It is assumed that the blood sugar level is distributed Normally with a mean of 50mg/ dL and standard deviation of 10 mg/dL. You are asked to perform your analysis by using the following bins. The bins are suggested such that the probability space is split into equal areas.

Bin-1: [0 mg/dL to 50 mg/dL]

Bin-2: [&gt;50 mg/dL to 70 mg/dL]

Bin-3: [&gt;70 mg/dL to 90 mg/dL]

Bin-4: [&gt;90 mg/dL to 100mg/dL]

Patient ID	Gender	Blood sugar level (in mg/dL)
P1	MALE	71
P2	MALE	84
P3	MALE	76
P4	MALE	78
P5	MALE	89
P6	FEMALE	92
P7	FEMALE	97
P8	FEMALE	95
P9	FEMALE	83
P10	FEMALE	72

Then answer the given subquestions.

**Sub questions****Question Number : 229 Question Id : 6406531113954 Question Type : SA****Correct Marks : 1**

**Question Label :** Short Answer Question

What is the expected frequency in Bin-2 for the statistical test to be performed? (*Note: give only a numerical value rounded to 2 decimal places. For example, if your answer is 10.1253, then input the answer as "10.13"*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2.5

**Question Number : 230 Question Id : 6406531113955 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

What is the value of the computed test statistic for the statistical test to be performed? (*Note: give only a numerical value rounded to 2 decimal places. For example, if your answer is 10.1253, then input the answer as "10.13"*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

33

**Question Number : 231 Question Id : 6406531113956 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

What is the number of degrees of freedom for the statistical test to be performed? (*Note: give only a numerical value rounded to 2 decimal places. For example, if your answer is 10.1253, then input the answer as "10.13"*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3

**Question Number : 232 Question Id : 6406531113957 Question Type : MSQ**

**Correct Marks : 1 Max. Selectable Options : 0**

**Question Label :** Multiple Select Question

If the p-value for the test is 0.85, then what can be the level of significance if the Null Hypothesis is NOT TO BE REJECTED (select all that is/are applicable)

**Options :**

6406533774684. ✘ 0.9

6406533774685. ✓ 0.15

6406533774686. ✘ Any value between 0 and 1

6406533774687. ✘ Cannot say without more data.

**Sub-Section Number :**

5

**Sub-Section Id :**

640653168574

**Question Shuffling Allowed :**

No

**Question Id : 6406531113938 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (233 to 236)**

Question Label : Comprehension

**(The following comprehension is purely imaginary)**

A local grosser has observed that the demand for Milk follows a linear demand response curve. Hence, he has decided to raise the "Milk" price by Rs. 5 rupees per litre to Rs. 45 per litre. If the demand was 300 litres per day before the rise and is now 100 litres per day after the rise, then answer the given subquestions.

**Sub questions**

**Question Number : 233 Question Id : 6406531113939 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

What is the elasticity of the linear demand response curve? (*Note: give only a numerical value rounded to 2 decimal places. For example, if your answer is 10.1253, then input the answer as "10.13"*)

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

40

**Question Number : 234 Question Id : 6406531113940 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

What is the market size for milk? (*Note: give only a numerical value rounded to 2 decimal places. For example, if your answer is 10.1253, then input the answer as "10.13"*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1900

**Question Number : 235 Question Id : 6406531113941 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

What is the satiating price for the Milk's demand response curve? (*Note: give only a numerical value rounded to 2 decimal places. For example, if your answer is 10.1253, then input the answer as "10.13"*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

47.5

**Question Number : 236 Question Id : 6406531113942 Question Type : MSQ**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Given the computed elasticity, what can you say about the "Milk" demand? (choose all that is/are applicable)

**Options :**

6406533774657. ✓ It is elastic

6406533774658. ✗ It is inelastic

6406533774659. ✗ It is a luxury

6406533774660. ✗ It is a necessity

6406533774661. ✗ Cannot say, insufficient information

**Question Id : 6406531113943 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (237 to 239)**

Question Label : Comprehension

**(The following comprehension is purely imaginary)**

You are given the following contingency table based on a sample data where different cities and their brand preferences are provided.

	Brand A	Brand B	Total
Chennai	200	145	345
Mumbai	600	255	855
Total	800	400	1200

Then answer the given subquestions.

### **Sub questions**

**Question Number : 237 Question Id : 6406531113944 Question Type : SA**

**Correct Marks : 1**

Question Label : Short Answer Question

From the given contingency table, find the expected frequency of Chennai people preferring brand B? (*Note: give only a numerical value rounded to 2 decimal places. For example, if your answer is 10.1253, then input the answer as "10.13"*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

115

**Question Number : 238 Question Id : 6406531113945 Question Type : SA**

**Correct Marks : 2**

Question Label : Short Answer Question

What is the calculated value of chi-squared? (*Note: give only a numerical value rounded to 2 decimal places. For example, if your answer is 10.1253, then input the answer as "10.13"*)

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

65.4 to 65.8

**Question Number : 239 Question Id : 6406531113946 Question Type : MSQ**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

At the significance level 0.05, chi-squared tabular value is 3.84. What do you conclude? (choose all that is/are applicable)

**Options :**

6406533774664. ✓ Reject the null hypothesis and conclude that the categorical variables are not independent
6406533774665. ✗ Fail to reject the null hypothesis and conclude that the categorical variables are not independent
6406533774666. ✗ Reject the null hypothesis and conclude that the categorical variables are independent
6406533774667. ✗ Fail to reject the null hypothesis and conclude that the categorical variables are independent
6406533774668. ✗ Accept the null hypothesis and conclude that the categorical variables are not independent
6406533774669. ✗ Do not accept the null hypothesis and conclude that the categorical variables are not independent
6406533774670. ✗ Accept the null hypothesis and conclude that the categorical variables are independent
6406533774671. ✗ Do not accept the null hypothesis and conclude that the categorical variables are independent
6406533774672. ✗ None of these

## System commands

<b>Section Id :</b>	64065379132
<b>Section Number :</b>	15
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	12
<b>Number of Questions to be attempted :</b>	12
<b>Section Marks :</b>	50
<b>Display Number Panel :</b>	Yes
<b>Section Negative Marks :</b>	0
<b>Group All Questions :</b>	No
<b>Enable Mark as Answered Mark for Review and Clear Response :</b>	No
<b>Section Maximum Duration :</b>	0
<b>Section Minimum Duration :</b>	0
<b>Section Time In :</b>	Minutes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653168575
<b>Question Shuffling Allowed :</b>	No

**Question Number : 240 Question Id : 6406531113958 Question Type : MCQ**

**Correct Marks : 0**

Question Label : Multiple Choice Question

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

6406533774688. ✓ YES

6406533774689. ✗ NO

**Sub-Section Number :** 2

**Sub-Section Id :** 640653168576

**Question Shuffling Allowed :** Yes

**Question Number : 241 Question Id : 6406531113959 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Assume that the user is in the home directory `/home/user1`. Consider the following commands.

```
mkdir app; mkdir app/public
cd app || cd app/public
touch index.html
cd ..
mv image.png app/public
```

What will be the current working directory after execution of the above commands?

**Options :**

6406533774690. ✗ `/home/user1/app/public`

6406533774691. ✓ `/home/user1`

6406533774692. ✗ `/home/user1/app`

**Question Number : 242 Question Id : 6406531113960 Question Type : MCQ****Correct Marks : 3**

Question Label : Multiple Choice Question

What will be the output of the following commands?

```
mkdir example; cd example  
touch .file-{1..3}{a..c}; ls | wc -l
```

**Options :**

640653774694. ✘ 9

640653774695. ✘ 6

640653774696. ✘ 3

640653774697. ✓ 0

**Question Number : 243 Question Id : 6406531113962 Question Type : MCQ****Correct Marks : 3**

Question Label : Multiple Choice Question

Consider that we have a file named `example.txt` in the current working directory.

```
ln example.txt example_a.txt  
ln -s example.txt example_b.txt
```

After execution of the commands above, a hard link and a soft link to `example.txt` is created as `example_a.txt` and `example_b.txt`, respectively.

Choose the appropriate option from the following.

**Options :**640653774702. ✘ The inode numbers of `example.txt` and `example_a.txt` are different.640653774703. ✘ The inode numbers of `example_a.txt` and `example_b.txt` are same.640653774704. ✓ The inode numbers of `example.txt` and `example_a.txt` are same.

640653774705. ✘

None of these

**Question Number : 244 Question Id : 6406531113963 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider that a bash script is written in a file named `script.sh` in the current working directory.

Which of the following commands will correctly set the permissions to allow the owner and group to read, write and execute the script, while denying all permissions to others?

**Options :**

6406533774706. ✘ `chmod 600 script.sh`

6406533774707. ✓ `chmod 770 script.sh`

6406533774708. ✘ `chmod 740 script.sh`

6406533774709. ✘ `chmod 750 script.sh`

**Question Number : 245 Question Id : 6406531113964 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following shell variables can be used to get the return code of the last command?

**Options :**

6406533774710. ✘ `$!`

6406533774711. ✓ `$?`

6406533774712. ✘ `$1`

6406533774713. ✘ `$0`

**Sub-Section Number :**

3

**Sub-Section Id :**

640653168577

**Question Shuffling Allowed :**

Yes

**Question Number : 246 Question Id : 6406531113961 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the following commands.

```
echo Hello > hello.txt  
cat hello.txt /blah.txt > output.txt 2>> output.txt
```

After execution, which of the following represents the contents of `output.txt` ?

**Options :**

`cat: /blah.txt: No such file or directory`

6406533774698. ✘

`Hello`

`cat: /blah.txt: No such file or directory`

6406533774699. ✓

`Hello`

6406533774700. ✘

`cat: /blah.txt: No such file or directory`

`Hello`

6406533774701. ✘

**Question Number : 247 Question Id : 6406531113965 Question Type : MCQ**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Assume that we are in the home directory of `user1`.

Which of the following commands will give us the count of files, other than `text files` (with a `.txt` extension) present in the current directory?

**Options :**

6406533774714. ✓ `find /home/user1 -not -name *.txt | wc -l`

6406533774715. ✘ `find /home/user1 -name *.txt | wc -l`

6406533774716. ✘ `ls /home/user1 | grep -v "(txt)$"`

6406533774717. ✘ `ls /home/user1 | grep "(txt)$" | wc -l`

**Sub-Section Number :** 4

**Sub-Section Id :** 640653168578

**Question Shuffling Allowed :** Yes

**Question Number : 248 Question Id : 6406531113966 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the following JSON file `people.json` which is present in the current working directory.

```
{  
  "people": [  
    {  
      "firstName": "Alice",  
      "sequence": 26803  
    },  
    {  
      "firstName": "Bob",  
      "sequence": 8629  
    },  
    {  
      "firstName": "Charlie",  
      "sequence": 27799  
    },  
    {  
      "firstName": "Dan",  
      "sequence": 4749  
    }  
  ]  
}
```

Which of the following commands can be used to extract the highest sequence number?

**Options :**

6406533774718. ✓ `cat people.json | egrep -o [:digit:]+ | sort -nr | head -n 1`

6406533774719. ✗ `cat people.json | egrep -o [:digit:]+ | sort -n | head -n 1`

6406533774720. ✓ `cat people.json | egrep -o [:digit:]+ | sort -n | tail -n 1`

6406533774721. ✗ `cat people.json | egrep -o [:digit:]+ | sort -nr | tail -n 1`

**Question Number : 249 Question Id : 6406531113968 Question Type : MSQ**

**Correct Marks : 3 Max. Selectable Options : 0**

**Question Label : Multiple Select Question**

Which of the following ways can be used run the `sleep` command in the background for 5 minutes?

**Options :**

6406533774726. ✘ `sleep 5;`

6406533774727. ✓ `sleep 5m &;`

6406533774728. ✓ `coproc sleep 300s;`

6406533774729. ✘ `sleep 5m;`

**Sub-Section Number :**

5

**Sub-Section Id :**

640653168579

**Question Shuffling Allowed :**

Yes

**Question Number : 250 Question Id : 6406531113967 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Hexadecimal color codes are used for specifying colors for various elements in web pages. It consists of a hash (#), followed by three pairs of hexadecimal digits (0-9, A-F), e.g.

`#1A2BCC`.

Which of the following regular expressions (extended) will correctly match hexadecimal color codes?

**Options :**

6406533774722. ✓ `^#\(\([0-9A-Fa-f]\)\)\{6\}$`

6406533774723. ✘ `^#\(\([0-9A-Fa-f]\)\)+$`

6406533774724. ✓ `^#\(\([0-9A-Fa-f]\)[0-9A-Fa-f]\)\{3\}$`

6406533774725. ✘ `\(\([0-9A-Fa-f]\)\)\{6\}`

**Sub-Section Number :**

6

**Sub-Section Id :**

640653168580

**Question Shuffling Allowed :**

No

**Question Id : 6406531113969 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Question Numbers : (251 to 255)**

**Question Label : Comprehension**

Consider the following and answer the given subquestions.

The output of `ls -l` in the current working directory is given below.

```
total 8
-rw-r--r-- 1 admin work 96 Jan 16 07:21 example.txt
-rwxr-xr-- 1 admin work 88 Jan 16 07:21 script.sh
```

### **Sub questions**

**Question Number : 251 Question Id : 6406531113970 Question Type : MCQ**

**Correct Marks : 4**

**Question Label : Multiple Choice Question**

What does `total 8` represent in the output  
of `ls -l` ?

**Options :**

6406533774730. ❌ The total number of files in the directory

6406533774731. ✓ The total number of blocks used by the files and directories

6406533774732. ❌ The total size of the directory in bytes

6406533774733. ❌ The total number of links to the directory

**Question Number : 252 Question Id : 6406531113971 Question Type : MCQ**

**Correct Marks : 3**

**Question Label : Multiple Choice Question**

Which of the following commands can be  
used to allow group users to edit `script.sh` ?

**Options :**

6406533774734. ✓ `chmod g+w script.sh`

6406533774735. ❌ `chmod g+x script.sh`

6406533774736. ❌ `chmod g-w script.sh`

6406533774737. ✘ chmod 700 script.sh

**Question Number : 253 Question Id : 6406531113972 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following represents the correct file size of example.txt ?

**Options :**

6406533774738. ✘ 96 blocks

6406533774739. ✓ 96 bytes

6406533774740. ✘ 96 kilobytes

6406533774741. ✘ 96 bits

**Question Number : 254 Question Id : 6406531113973 Question Type : MCQ**

**Correct Marks : 3**

Question Label : Multiple Choice Question

The output of the command

tail -n 10 example.txt is

**Options :**

6406533774742. ✘ the first 10 characters of the file example.txt

6406533774743. ✘ the first 10 lines of the file example.txt

6406533774744. ✘ the last 10 characters of the file example.text

6406533774745. ✓ the last 10 lines of the file example.txt

**Question Number : 255 Question Id : 6406531113974 Question Type : MSQ**

**Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Select the appropriate option(s) regarding permissions of script.sh

**Options :**

6406533774746. ✘ All users can execute script.sh

6406533774747. ✓ All users can read `script.sh`

6406533774748. ✓ Group users can execute `script.sh`

6406533774749. ✖ Group users can edit `script.sh`