

**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 IMPROVEMENT FN EXAM QDD1 01 Sep 2024
<b>Subject Name :</b>	2024 Sep01: IIT M FN EXAM QDD1
<b>Creation Date :</b>	2024-08-28 15:47:53
<b>Duration :</b>	90
<b>Total Marks :</b>	1085
<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>	64065320250
<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 :	1085
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
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

## Sem1 CT

Section Id :	64065364099
Section Number :	1
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	18
Number of Questions to be attempted :	18
Section Marks :	100
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653133862
Question Shuffling Allowed :	No

**Question Number : 1 Question Id : 640653903120 Question Type : MCQ Calculator : Yes**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER I: 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 :**

6406533041351. ✓ YES

6406533041352. ✗ NO

**Question Number : 2 Question Id : 640653903121 Question Type : MCQ Calculator : Yes**

**Correct Marks : 0**

Question Label : Multiple Choice Question

## Scores

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

## Words

SeqNo	Word	PartOfSpeech	LetterCount
0	It	Pronoun	2
			■ ■ ■

64 cane. Noun 4

## Library

SeqNo	Name	Author	Genre	Language	Pages	Publisher	Year
0	Igniting Minds	Kalam	Nonfiction	English	178	Penguin	2002
					■ ■ ■		

29 Maigudi 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
Carrots	Vegetables/Food	1.5	50
Soup	Toiletries	4	32
Tomatoes	Vegetables/Food	2	40
Bananas	Vegetables/Food	8	64
Socks	Footwear/Apparel	3	168
Curd	Dairy/Food	0.5	32
Milk	Dairy/Food	1.5	24
			567

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

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

Options :

6406533041353. ✓ Useful Data has been mentioned above.

6406533041354. ✗ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number :

2

Sub-Section Id :

640653133863

Question Shuffling Allowed :

Yes

Question Number : 3 Question Id : 640653903122 Question Type : MCQ Calculator : Yes

## Correct Marks : 5

### Question Label : Multiple Choice Question

The given pseudocode is executed using the "Scores" dataset. What will the value of **Count** represent at the end of the execution?

```
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         Count = Count + DoSomething(X, Y)
8         Move Y to Table 3
9     }
10    Move all rows from Table 3 to Table 1
11 }
12
13 Procedure DoSomething(A, B)
14     if(A.Gender != B.Gender or A.TownCity == B.TownCity){
15         return(1)
16     }
17     else{
18         return(0)
19     }
20 End DoSomething
```

### Options :

6406533041355. ✓ Number of pairs of students with different gender or same TownCity  
6406533041356. ✗ Number of pairs of students with same gender or different TownCity  
6406533041357. ✗ Number of pairs of students with the same gender and the same TownCity  
6406533041358. ✗ The code will give an error due to incorrect return statements in lines 15 and 18

**Question Number : 4 Question Id : 640653903125 Question Type : MCQ Calculator : Yes**

## Correct Marks : 5

### Question Label : Multiple Choice Question

The following pseudocode is executed using the "Scores" dataset. What will **cityD[k]** represent at the end of execution?

```
1 cityD = {}
2 while(Table 1 has more rows){
3     Read the first row X in Table 1
4     if(isKey(cityD, X.Town/City)){
5         if(isKey(cityD[X.Town/City], X.Gender)){
6             if(cityD[X.Town/City][X.Gender] > X.Physics){
7                 cityD[X.Town/City][X.Gender] = X.Physics
8             }
9         }
10    else{
11        cityD[X.Town/City][X.Gender] = X.Physics
12    }
13 }
14 else{
15     cityD[X.Town/City] = {}
16     cityD[X.Town/City][X.Gender] = X.Physics
17 }
18 Move X to Table 2
19 }
```

### Options :

- 6406533041367. ❌ A dictionary with gender as key mapped to the Physics marks
- 6406533041368. ❌ A dictionary with gender as key mapped to the highest Physics marks scored by that gender in city **k**
- 6406533041369. ✓ A dictionary with gender as key mapped to the lowest Physics marks scored by that gender in city **k**
- 6406533041370. ❌ A dictionary with cities as keys mapped to the Physics marks

**Question Number : 5 Question Id : 640653903126 Question Type : MCQ Calculator : Yes**

**Correct Marks : 5**

Question Label : Multiple Choice Question

The following pseudocode is executed using the "Scores" dataset. What will  $\text{first}(D[i]) - \text{last}(D[i])$  represent for a given key  $i$ ?

```
1 | D = {}
2 | while(Table 1 has more rows){
3 |   Read the first row X in Table 1
4 |   if(isKey(D, X.TownCity)){
5 |     if(first(D[X.TownCity]) < X.Mathematics){
6 |       D[X.TownCity] = [X.Mathematics, last(D[X.TownCity])]
7 |     }
8 |     if(last(D[X.TownCity]) > X.Mathematics){
9 |       D[X.TownCity] = [first(D[X.TownCity]), X.Mathematics]
10 |
11 }
12 }
13 else{
14   D[X.TownCity] = [X.Mathematics, X.Mathematics]
15 }
16 Move X to Table 2
17 }
```

**Options :**

6406533041371. ✓ The difference between highest and lowest Mathematics marks of the city  $i$
6406533041372. ✗ The difference between overall highest and lowest Mathematics marks of the dataset
6406533041373. ✗ The difference between highest and second highest Mathematics marks of the city  $i$
6406533041374. ✗ It will be always 0

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133864

**Question Shuffling Allowed :**

Yes

**Question Number : 6 Question Id : 640653903123 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the following procedure, where **L1** and **L2** are two non-empty lists.

```
1 Procedure findsomething(L1, L2)
2     if(length(L1) != length(L2)){
3         return(False)
4     }
5     while(length(L1) > 0){
6         if(last(L1) != last(L2)){
7             return(False)
8         }
9         L1 = init(L1)
10        L2 = init(L2)
11    }
12    return(True)
13 End findsomething
```

When will **findSomething(L1, L2)** return True?

**Options :**

6406533041359. ✘ all the elements of both lists **L1** and **L2** are same but arranged in the reverse order.

6406533041360. ✓ all the elements of both lists **L1** and **L2** are same and are arranged in the same order.

6406533041361. ✘ all the elements of list **L1** are present in **L2** where **length(L2) > length(L1)**.

6406533041362. ✘ all the elements of list **L2** are present in **L1** where **length(L1) > length(L2)**.

**Sub-Section Number :**

4

**Sub-Section Id :**

640653133865

**Question Shuffling Allowed :**

Yes

**Question Number : 7 Question Id : 640653903124 Question Type : MCQ Calculator : Yes**

**Correct Marks : 6**

Question Label : Multiple Choice Question

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

```
1 wordCount = 0
2 while(Table 1 has more rows){
3     Read the first row X in Table 1
4     if(checksomething(X) == 1){
5         wordCount = wordCount + 1
6     }
7     Move X to Table 2
8 }
9
10 Procedure checksomething(Y)
11     i = 1, C = 0
12     A = False, B = False
13     while(i <= Y.LetterCount){
14         if(ith letter of Y.Word is vowel){
15             if(A and not B){
16                 C = 1
17             }
18             A = True, B = False
19         }
20         else{
21             if(not A and B){
22                 C = 1
23             }
24             A = False, B = True
25         }
26         i = i + 1
27     }
28     return(C)
29 End checksomething
```

#### Options :

6406533041363. ❌ Number of words in which vowels occur consecutively

6406533041364. ❌ Number of words in which no two vowels occur consecutively

6406533041365. ✓ Number of words in which either vowels or consonants occur consecutively

6406533041366. ❌ Number of words in which no two vowels and no two consonants occur consecutively

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133866

**Question Shuffling Allowed :**

Yes

**Question Number : 8 Question Id : 640653903127 Question Type : MSQ Calculator : Yes**

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

**Question Label : Multiple Select Question**

Consider the following pseudocode. At the end of the execution of the following pseudocode, if **flag** has value True, then choose the possible values of list **L** from the given choices.

```
1 flag = False
2 position = 0
3 foreach element in L{
4     if((position == 1) and (element == 'x')){
5         flag = True
6     }
7     position = position + 1
8 }
```

**Options :**

640653041375. ❌ ['z', 'y']

640653041376. ✓ ['y', 'x', 'z']

640653041377. ❌ ['x', 'y']

640653041378. ✓ ['z', 'x', 'y']

**Sub-Section Number :**

6

**Sub-Section Id :**

640653133867

**Question Shuffling Allowed :**

Yes

**Question Number : 9 Question Id : 640653903128 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the procedure given below, where **aList** is a non-empty list of positive numbers.

```
1 procedure cumulative(aList)
2     sum = 0, cumuList = []
3     foreach element in aList{
4         sum = sum + element
5         cumuList = cumuList ++ [sum]
6     }
7     return(cumuList)
8 end cumulative
```

At the end of the execution, which of the following option(s) would be correct? It is a Multiple Select Question (MSQ).

**Options :**

640653041379. ✓ The first element of both the lists, **cumuList** and **aList**, will be same.

640653041380. ❌ Number of elements in **cumuList** will be one lesser than that of **aList**.

640653041381. ✓ **cumuList** is a list of numbers in increasing order.

6406533041382. ❌ Number of elements in both lists, **cumuList** and **aList**, will be different.

**Sub-Section Number :**

7

**Sub-Section Id :**

640653133868

**Question Shuffling Allowed :**

Yes

**Question Number : 10 Question Id : 640653903129 Question Type : MSQ Calculator : Yes**

**Correct Marks : 6 Max. Selectable Options : 0**

Question Label : Multiple Select Question

For the 'Words' dataset, consider a scenario where we want to find the number of sentences containing at least 10 distinct letters. We asked ChatGPT to generate the pseudocode for this task. Below are the two pseudocodes provided by ChatGPT.

#### Pseudocode 1 :

```
1 count = 0
2 L = []
3 while(Table 1 has more rows){
4     Read the first row X in Table 1
5     L = addSomething(L, X)
6     if(X.word ends with a full stop){
7         if(length(L) >= 10){
8             count = count + 1
9         }
10        L = []
11    }
12    Move X to Table 2
13 }
14
15 Procedure addSomething(M, Y)
16     i = 1
17     while(i <= Y.LetterCount){
18         p = ith letter of Y.word
19         if(not (member(M, p))){
20             M = M ++ [p]
21         }
22         i = i + 1
23     }
24     return(M)
25 End addSomething
```

#### Pseudocode 2 :

```
1 count = 0
2 L = []
3 while(Table 1 has more rows){
4     Read the first row X in Table 1
5     L = addSomething(L, X)
6     if(X.word ends with a full stop and length(L) >= 10){
7         count = count + 1
8         L = []
9     }
10    Move X to Table 2
11 }
12
13 Procedure addSomething(M, Y)
14     i = 1
15     while(i <= Y.LetterCount){
16         p = ith letter of Y.word
17         if(not (member(M, p))){
18             M = M ++ [p]
19         }
20         i = i + 1
21     }
22     return(M)
23 End addSomething
```

Which of the following statements is/are correct? It is a Multiple Select Question (MSQ).

#### Options :

6406533041383. ❌ Both **Pseudocode 1** and **Pseudocode 2** will give the same required output.

6406533041384. ✓ **Pseudocode 1** produces the desired output, while **Pseudocode 2** does not.

6406533041385. ❌ **Pseudocode 2** produces the desired output, while **Pseudocode 1** does not.

6406533041386. ❌ Both **Pseudocode 1** and **Pseudocode 2** will not give the required output.

For **Pseudocode 1**, if any sentence contains less than 10 distinct integers, List L will not be reinitialized to `[]`.

6406533041387. ❌ For **Pseudocode 2**, if any sentence contains less than 10 distinct integers, List L will not be reinitialized to `[]`.

**Question Number : 11 Question Id : 640653903130 Question Type : MSQ Calculator : Yes**

**Correct Marks : 6 Max. Selectable Options : 0**

Question Label : Multiple Select Question

The following pseudocode is executed using the "Library" dataset. At the end of the execution, A stores a dictionary with the author's name as key and the number of books written by him/her as its value. But the code may have mistakes. Identify all such mistakes (if any). Assume that all statements not listed in the options below are free of errors.

```
1 A = {}
2 while(Table 1 has more rows){
3     Read the first row X from Table 1
4     if(not isKey(A, X.Author)){
5         A[X.Author] = A[X.Author] + 1
6     }
7     else{
8         A[X.Author] = 1
9     }
10    Move X to Table 2
11 }
```

**Options :**

Replacing the condition given in line 4 with the statement given below will provide the correct result.

```
1 | if(isKey(A, X.Author))
```

6406533041389. ✓

Replacing the statements given from line 4 to 9 with the statements given below will provide the correct result.

```
1 | if(not isKey(A, X.Author)){
2     A[X.Author] = 0
3 }
4 A[X.Author] = A[X.Author] + 1
```

6406533041390. ✓

6406533041391. ✓ Interchanging Line 5 and 8 will provide the correct result.

Replacing the statements given from line 4 to 9 with the statements given below will provide the correct result.

```
1 if(not isKey(A, X.Author)){  
2     A[X.Author] = 0  
3 }  
4 else{  
5     A[X.Author] = A[X.Author] + 1  
6 }  
7
```

6406533041392. ✘

**Question Number : 12 Question Id : 640653903131 Question Type : MSQ Calculator : Yes**

**Correct Marks : 6 Max. Selectable Options : 0**

Question Label : Multiple Select Question

The given pseudocode is executed using the "Words" dataset. At the end of execution **A** captures the frequency count of the most frequent vowel in the dataset. But the pseudocode may have mistakes. Identify all such mistakes (if any). Assume that all statements not listed in the options below are free of errors. It is a Multiple Select Question (MSQ).

```
1 D = { }, A = 0
2 while(Table 1 has more rows){
3     Read the first row X in Table 1
4     D = updateDictionary(D, X)
5     Move X to Table 2
6 }
7 foreach C in keys(D){
8     if(C is a vowel and D[C] < A){
9         A = D[C]
10    }
11 }
12 Procedure updateDictionary(D, Y)
13     i = 1
14     while(i ≤ Y.LetterCount){
15         B = ith letter in Y.Word
16         if(not isKey(D, B)){
17             D[B] = D[B] + 1
18         }
19         else{
20             D[B] = 1
21         }
22         i = i + 1
23     }
24     return(D)
25 End updateDictionary
```

#### Options :

6406533041393. ❌ Line 1: Incorrect initialization of **D**

6406533041394. ✓ Line 8: Incorrect conditional expression

6406533041395. ❌ Line 9: **A** updated with wrong value

6406533041396. ❌ Line 13: Incorrect initialization of **i**

6406533041397. ✓ Line 16: Conditional expression should not use "**not**" operator

6406533041398. ❌ Line 22: **i** updated at wrong place

**Sub-Section Id :**

640653133869

**Question Shuffling Allowed :**

Yes

**Question Number : 13 Question Id : 640653903132 Question Type : SA Calculator : None**

**Correct Marks : 5**

Question Label : Short Answer Question

What will the value of **S** be at the end of the execution of the following pseudocode?

```
1 L1 = [1, -1, 5]
2 L2 = [3, 1, 2]
3 S = dosomething(L1, L2) - dosomething(L2, L1)
4
5 Procedure dosomething(X, Y)
6     if(length(X) != length(Y)){
7         return(0)
8     }
9     if(length(X) == 1 and length(Y) == 1){
10        return(first(X) * first(Y))
11    }
12    return(first(X) * last(Y) + dosomething(rest(X), init(Y)))
13 End dosomething
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

0

**Question Number : 14 Question Id : 640653903133 Question Type : SA Calculator : None**

**Correct Marks : 5**

Question Label : Short Answer Question

The given pseudocode is executed using a dataset having the same fields as the "Words" dataset, and contains the following words:

"I ordered this product from Gitark. I am very happy to share my review regarding this awesome product. It is not only nice to use, but also has a very cool look. I think this is the best and the most awesome product which can be bought in this price range."

Consider the following information:

1. **unique(L)** returns a list of unique elements of list **L**. For example **unique(["think", "like", "toppers", "think"])** will return **["think", "like", "toppers"]**.
2. **comNo(L1, L2)** returns the number of common elements in lists **L1** and **L2**.
3. Ignore the upper and lower case, and punctuation symbols while comparing with other words.

```
1 positiveList = ["happy", "awesome", "nice", "fine", "best", "cool"]
2 posSen = 0, L = []
3 while(Table 1 has more rows){
4     Read the first row X in Table 1
5     L = L ++ [x.word]
6     if(x.word ends with full stop){
7         L = unique(L)
8         posCount = comNo(positiveList, L)
9         if(posCount >= 2){
10             posSen = posSen + 1
11         }
12         L = []
13     }
14     Move X to Table 2
15 }
```

What will the value of **posSen** be at the end of the execution of the above pseudocode?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3

**Sub-Section Number :** 9

**Sub-Section Id :** 640653133870

**Question Shuffling Allowed :** No

**Question Id :** 640653903134 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix **Calculator :** None

## Question Numbers : (15 to 16)

Question Label : Comprehension

Let **a** and **b** be positive integers. Procedure **remainder(a, b)** returns remainder if **a** is divided by **b**.

```
1 Procedure doSomething(x)
2     j = 2, Flag = True
3     if(x == 1){
4         return(False)
5     }
6     while(j < x){
7         if(remainder(x, j) == 0){
8             Flag = False
9             exitloop
10        }
11        j = j + 1
12    }
13    return(Flag)
14 End doSomething
```

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 15 Question Id : 640653903135 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

When will procedure **doSomething(X)** return True?

**Options :**

6406533041401. ✓ X is a prime number

6406533041402. ✗ X is an even number

6406533041403. ✗ X is an odd number

6406533041404. ✗ X is more than 1

**Question Number : 16 Question Id : 640653903136 Question Type : MCQ Calculator : Yes**

**Correct Marks : 5**

Question Label : Multiple Choice Question

Consider the procedure discussed above. What will the value of M be at the end of the execution of the given pseudocode below?

```
1 | L = [8, 12, 13, 23, 11, 40]
2 | M = []
3 | position = 1
4 | foreach element in L{
5 |     if(dosomething(position) and dosomething(element)){
6 |         M = M ++ [element]
7 |     }
8 |     position = position + 1
9 | }
```

**Options :**

6406533041405. ✓ M = [13, 11]

6406533041406. ✗ M = [13, 23, 11]

6406533041407. ✗ M = [11, 23]

6406533041408. ✗ M = [13, 23]

**Question Id : 640653903143 Question Type : COMPREHENSION Sub Question Shuffling**

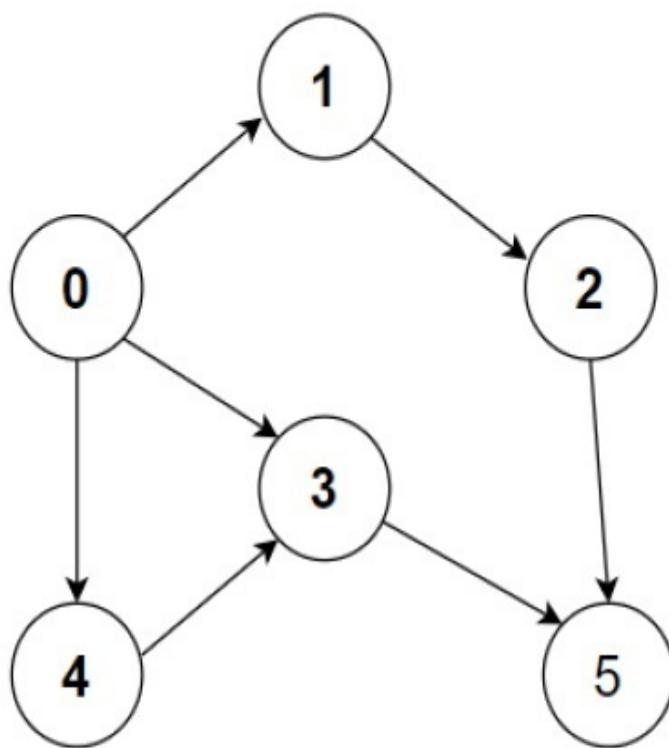
**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Calculator : None**

**Question Numbers : (17 to 18)**

Question Label : Comprehension

Let  $M$  be the adjacency matrix of the graph  $G$  as shown below and consider the procedure **Dosomething** given below.



```
1 Procedure Dosomething(M, q)
2     count = 0
3     foreach i in rows(M){
4         if(M[i][q] == 1 or M[q][i] == 1){
5             count = count + 1
6         }
7     }
8     return(count)
9 End Dosomething
```

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 17 Question Id : 640653903144 Question Type : SA Calculator : None**

**Correct Marks : 5**

Question Label : Short Answer Question

What will the value of  $B$  be at the end of the execution of the pseudocode given below?

```
1 | B = Dosomething(M, 3)
```

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3

**Question Number : 18 Question Id : 640653903145 Question Type : SA Calculator : None**

**Correct Marks : 4**

Question Label : Short Answer Question

What will the value of **B** be at the end of execution of pseudocode given below?

```
1 | B = Dosomething(M, 4)
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Sub-Section Number :** 10

**Sub-Section Id :** 640653133871

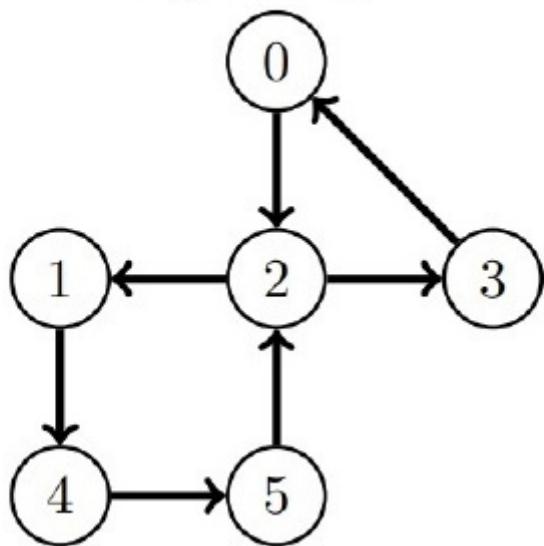
**Question Shuffling Allowed :** No

**Question Id : 640653903137 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (19 to 20)**

Question Label : Comprehension

Let  $M$  be an adjacency matrix of a graph  $G$  given below, where  $M[i][j] = 1$  if there is an edge from  $i$  to  $j$ , otherwise 0.



```
1 Procedure updateMatrix(M)
2     tempMat = M
3     foreach i in rows(M){
4         foreach k in columns(M){
5             if(M[i][k] == 1){
6                 foreach j in columns(M){
7                     if(M[k][j] == 1){
8                         tempMat[i][j] = 1
9                     }
10                }
11            }
12        }
13    }
14    return(tempMat)
15 End updateMatrix
```

Based on above information, answer the given subquestions

### Sub questions

**Question Number : 19 Question Id : 640653903138 Question Type : MCQ Calculator : Yes**

**Correct Marks : 5**

Question Label : Multiple Choice Question

What will the values of  $p$  and  $q$  be at the end of execution of pseudocode given below?

```
1 newMatrix = updateMatrix(M)
2 p = newMatrix[0][3]
3 q = newMatrix[3][4]
```

**Options :**

6406533041409. ✘  $p = 0, q = 0$

6406533041410. ✓ p = 1, q = 0

6406533041411. ✗ p = 0, q = 1

6406533041412. ✗ p = 1, q = 1

**Question Number : 20 Question Id : 640653903139 Question Type : MCQ Calculator : Yes**

**Correct Marks : 5**

Question Label : Multiple Choice Question

What will the values of **p** and **q** be at the end of execution of pseudocode given below?

```
1 newMatrix1 = updateMatrix(M)
2 newMatrix2 = updateMatrix(newMatrix1)
3 p = newMatrix2[0][3]
4 q = newMatrix2[3][4]
```

**Options :**

6406533041413. ✗ p = 0, q = 0

6406533041414. ✗ p = 1, q = 0

6406533041415. ✗ p = 0, q = 1

6406533041416. ✓ p = 1, q = 1

**Question Id : 640653903140 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (21 to 22)**

Question Label : Comprehension

The following pseudocode constructs a graph G using the "Scores" dataset, represented by the adjacency matrix **B**. Let **A** be a dictionary with sequence numbers of students as keys mapped to their total marks.

```
1 n = length(keys(A))
2 B = createMatrix(n, n)
3
4 foreach i in keys(A){
5     foreach j in keys(A){
6         if(A[i] > A[j]){
7             B[i][j] = 1
8         }
9     }
10 }
```

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 21 Question Id : 640653903141 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Choose the correct option(s) with respect to the graph G.

**Options :**

6406533041417. ✓ G is always acyclic.

6406533041418. ✗ If  $B[i][j] = 1$  then  $B[j][i] = 1$ , for any  $i, j$

6406533041419. ✓ If  $B[i][j] = 1$  then  $B[j][i] = 0$ , for any  $i, j$

6406533041420. ✗ If  $B[i][j] = 0$  then  $B[j][i] = 1$ , for any  $i, j$

**Question Number : 22 Question Id : 640653903142 Question Type : MCQ Calculator : Yes**

**Correct Marks : 5**

Question Label : Multiple Choice Question

When will the procedure **checkSomething(B, i)** return True?

```
1 Procedure checksomething(B, i)
2     foreach j in columns(B){
3         if((i != j) and (B[i][j] == 0)){
4             return(False)
5         }
6     }
7     return (True)
8 End checksomething
```

**Options :**

6406533041421. ✗ If student  $i$  has scored greater total marks than at least one student

6406533041422. ✗ If student  $i$  has scored less total marks than at least one student

6406533041423. ✗ If student  $i$  has scored lowest total marks among all students

6406533041424. ✓ If student  $i$  has scored highest total marks among all students

## Sem2 Intro to python

Section Id :	64065364100
Section Number :	2
Section type :	Online
Mandatory or Optional :	Mandatory

<b>Number of Questions :</b>	18
<b>Number of Questions to be attempted :</b>	18
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133872
<b>Question Shuffling Allowed :</b>	No

**Question Number : 23 Question Id : 640653903146 Question Type : MCQ Calculator : Yes**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "[FOUNDATION LEVEL : SEMESTER II: 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 :**

640653041427. ✓ YES

640653041428. ✗ NO

**Question Number : 24 Question Id : 640653903147 Question Type : MCQ Calculator : Yes**

**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

In both the blocks, please note that the region to the left of the thin vertical line — | — corresponds to line-numbers. Do not confuse the line numbers with the content of the code or the input-output. Just to be clear:

Line Numbers ← → Code/Input/Output

1	0
2	2
3	4
4	6
5	8

## Useful information

### range

Sample behaviour 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 :

6406533041429. ✓ Useful Data has been mentioned above.

6406533041430. ❌ This data attachment is just for a reference & not for an evaluation.

**Sub-Section Number :**

2

**Sub-Section Id :**

640653133873

**Question Shuffling Allowed :**

Yes

**Question Number : 25 Question Id : 640653903148 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

**Question Label : Multiple Choice Question**

A system categorizes people based on their age as follows:

Marks	Grade
$0 \leq Age < 13$	<i>Child</i>
$13 \leq Age < 20$	<i>Teenager</i>
$20 \leq Age < 60$	<i>Adult</i>
$Age > 60$	<i>SeniorCitizen</i>

Which of the following snippets computes and prints the category after accepting the age as input? Assume that the input entered by the user will be an integer and will lie only in the range  $[0, 70]$ .

#### Snippet-1

```
age = int(input())
if age < 13:
    category = 'Child'
elif age < 20:
    category = 'Teenager'
elif age < 60:
    category = 'Adult'
else:
    category = 'Senior Citizen'
print(category)
```

#### Snippet-2

```
age = int(input())
if age < 13:
    category = 'Child'
if age < 20:
    category = 'Teenager'
if age < 60:
    category = 'Adult'
else:
    category = 'Senior Citizen'
print(category)
```

#### Options :

6406533041431. ✓ Only snippet-1 is correct

6406533041432. ✗ Only snippet-2 is correct

6406533041433. ✗ Both snippets are correct

6406533041434. ❌ Both snippets are incorrect

**Question Number : 26 Question Id : 640653903149 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What will be the output of the following Python code?

```
string1 = 'diploma'
string2 = 'data science'
L = []
for i in range(0, len(string1)):
    for j in range(0, len(string2)):
        if (string1[i] == string2[j]):
            L.append(string1[i])
            break
        else:
            continue
print(L)
```

**Options :**

['d', 'i', 'a']

6406533041435. ✓

['d', 'i', 'a', 'd', 'i', 'a']

6406533041436. ❌

['d', 'd', 'i', 'i', 'a', 'a']

6406533041437. ❌

6406533041438. ❌ None of these

**Question Number : 27 Question Id : 640653903150 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

`check_level` is a method of the class `Tank` that updates the attribute `fill_required` to the Boolean literal `True` if the attribute `waterlevel` is less than 50 litres, indicating that the tank needs refilling and `False` otherwise. Select the correct implementation of this method.

**Options :**

```
def check_level(self):
    if self.waterlevel < 50:
        self.fill_required = True
    else:
        self.fill_required = False
```

6406533041439. ✓

```
def check_level():
    if self.waterlevel < 50:
        self.fill_required = True
    else:
        self.fill_required = False
```

6406533041440. ✗

```
def check_level(self):
    if waterlevel < 50:
        self.fill_required = True
    else:
        self.fill_required = False
```

6406533041441. ✗

```
def check_level(self):
    if self.waterlevel <= 50:
        fill_required = True
    else:
        fill_required = False
```

6406533041442. ✗

**Question Number : 28 Question Id : 640653903151 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following function.

```
def createList(nums):
    outlist = []

    for x in nums:
        for y in range(len(outlist)):
            outlist.append(outlist[y]+[x])

    print(outlist)
```

The output when we invoke `createList([1,2,5])` is:

**Options :**

6406533041443. ✘ `[[], [1], [2], [1, 2], [1, 2, 5], [2, 5], [5], [1, 5]]`

6406533041444. ✘ `[[], [1], [2], [1, 2], [5], [1, 5], [2, 5], [1, 2, 5]]`

6406533041445. ✘ `[[], [1], [2], [1, 2], [1, 2, 5], [2, 5], [5], [1, 5]]`

6406533041446. ✓ `[[], [1], [2], [1, 2], [5], [1, 5], [2, 5], [1, 2, 5]]`

**Question Number : 29 Question Id : 640653903152 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What will be the output of the code below.

```
def matrix_operation(matrix):
    new_matrix = []
    for j in range(len(matrix[0])):
        modified_row = []
        for i in range(len(matrix)):
            modified_row.append(matrix[i][j])
        new_matrix.append(modified_row)
    print(new_matrix)

A = [[1, 2, 3], [4, 5, 6], [7, 8, 9]]
matrix_operation(A)
```

**Options :**

640653041447. ✓ [[1, 4, 7], [2, 5, 8], [3, 6, 9]]

640653041448. ✗ [[1, 2, 3], [4, 5, 6], [7, 8, 9]]

640653041449. ✗ [[1, 2, 3], [7, 8, 9], [4, 5, 6]]

640653041450. ✗ [[1, 3, 2], [7, 9, 8], [4, 6, 5]]

**Question Number : 30 Question Id : 640653903153 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the file `countries.txt` given below, also consider the python file both in the same directory. What will be the output of the code below?

`countries.txt`

```
IND-New Delhi-+91  
USA-Washington D.C.-+1  
RU-Moscow-+7  
CHN-Beijing-+86  
BR-Brasilia-+55
```

```
file_path = "countries.txt"  
file = open(file_path, "r")  
  
for line in file:  
    modified_line = line.strip()  
    modified_line = modified_line.split('-')  
    print(modified_line[0], "|", modified_line[2])  
  
file.close()
```

The separator used in `countries.txt` is `-` which is same as the one used in `.split()` method in python code.

**Options :**

```
IND-New Delhi  
USA-Washington D.C.  
RU-Moscow  
CHN-Beijing  
BR-Brasilia
```

6406533041451. ✘

6406533041452. ✘

IND | Delhi  
USA | States-Washington  
RU |  
CHN |  
BR |

IND | +91  
USA | +1  
RU | +7  
CHN | +86  
BR | +55

6406533041453. ✓

IND | New Delhi  
USA | Washington D.C.  
RU | Moscow  
CHN | Beijing  
BR | Brasilia

6406533041454. ❌

**Sub-Section Number :** 3  
**Sub-Section Id :** 640653133874  
**Question Shuffling Allowed :** Yes

**Question Number : 31 Question Id : 640653903154 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider the Python code given below.

```
f = open('output.txt', 'w')
f.write('rose')
f.write('jasmine\n')
f.write('''lotus
lilly
orchard''')
f.close()
```

How many number of lines will be present in the file `output.txt` after the execution of the above code?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

4

**Question Number :** 32 **Question Id :** 640653903155 **Question Type :** SA **Calculator :** None

**Correct Marks :** 3

**Question Label :** Short Answer Question

What is the output of the following snippet of code?

```
given = '27{4517}90'
word = '' # empty string
index = 0
flag = False
while index < len(given):
    char = given[index]
    if char == '{':
        flag = True
    if flag and char not in '{}':
        word += char
    if char == '}':
        break
    index += 1

print(int(word))
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

4517

**Question Number :** 33 **Question Id :** 640653903156 **Question Type :** SA **Calculator :** None

**Correct Marks :** 3

**Question Label :** Short Answer Question

Given below is the python code.

```
s1, s2 = set(), set()
s3 = s1

for i in range(7,10,2):
    s1.add(i)

for i in range(6,20,3):
    s2.add(i)

for i in range(18,14,-1):
    s3.add(i)

tup = tuple(s1 & s2 & s3)

print(len(tup))
```

What will be in the length of variable named `tup` .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3

**Question Number :** 34 **Question Id :** 640653903157 **Question Type :** SA **Calculator :** None

**Correct Marks :** 3

**Question Label :** Short Answer Question

```
numbers = [20, 10, 9, 12, 3]

result = []

for num in numbers:
    if num % 3 == 0:
        result.append(num * num)

result.sort()

result.pop()

print(result[-1])
```

What will be the output of the snippet of code?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

81

**Question Number :** 35 **Question Id :** 640653903158 **Question Type :** SA **Calculator :** None

**Correct Marks :** 3

**Question Label :** Short Answer Question

Consider the following snippet of code.

```
def filter(people, age, city):
    people_list = []
    for person in people:
        if person["age"] >= age and person["city"] == city:
            people_list.append(person)
    return people_list

people = [
    {"name": "Alice", "age": 25, "city": "New York"},
    {"name": "Bob", "age": 30, "city": "Los Angeles"},
    {"name": "Charlie", "age": 20, "city": "Chicago"},
    {"name": "David", "age": 35, "city": "New York"},
    {"name": "Elsie", "age": 31, "city": "New York"}]

print(len(filter(people, 30, "New York")))
```

What will be the output of the snippet of code?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Sub-Section Number :** 4

**Sub-Section Id :** 640653133875

**Question Shuffling Allowed :** Yes

**Question Number :** 36 **Question Id :** 640653903159 **Question Type :** MSQ **Calculator :** Yes

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

**Question Label :** Multiple Select Question

Consider the below snippets which are intended to create a dictionary with the elements as key and their frequency in the given list as values.

#### Snippet-1

```
L = ['yellow', 'indigo', 'blue', 'yellow', 'blue']
freq = {word: L.count(word) for word in L}
print(freq)
```

#### Snippet-2

```
L = ['yellow', 'indigo', 'blue', 'yellow', 'blue']
freq = {word: count(word) for word in L}
print(freq)
```

Choose all the correct options regarding the given code .

#### Options :

6406533041460. ✓ Snippet-1 is correct

6406533041461. ✗ Snippet-2 is correct

The correct snippet generates the output:

```
{['yellow': 2], ['indigo': 1], ['blue': 2]}
```

6406533041462. ✗

The correct snippet generates the output:

```
{'yellow': 2, 'indigo': 1, 'blue': 2}
```

6406533041463. ✓

**Question Number : 37 Question Id : 640653903160 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Select error-free implementations of a program that reads and prints `input.txt` line by line. If the file doesn't exist, the program should terminate without raising any error.

#### Options :

6406533041464. ✓

```
try:  
    f = open('input.txt', 'r')  
    for line in f:  
        print(line.strip())  
except FileNotFoundError:  
    print('File does not exist')
```

```
try:  
    f = open('input.txt', 'r')  
    for line in f:  
        print(line.strip())  
except:  
    print('File does not exist')
```

6406533041465. ✓

```
try:  
    f = open('input.txt', 'r')  
    for line in f:  
        print(line.strip())  
except InvalidError:  
    print('File does not exist')
```

6406533041466. ✗

```
try:  
    f = open('input.txt', 'r')  
    for line in f:  
        print(line.strip())  
except FileNotFoundError:  
    print('File does not exist')  
  
except:  
    print('This is for all other errors that might come up')
```

6406533041467. ✓

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133876

**Question Shuffling Allowed :**

Yes

**Question Number : 38 Question Id : 640653903161 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following python code.

```
def word_shuffle(s, t):
    if len(s) != len(t):
        return False
    dict_s = {}
    dict_t = {}

    for char in s:
        dict_s[char] = dict_s.get(char, 0) + 1

    for char in t:
        dict_t[char] = dict_t.get(char, 0) + 1

    return dict_s == dict_t
```

Each input is a word in which all the characters are in lower case. These will be set as argument when the function `word_shuffle()` is called. Select all set of arguments which will return True.

Hint:

`dict.get(key, default_value)` returns the value corresponding to the `key`, if `key` is not found then it returns the `default_value`.

Example:

```
sample_dict = {'a' : 1}
sample_dict.get('a') # returns 1
sample_dict.get('b') # returns None
sample_dict.get('b',0) # retuns 0
```

**Options :**

640653041468. ❌ "rat", "cat"

640653041469. ✓ "listen", "silent"

6406533041470. ✓ "race", "care"

6406533041471. ✘ "train", "intro"

**Sub-Section Number :** 6

**Sub-Section Id :** 640653133877

**Question Shuffling Allowed :** No

**Question Id : 640653903162 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (39 to 40)**

Question Label : Comprehension

Consider the class `Player` :

```
class Player:  
    def __init__(self, name, score):  
        self.name = name  
        self.score = score  
  
    def change_score(self, new_score):  
        self.score = new_score  
  
    def print_info(self):  
        print(f'Player name: {self.name}')  
        print(f'Player score: {self.score}')
```

`Captain` is a sub-class of `Player`:

```
class Captain(Player):  
    count = 0  
  
    def __init__(self, name, score, game_type):  
        super().__init__(name, score)  
        self.game_type = game_type  
        Captain.count += 1  
  
    def is_Cricket(self):  
        return self.game_type == 'Cricket'  
  
    def print_info(self):  
        super().print_info()  
        print('Player is a Captain')  
        print(f'Game type: {self.game_type}')
```

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 39 Question Id : 640653903163 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1.5**

**Question Label : Multiple Choice Question**

What is the output of the following snippet of code?

```
capt = Captain('Ronaldo', 708, 'Football')
capt.change_score(800)
capt.print_info()
```

Options :

Player name: Ronaldo  
Player score: 800

6406533041472. ✘

Player is a Captain  
Game type: Football

6406533041473. ✘

Player name: Ronaldo  
Player score: 708  
Player is a Captain  
Game type: Football

6406533041474. ✘

Player name: Ronaldo  
Player score: 800  
Player is a Captain  
Game type: Football

6406533041475. ✓

Question Number : 40 Question Id : 640653903164 Question Type : SA Calculator : None

Correct Marks : 1.5

Question Label : Short Answer Question

`matches` represents a list of objects of type `Captain`. What is the output of the following snippet of code?

```
Captain.count = 0
matches = [Captain('Ali', 678, 'Football'),
           Captain('Sachin', 128, 'Cricket'),
           Captain('Madonna', 134, 'Football'),
           Captain('Dhoni', 120, 'Cricket')]
count = 0

for c in matches:
    if c.is_Cricket():
        count = count + 1
print(count)
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Sub-Section Number :** 7

**Sub-Section Id :** 640653133878

**Question Shuffling Allowed :** No

**Question Id :** 640653903165 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix  
**Calculator :** None

**Question Numbers :** (41 to 43)

**Question Label :** Comprehension

Execute the following snippet of code and answer the given sub-questions

```
li = ['valorant', 'apex', 'cod']

def count(s):
    n = 0
    for char in s:
        if char in 'aeiou':
            n += 1
    return {s : n}

def recursiveFunc(n):
    if n <= 0:
        print("Blastoff!")
    else:
        print(n)
        elem = li.pop(0)
        li.append(count(elem))
        recursiveFunc(n - 1)

recursiveFunc(3)
```

### Sub questions

**Question Number : 41 Question Id : 640653903166 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1.5**

Question Label : Multiple Choice Question

What will be printed when the code  
is run?

**Options :**

- 3
- 2
- 1

6406533041477. ✘

6406533041478. ✓

3  
2  
1  
Blastoff!

Blastoff!

1  
2  
3

6406533041479. ✘

3  
2  
1  
Blastoff!  
Blastoff!

6406533041480. ✘

**Question Number : 42 Question Id : 640653903167 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1.5**

Question Label : Multiple Choice Question

What will be the value of `li`  
at the end of execution?

**Options :**

6406533041481. ✘ `['valorant', 'apex', 'cod']`

6406533041482. ✘ `['cod', 'apex', 'valorant']`

6406533041483. ✘ `[{'cod': 1}, {'apex': 2}, {'valorant': 3}]`

6406533041484. ✓ `[{'valorant': 3}, {'apex': 2}, {'cod': 1}]`

**Question Number : 43 Question Id : 640653903168 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

For which argument will the function

`recursiveFunc()` cause an error?

**Options :**

6406533041485. ✘ `recursiveFunc(1)`

6406533041486. ✘ `recursiveFunc(-1)`

6406533041487. ✓ `recursiveFunc(5)`

6406533041488. ✘ `recursiveFunc(0)`

## DBMS

<b>Section Id :</b>	64065364101
<b>Section Number :</b>	3
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	21
<b>Number of Questions to be attempted :</b>	21
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133879
<b>Question Shuffling Allowed :</b>	No

**Question Number : 44 Question Id : 640653903169 Question Type : MCQ Calculator : Yes**

**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 :**

6406533041489. ✓ YES

6406533041490. ✗ NO

**Sub-Section Number :** 2

**Sub-Section Id :** 640653133880

**Question Shuffling Allowed :** Yes

**Question Number : 45 Question Id : 640653903170 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Let  $S(Y, U, V)$  be a relation. Let  $R(P, W, X, Y, Z)$  be another relation with the following functional dependencies:

$$\mathcal{F} = \{X \rightarrow ZW, Y \rightarrow X, W \rightarrow P\}$$

$R$  contains 250 tuples and  $S$  contains 300 tuples. What is the maximum number of tuples possible as output of  $R \times S$ ?

**Options :**

6406533041491. ✗ 75000

6406533041492. ✗ 250

6406533041493. ✓ 300

6406533041494. ✗ 50

**Question Number : 46 Question Id : 640653903171 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct output obtained on running the given SQL statements on Table Employee.

EID	EName
E01	Arthur
E02	Raina
E03	Meena
E04	Arthur
E06	Joey

Table Employee

```
SQL> SAVEPOINT SP1;
SQL> UPDATE Employee SET EName='Jainie'
      WHERE EID='E06';
SQL> SAVEPOINT SP2;
SQL> DELETE FROM Employee WHERE EID='E02';
SQL> SAVEPOINT SP3;
SQL> UPDATE Employee SET EName='Raina'
      WHERE EID='E04';
SQL> ROLLBACK TO SP2;
```

**Options :**

EID	EName
E01	Arthur
E02	Raina
E03	Meena
E04	Arthur
E06	Jainie

6406533041495. ✓

EID	EName
E01	Arthur
E03	Meena
E04	Arthur
E06	Jainie

6406533041496. ✘

EID	EName
E01	Arthur
E03	Meena
E04	Raina
E06	Jainie

6406533041497. ✘

EID	EName
E01	Arthur
E02	Raina
E03	Meena
E04	Arthur
E06	Joey

6406533041498. ✘

**Question Number : 47 Question Id : 640653903172 Question Type : MCQ Calculator : Yes****Correct Marks : 2**

Question Label : Multiple Choice Question

Given below are four statements. Match each of them with the corresponding property in the set of ACID properties.

*Statement 1:* Any data written to the database must be valid according to all the defined rules like the check and key constraints and triggers.

*Statement 2:* Every completed transaction is saved into the secondary storage.

*Statement 3:* During money transfer, either the amount debited from the source account must be credited to the destination account or the money should not be debited from the source account at all.

*Statement 4:* If multiple transactions are being executed concurrently, then the final result should be the same irrespective of the sequence in which the transactions were executed.

Let A denote Atomicity, C denote Consistency, I denote Isolation and D denote Durability. From among the given options, find the correct match.

**Options :**

6406533041499. ✘ 1 - A, 2 - C, 3 - I, 4 - D

6406533041500. ✓ 1 - C, 2 - D, 3 - A, 4 - I

6406533041501. ✘ 1 - C, 2 - D, 3 - I, 4 - A

6406533041502. ✘ 1 - I, 2 - A, 3 - D, 4 - C

**Question Number : 48 Question Id : 640653903173 Question Type : MCQ Calculator : Yes****Correct Marks : 2**

Question Label : Multiple Choice Question

Consider the following monthly backup schedule used by a company:

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1/ Full	2/ Incremental	3/ Incremental	4/ Incremental	5/ Incremental	6/ Incremental	7/ Differential
8/ Incremental	9/ Incremental	10/ Incremental	11/ Incremental	12/ Differential	13/ Incremental	14/ Incremental
15/ Incremental	16/ Incremental	17/ Differential	18/ Incremental	19/ Incremental	20/ Incremental	21/ Incremental
22/ Differential	23/ Incremental	24/ Incremental	25/ Incremental	26/ Incremental	27/ Incremental	28/ Incremental
29/ Incremental	30/ Incremental					

If a failure occurs on the 27th day of the month before the backup for the day has been completed, how many backup sets have to be loaded for a full recovery?

**Options :**

6406533041503. ✘ 4

6406533041504. ✘ 5

6406533041505. ✓ 6

6406533041506. ✘ 7

**Question Number : 49 Question Id : 640653903176 Question Type : MCQ Calculator : Yes****Correct Marks : 2**

Question Label : Multiple Choice Question

Consider the table Players as given below:

PID	name	gender	level
001	Percy	Male	International
002	Jason	Male	District
003	Hazel	Female	National
004	Leo	Male	National
005	Rayna	Female	District
006	Annabeth	Female	National
007	Frank	Male	International
008	Piper	Female	District

Table 1: Players

Let us create two different bitmap indices, one on the *gender* attribute and the other on the *level* attribute. Which of the following options will give the correct result if we want to find all females who are playing in the 'District' level.

Note: Options are in the form of gender (operation) level

**Options :**

6406533041515. ✓ 00101101 AND 01001001

6406533041516. ✗ 00101101 OR 00110100

6406533041517. ✗ 11010010 AND 01001001

6406533041518. ✗ 11010010 OR 00110100

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133881

**Question Shuffling Allowed :**

Yes

**Question Number : 50 Question Id : 640653903174 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

**Question Label : Multiple Choice Question**

Consider a schedule S given below where  $W_i(a)$  means that transaction  $T_i$  is performing a write operation on data item  $(a)$  and similarly  $R_i(a)$  means that transaction  $T_i$  is performing a read operation on data item  $(a)$ .

S :  $R_1(B), R_4(A), W_2(A), W_3(C), R_1(B), W_2(A), W_3(A), W_4(D), R_2(D), R_1(D)$

Identify the appropriate time stamp ordering for transactions  $T_1, T_2, T_3$  and  $T_4$  that allows to execute the given schedule S using the time stamp protocol.

**Options :**

6406533041507. ✗ 20, 30, 25, 15

6406533041508. ✗ 15, 20, 25, 30

6406533041509. ✓ 20, 25, 30, 15

6406533041510. ✗ 20, 25, 15, 30

**Question Number : 51 Question Id : 640653903175 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

The following key values are inserted into a  $B^+$  tree of order 4 in a given sequence. The tree is initially empty.

**25,8,13,59,3,31,60,11,43**

How many node splits will be required to perform these insertions?

**Options :**

6406533041511. ✘ 5

6406533041512. ✘ 4

6406533041513. ✘ 6

6406533041514. ✓ 3

**Question Number : 52 Question Id : 640653903177 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Imagine you're designing a database for an employee management system where employees are categorized based on their departments, job roles, and joining dates. The schema includes a relation  $\text{Employees}(EmpID, EmpName, Dept, JobRole, JoiningDate)$  to store information about the employees.

Choose the correct sets of functional dependencies for the relation

$\text{Employees}(EmpID, EmpName, Dept, JobRole, JoiningDate)$  under which Employees is in 3NF:

**Options :**

6406533041519. ✓  $\{EmpID \rightarrow (EmpName, Dept, JobRole, JoiningDate)\}$

6406533041520. ✘  $\{EmpID \rightarrow (EmpName, Dept, JobRole, JoiningDate), EmpName \rightarrow JoiningDate\}$

6406533041521. ✘  $\{EmpID \rightarrow (EmpName, Dept), Dept \rightarrow (JobRole, joiningDate)\}$

6406533041522. ✘  $\{EmpID \rightarrow EmpName, EmpName \rightarrow (Dept, JobRole, JoiningDate)\}$

**Sub-Section Number :**

4

**Sub-Section Id :**

640653133882

**Question Shuffling Allowed :**

Yes

**Question Number : 53 Question Id : 640653903179 Question Type : MSQ Calculator : Yes**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Choose the correct statement(s):

**Options :**

- 6406533041527. ✓ In a dense index, index record appears for every search-key value in the file.
- 6406533041528. ✓ Secondary index is also called non-clustering index
- 6406533041529. ✓ Sparse index contains index records for only some search-key values.
- 6406533041530. ✓ In an ordered index, index entries are stored sorted on the search key value.

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133883

**Question Shuffling Allowed :**

Yes

**Question Number : 54 Question Id : 640653903178 Question Type : MSQ Calculator : Yes****Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Let A( $T, U, V, W$ ) be a relational schema with the following functional dependencies:

$$\mathcal{F} = \{W \rightarrow UT, UV \rightarrow W, V \rightarrow T, W \rightarrow U\}$$

We want to decompose the relation A into 3NF. We asked ChatGPT to decompose the relation into 3NF and below shown is the response from ChatGPT:

The decomposed schema in 3NF is:

1. R1( $W, U, T$ )
2. R2( $V, T$ )
3. R3( $U, V, W$ )

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

**Options :**

- 6406533041523. ✓ The decomposition **R1, R2, R3** are in 3NF and all the dependencies are getting preserved.

6406533041524. ❌ In the decomposition, **R2** is not required. As **R1 and R3** is sufficient decomposition in 3NF and all the dependencies are getting preserved.

6406533041525. ❌ In the decomposition, **R1** is not required. As **R2 and R3** is sufficient decomposition in 3NF and all the dependencies are getting preserved.

6406533041526. ✓ In the decomposition, **R2** is not required. As **R1 and R3** is sufficient decomposition in 3NF but all the dependencies will not get preserved.

**Question Number : 55 Question Id : 640653903180 Question Type : MSQ Calculator : Yes****Correct Marks : 3 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the following schedule S.

$$S : R_1(A), R_2(B), W_1(C), Com_1, R_3(B), R_3(C), W_2(B), W_3(A), Com_2, Com_3$$

Which of the following options is/are correct?

**Options :**

6406533041531. ❌ Schedule **S** can not be two-phase lockable.
6406533041532. ✓ Schedule **S** can be two-phase lockable.

640653041533. ✓ Schedule **S** can be strict two-phase lockable.

640653041534. ✓ Schedule **S** is conflict serializable.

**Question Number : 56 Question Id : 640653903181 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following schedule **S**.

T1	T2
r(A)	r(b)
w(A)	r(A)
	w(A)
	w(B)
r(B)	
w(B)	

Table 2: schedule: **S**

Which of the following is true for schedule **S**?

**Options :**

640653041535. ✗ Schedule **S** is Conflict serializable

640653041536. ✗ Schedule **S** is View serializable

640653041537. ✓ Schedule **S** is not Conflict Serializable

640653041538. ✓ Schedule **S** is not View Serializable

**Question Number : 57 Question Id : 640653903182 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Given relation `student_info(roll_no, name, subject, marks)` with `(roll_no, subject)` as candidate key. Which of the following functional dependencies violates the Third normal form(3NF)?

**Options :**

640653041539. ✗  $roll\_no, subject \rightarrow marks$

640653041540. ✗  $roll\_no, subject \rightarrow name$

640653041541. ✓  $name \rightarrow marks$

640653041542. ✓  $marks \rightarrow name$

**Question Number : 58 Question Id : 640653903183 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following schema

Customers(C\_id, C\_name, address)

Items(Itm\_id, Itm\_name)

Orders(ord\_id, C\_id, Itm\_id, cost)

Which of the following relational algebra expressions returns the name of customers who purchased biscuits?

**Options :**

6406533041543. ❌  $\Pi_{C\_name}(\sigma_{Itm\_name='biscuits'} Items \bowtie Orders)$

6406533041544. ✓  $\Pi_{C\_name}(\Pi_{C\_id}(\Pi_{Itm\_id}(\sigma_{Itm\_name='biscuits'} Items) \bowtie Orders) \bowtie Customers)$

6406533041545. ❌  $\Pi_{C\_name}(\sigma_{Itm\_name='biscuits'} Items \bowtie Customers)$

6406533041546. ✓  $\Pi_{C\_name}((\sigma_{Itm\_name='biscuits'} Items) \bowtie Orders \bowtie Customers)$

**Question Number : 59 Question Id : 640653903185 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following schema

Students(StudentID, Name, Department)

Hostels(HostelID, H\_name)

Hostel\_Allocation(StudentID, HostelID, RoomNumber)

Which of the following queries returns the *StudentID* and *Name* of students to whom Narmada hostel is allotted?

**Options :**

SELECT Students.StudentID, Students.Name FROM Students  
JOIN Hostel\_Allocation ON Students.StudentID = Hostel\_Allocation.StudentID  
JOIN Hostels ON Hostel\_Allocation.HostelID = Hostels.HostelID  
WHERE Hostels.H\_name = 'Narmada';

6406533041552. ❌ SELECT StudentID, Name FROM Students WHERE StudentID IN  
(SELECT HostelID from Hostels WHERE Hostels.H\_Name = 'Narmada');

```
SELECT Students.StudentID, Students.Name FROM Students  
JOIN Hostel_Allocation ON Students.StudentID = Hostel_Allocation.StudentID  
6406533041553. ✘ WHERE Hostels.H_Name = 'Narmada';
```

```
SELECT StudentID, Name FROM Students WHERE StudentID IN  
(SELECT StudentID from Hostel_Allocation WHERE HostelID =  
6406533041554. ✓ (SELECT HostelID from Hostels WHERE Hostels.H_Name = 'Narmada'));
```

**Sub-Section Number :**

6

**Sub-Section Id :**

640653133884

**Question Shuffling Allowed :**

Yes

**Question Number : 60 Question Id : 640653903187 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

The following numbers are inserted into an empty binary search tree in the given order: 27, 23, 33, 49, 51, 92, 83, 10, 78. What is the height of the resulting binary search tree?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

6

**Question Number : 61 Question Id : 640653903188 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider a **Block nested loop join** for the two relations,**instructor** and **department**. Assuming the worst-case memory availability and **instructor** as the outer relation, the provided details are as follows:

- Total number of block transfers: 20500
- Total number of seeks required: 1000
- Number of block in the outer relation: 500

What is the number of blocks in the inner relations?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

40

**Sub-Section Number :** 7

**Sub-Section Id :** 640653133885

**Question Shuffling Allowed :** Yes

**Question Number :** 62 **Question Id :** 640653903189 **Question Type :** SA **Calculator :** None

**Correct Marks :** 2

Question Label : Short Answer Question

Consider the given log records at an instance of time:

Table 3: Log records

< $T_0$ start >
< $T_0$ , A, 100, 200 >
< $T_1$ start >
< $T_1$ , B, 400, 300 >
< $T_0$ , C, 500, 600 >
< $T_2$ start >
< $T_2$ , D, 800, 700 >
< Commit $T_1$ >
< Checkpoint L >
< $T_2$ , C, 500, 1000 >
< Commit $T_2$ >
< $T_0$ , B, 400, 500 >

Suppose there is a system crash after the last log record. What will be the value of the expression  $(B+C)-(A+D)$ , based on the values stored on the disk at that point:

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

500

**Sub-Section Number :** 8

**Sub-Section Id :** 640653133886

**Question Shuffling Allowed :** Yes

**Question Number :** 63 **Question Id :** 640653903184 **Question Type :** MSQ **Calculator :** Yes

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

Question Label : Multiple Select Question

Consider the relational schema  $R(A, B, C, D, E, F, G)$  with the given list of functional dependencies:  $\mathcal{F} = \{B \rightarrow AC, E \rightarrow G, CD \rightarrow F\}$   
Which of the following is/are a super key for  $R$ ?

**Options :**

6406533041547. ✓  $\{BDE\}$

6406533041548. ✗  $\{DE\}$

6406533041549. ✗  $\{CD\}$

6406533041550. ✗  $\{BGE\}$

**Question Number : 64 Question Id : 640653903186 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the ER Diagram as shown below:

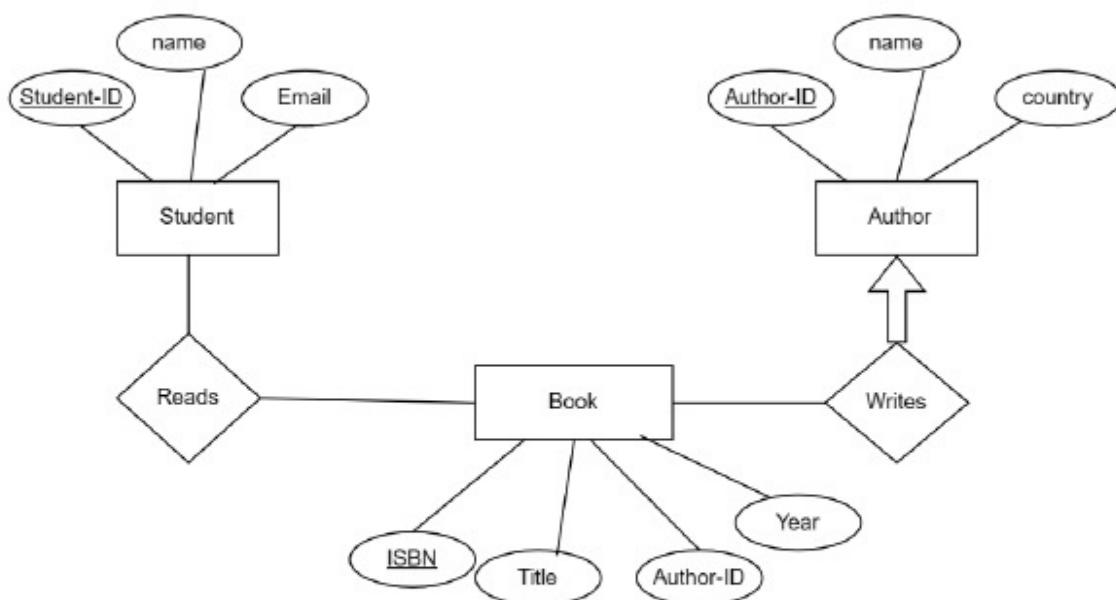


Figure 1: Library

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

**Options :**

6406533041555. ✗ There might exist an author who has not written any books

6406533041556. ✓ There might exist a student who has not read any book

6406533041557. ✗ An author can write at most one book

6406533041558. ✗ A student can read at most one book

## PDSA

<b>Section Id :</b>	64065364102
<b>Section Number :</b>	4
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	25
<b>Number of Questions to be attempted :</b>	25
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133887
<b>Question Shuffling Allowed :</b>	No

**Question Number : 65 Question Id : 640653903190 Question Type : MCQ Calculator : Yes**

**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 :**

6406533041562. ✓ YES

6406533041563. ✗ NO

<b>Sub-Section Number :</b>	2
<b>Sub-Section Id :</b>	640653133888
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 66 Question Id : 640653903191 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the following function:

$$g1(n) = 5n + \log n$$

$$g2(n) = n \log n + n$$

$$g3(n) = n^3 + 100n \log n$$

$$g4(n) = 10 \log n$$

$$g5(n) = n \log (2^n)$$

Arrange the above functions in increasing order of asymptotic complexity.

**Options :**

6406533041564. ✘  $g4(n), g1(n), g2(n), g3(n), g5(n)$

6406533041565. ✓  $g4(n), g1(n), g2(n), g5(n), g3(n)$

6406533041566. ✘  $g1(n), g4(n), g2(n), g3(n), g5(n)$

6406533041567. ✘  $g4(n), g1(n), g3(n), g2(n), g5(n)$

**Question Number : 67 Question Id : 640653903192 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

A list consisting of  $2^k$  elements needs to be sorted on a system. Algorithms A and B require  $100n \log_2 n$  and  $2n^2$  time respectively. What is the maximum value of  $k$  for which algorithm B should be preferred over algorithm A?

**Options :**

6406533041568. ✓ 8

6406533041569. ✘ 9

6406533041570. ✘ 10

6406533041571. ✘ 11

**Question Number : 68 Question Id : 640653903193 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

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

**Options :**

6406533041572. ❌ Recurrence is  $T(n) = 2T(n/2) + O(n)$  and time complexity is  $O(n^2)$

6406533041573. ❌ Recurrence is  $T(n) = T(n/2) + O(n)$  and time complexity is  $O(n)$

6406533041574. ✓ Recurrence is  $T(n) = 2T(n/2) + O(n)$  and time complexity is  $O(n \log n)$

6406533041575. ❌ Recurrence is  $T(n) = 2T(n/2) + O(1)$  and time complexity is  $O(n \log n)$

**Question Number : 69 Question Id : 640653903195 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider following is the updated list after applying the **Quick-sort partition** algorithm once.

```
L = [21, 33, 29, 34, 45, 48, 40, 60, 65]
```

The number of elements that could have been chosen as a pivot in the first round is \_\_\_ ?

**Options :**

6406533041577. ❌ 1

6406533041578. ❌ 2

6406533041579. ❌ 3

6406533041580. ✓ 4

**Question Number : 70 Question Id : 640653903196 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

There is a stack `s` and a queue `Q`. Suppose the elements  $A, B, C, D, E, F, G$  and  $H$  are enqueued into `Q` in the reverse order i.e., starting from  $H$ . The following operations are performed on the stack and the queue.

```
1 S.push(Q.dequeue())
2 S.push(Q.dequeue())
3 S.push(Q.dequeue())
4 Q.enqueue(S.pop())
5 Q.enqueue(S.pop())
6 S.push(Q.dequeue())
7 S.push(Q.dequeue())
8 Q.enqueue(S.pop())
9 Q.enqueue(S.pop())
```

What is the state of queue `Q` after the above operation? Consider the first element of the list as front element of queue in options.

**Options :**

6406533041581. ✓ [C, B, A, F, G, D, E]

6406533041582. ✗ [C, B, A, G, F, D, E]

6406533041583. ✗ [C, B, A, F, G, E, D]

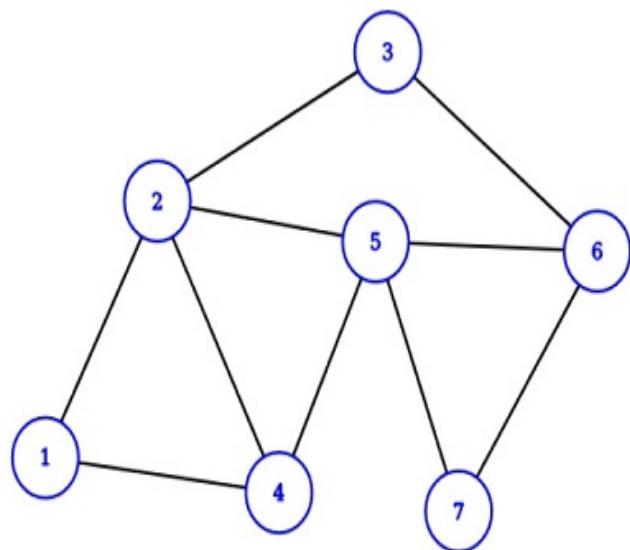
6406533041584. ✗ [C, B, A, G, F, E, D]

**Question Number : 71 Question Id : 640653903197 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the following graph



Which of the following vertex sequence is the correct **DFS traversal** on the graph started from node **6**? Assume that when a node has multiple neighbours, DFS would visit the numerically smaller valued node first.

**Options :**

6406533041585. ✓ 6,3,2,1,4,5,7

6406533041586. ✗ 6,3,2,1,5,4,7

6406533041587. ✗ 6,3,2,4,1,5,7

6406533041588. ✗ 6,3,5,7,2,4,1

**Question Number : 72 Question Id : 640653903199 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

To determine the minimum number of sequential steps required for a chef to prepare a dish J, consider the following dependencies and constraints for the preparation process, where each step represents a time unit during which one or more items can be prepared in parallel:

1. Item A is used to make items C and D.
2. Item B is added to cook items E and F.
3. Item G is prepared by mixing items D and E.
4. Item B is made by boiling item A.
5. Item H is made by mixing items C and G.
6. Item I is made by adding water to item F.
7. The dish J is prepared by cooking items H and I together.

Given that the chef has enough assistants to work on multiple items in parallel, what is the minimum number of steps required to complete the dish J, considering all dependencies?

**Options :**

6406533041593. ✗ 4

6406533041594. ✘ 5

6406533041595. ✘ 3

6406533041596. ✓ 6

**Question Number : 73 Question Id : 640653903200 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider a weighted, directed acyclic graph  $G = (V, E, w)$  in which edges that leave the source vertex  $s$  may have negative weights and all other edge weights are non-negative.

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

I. Dijkstra's algorithm computes an incorrect shortest-path weight  $\delta(s, t)$  from  $s$  to at least one vertex  $t$  in this graph  $G$ .

II. Bellman's Ford algorithm correctly computes the shortest-path weight  $\delta(s, t)$  from  $s$  to every vertex  $t$  in this graph  $G$ .

**Options :**

6406533041597. ✘ Only I is correct

6406533041598. ✓ Only II is Correct

6406533041599. ✘ Both I and II are correct

6406533041600. ✘ Both I and II are incorrect

**Question Number : 74 Question Id : 640653903201 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

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

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

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

III. It is single source shortest path algorithm.

**Options :**

6406533041601. ✓ Only statement I and II are correct

6406533041602. ✘ Only statement I and III are correct

6406533041603. ✘ Only statement II and III are correct

6406533041604. ✘ All statements are correct

6406533041605. ✘ All statements are incorrect

**Question Number : 75 Question Id : 640653903204 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Pre-order traversal of a given binary search tree T produces the following sequence of keys:

15, 12, 5, 2, 8, 6, 11, 14, 25, 20, 35

Right child of element 8 is\_\_.

**Options :**

6406533041608. ✘ 12

6406533041609. ✓ 11

6406533041610. ✘ 14

6406533041611. ✘ 8 is a leaf node.

**Question Number : 76 Question Id : 640653903209 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the following recursive function to find the maximum element in list L of size n where

lower and upper represents the first index and last index of list L respectively.

```
1 def find_max(L, lower, upper):
2     if upper-lower == 0:
3         return L[lower]
4     mid = (upper+lower) // 2
5     left_max = find_max(L,lower,mid)
6     right_max = find_max(L,mid+1,upper)
7     return max(left_max, right_max)
```

What is the Recurrence relation of the given function?

**Options :**

6406533041622. ✓  $T(n) = 2T(n/2) + 1$  ,  $T(1) = 1$

6406533041623. ✘  $T(n) = 2T(n/2) + n$  ,  $T(1) = 1$

6406533041624. ✘  $T(n) = T(n/2) + n$  ,  $T(1) = 1$

6406533041625. ✘  $T(n) = T(n/2) + 1$  ,  $T(1) = 1$

**Question Number : 77 Question Id : 640653903210 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

**Subsequence:** A subsequence is a sequence that appears in the same relative order in the source strings, but not necessarily consecutively.

In the Longest Common Subsequence problem we are given two string  $S_1 = a_1a_2\dots a_m$  and  $S_2 = b_1b_2,\dots b_n$ . To get the length of Longest Common Subsequence at  $LCS[m][n]$ , the recursion formula is given as follows to fill matrix  $LCS[i][j]$  where  $0 \leq i \leq m$  and  $0 \leq j \leq n$ .

$$LCS[i, j] = \begin{cases} 0, & \text{if } i = 0 \text{ or } j = 0 \\ 1 + LCS[i - 1, j - 1], & \text{if } a_i = b_j \\ \underline{\quad}, & \text{if } a_i \neq b_j \end{cases}$$

Which among the following is the correct statement to fill the blank.

**Options :**

6406533041626. ❌  $\min(LCS[i - 1, j], LCS[i, j - 1])$

6406533041627. ✓  $\max(LCS[i - 1, j], LCS[i, j - 1])$

6406533041628. ❌  $\min(LCS[i - 1, j] + 1, LCS[i, j - 1] + 1)$

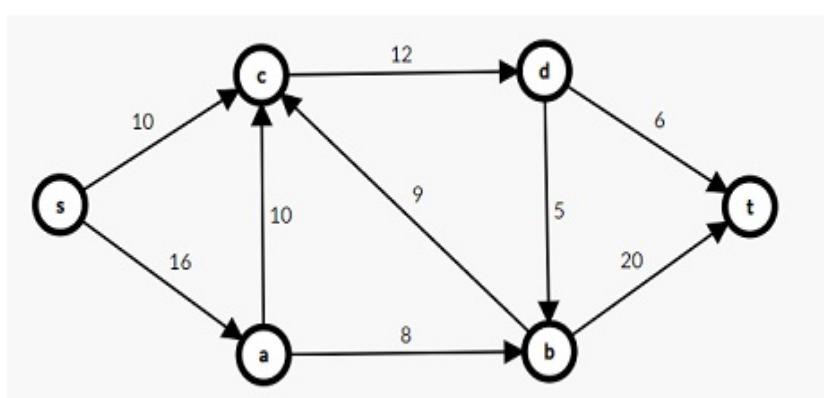
6406533041629. ❌  $LCS[i - 1, j - 1] + 1$

**Question Number : 78 Question Id : 640653903215 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the network given below with source  $s$  and sink  $t$ , with the numbers on the edges denoting maximum capacity across a particular edge.



The value of the maximum flow in the given network is\_\_

**Options :**

6406533041643. ❌ 14

6406533041644. ❌ 25

6406533041645. ✓ 19

6406533041646. ✗ 20

**Question Number : 79 Question Id : 640653903216 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Let Z be an NP-complete problem and X and Y be two other problems not known to be in NP. X is polynomial time reducible to Z and Z is polynomial-time reducible to Y. Which one of the following statements is true?

**Options :**

6406533041647. ✗ Y is NP-complete

6406533041648. ✓ Y is NP-hard

6406533041649. ✗ X is NP-complete

6406533041650. ✗ X is NP-hard

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133889

**Question Shuffling Allowed :**

Yes

**Question Number : 80 Question Id : 640653903194 Question Type : SA Calculator : None**

**Correct Marks : 4**

Question Label : Short Answer Question

Given the following sorted list :

[16, 53, 59, 81, 94, 99, 121, 150, 162, 170]

If we use the binary search algorithm to search for element 99 in the given list, then the number of list elements for comparison to 99 (including comparison with 99 in list) in this process is\_\_.

**Note:** Assume here that binary search will compute the midpoint by using

$(First\ index + Last\ index)/2$

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3

**Question Number : 81 Question Id : 640653903202 Question Type : SA Calculator : None**

**Correct Marks : 4**

Question Label : Short Answer Question

Consider a complete undirected graph with vertex set  $\{0, 1, 2, 3, 4\}$ . Every entry  $w[i][j]$  where  $i \neq j$  in the matrix  $w$  below is the weight of the edge from vertex  $i$  to vertex  $j$ .

$$W = \begin{bmatrix} 0 & 2 & 10 & 3 & 5 \\ 2 & 0 & 8 & 4 & 6 \\ 10 & 8 & 0 & 9 & 7 \\ 3 & 4 & 9 & 0 & 1 \\ 5 & 6 & 7 & 1 & 0 \end{bmatrix}$$

What is the weight of the minimum spanning tree for the given graph?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

13

**Question Number :** 82 **Question Id :** 640653903203 **Question Type :** SA **Calculator :** None

**Correct Marks :** 4

**Question Label :** Short Answer Question

The number of leaf nodes in a rooted tree of 10 nodes, with each node having 0 or 3 children is \_\_\_\_\_.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

7

**Question Number :** 83 **Question Id :** 640653903206 **Question Type :** SA **Calculator :** None

**Correct Marks :** 4

**Question Label :** Short Answer Question

Consider the following tasks  $T_1, \dots, T_9$ .

Task	T1	T2	T3	T4	T5	T6	T7	T8	T9
Deadline	7	2	5	3	4	5	2	7	3

The execution of each task requires one unit of time. We can execute one task at a time. What is the maximum number of tasks that can be completed without lateness(before or by the deadline)? Consider the start time 0.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

7

**Question Number :** 84 **Question Id :** 640653903208 **Question Type :** SA **Calculator :** None

**Correct Marks :** 4

**Question Label :** Short Answer Question

Consider the following code to find median.

```
1 def MoM(L):
2     if len(L) <= 5:
3         L.sort()
4         return L[2]
5     M = []
6     for i in range(0,len(L),5):
7         X = L[i:i+5]
8         X.sort()
9         M.append(X[2])
10    return MoM(M)
```

What median value will be returned by the given `MoM` function for the following list?

L = [73, 3, 55, 8, 49, 69, 35, 84, 39, 60, 18, 67, 94, 52, 5, 16, 41, 58, 36, 91, 19, 59, 7, 78, 81]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

52

**Sub-Section Number :** 4

**Sub-Section Id :** 640653133890

**Question Shuffling Allowed :** Yes

**Question Number :** 85 **Question Id :** 640653903198 **Question Type :** MSQ **Calculator :** Yes

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

**Question Label :** Multiple Select Question

Let  $T_B$  and  $T_D$  be the BFS tree and DFS tree respectively generated when BFS and DFS are applied on the node  $s$  in undirected and unweighted graph  $G$ . Let  $d(x)$  be the shortest distance of node  $x$  from the node  $s$  in  $G$ . Which among the following statements is/are correct ?

**Options :**

6406533041589. ✓ For every neighbor  $v$  of  $s$  in graph  $G$ , the edge  $(s, v)$  must exist in  $T_B$ .

6406533041590. ✗ If  $(u, v)$  is an edge of  $G$  that is not in  $T_B$  then  $|d(u) - d(v)| > 1$ .

6406533041591. ✗ If there is path from  $s$  to  $u$  in  $T_D$ , then  $u$  is in a different component from  $s$ .

6406533041592. ✓ The number of edges in  $T_B$  and  $T_D$  is equal.

**Question Number : 86 Question Id : 640653903205 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider a binary **max-heap** implemented using list. Which of the following lists represents a binary max-heap?

**Options :**

6406533041612. ✗ [25, 12, 16, 13, 10, 8, 14]

6406533041613. ✗ [25, 14, 13, 16, 10, 8, 12]

6406533041614. ✓ [25, 14, 16, 13, 10, 8, 12]

6406533041615. ✓ [25, 14, 16, 13, 12, 8, 10]

**Question Number : 87 Question Id : 640653903207 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

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

**Options :**

In a Huffman tree, if a leaf labelled  $x$  is at depth(from root) smaller than the leaf labelled  $y$ ,

6406533041617. ✓ then  $frequency(x) \geq frequency(y)$ .

6406533041618. ✓ Huffman coding algorithm uses greedy approach to construct the Huffman tree.

In a Huffman tree, if a leaf labelled  $x$  is at depth(from root) smaller than the leaf labelled  $y$ ,

6406533041619. ✗ then  $frequency(x) \leq frequency(y)$ .

6406533041620. ✗ In Huffman codes, The code of one character can be prefix of other character's code.

**Question Number : 88 Question Id : 640653903214 Question Type : MSQ Calculator : Yes**

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

**Question Label : Multiple Select Question**

A company makes two kinds of leather belts, belt  $A$  and belt  $B$ . Belt  $A$  is a high quality belt and belt  $B$  is of lower quality. The respective profits are Rs 4 and Rs 3 per belt. The production of each type  $A$  requires twice as much time as a belt of type  $B$ ; if all belts were of type  $B$ , the company could make only 1000 belts per day. The supply of leather is sufficient for only 800 belts per day (both  $A$  and  $B$  combined). Belt  $A$  requires a fancy buckle and only 400 of these are available per day. There are only 700 buckles a day available for belt  $B$ .

The above problem is to be formulated as a linear programming problem. Let  $x_1$  and  $x_2$  be the number of belts of type  $A$  and  $B$  respectively manufactured each day.

Which of the following is/are valid constraints ?

**Options :**

6406533041638. ✓  $x_1 \leq 400$

6406533041639. ✓  $x_2 \leq 700$

6406533041640. ✗  $x_1 + 2x_2 \leq 800$

6406533041641. ✓  $2x_1 + x_2 \leq 1000$

6406533041642. ✗  $x_1, x_2 \leq 0$

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133891

**Question Shuffling Allowed :**

No

**Question Id : 640653903211 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (89 to 90)**

**Question Label : Comprehension**

Your final end term exams are going to be over and you are catching up on Netflix. You have a schedule of interesting live shows during the next day. You hate to start or stop watching a show midway, so your aim is to watch as many complete shows as possible during the day.

Suppose there are  $n$  such shows  $S_1, S_2, \dots, S_n$  available during the same day.

The shows are ordered by starting time, so for each  $i \in \{1, 2, \dots, n - 1\}$ ,

$S_i$  starts before  $S_{i+1}$ . However, show  $S_i$  may not end before  $S_{i+1}$  starts,

so for each  $i \in \{1, 2, \dots, n - 1\}$ ,  $\text{next}[i]$  is the smallest  $j > i$  such that

$S_j$  starts after  $S_i$  finishes if such a  $j$  exists, otherwise  $-1$ . Given the sequence

$S_1, S_2, \dots, S_n$  and the values  $\text{next}[i]$  for each  $i \in \{1, 2, \dots, n - 1\}$ ,

aim is to compute the maximum number of complete shows that can be watched.

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 89 Question Id : 640653903212 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the following dynamic programming approach. Let  $\text{watch}[i]$  denote the maximum number of complete shows that can be watched among  $S_i, \dots, S_n$ .

Consider the following

optimal substructure of  $\text{watch}[i]$

for  $i \in n, n - 1, n - 2, \dots, 2, 1$  ?

$$\text{watch}[i] = \begin{cases} 1, & \text{if } i = n \\ \text{watch}[i + 1], & \text{if } \text{next}[i] = -1 \\ \underline{\quad}, & \text{if } \text{next}[i] \neq -1 \end{cases}$$

Which among the following statements

fills the blank correctly ?

### Options :

6406533041630. ✓  $\max\{1 + \text{watch}[\text{next}[i]], \text{watch}[i + 1]\}$

6406533041631. ✘  $\max\{watch[next[i]], watch[i + 1]\}$

6406533041632. ✘  $\max\{watch[next[i]], 1 + watch[i + 1]\}$

6406533041633. ✘  $\max\{1 + watch[next[i]], 1 + watch[i + 1]\}$

**Question Number : 90 Question Id : 640653903213 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

What is the time complexity of the given algorithm ?

**Options :**

6406533041634. ✘  $O(n^2)$

6406533041635. ✘  $O(n \log n)$

6406533041636. ✓  $O(n)$

6406533041637. ✘  $O(n^3)$

## AppDev1

<b>Section Id :</b>	64065364103
<b>Section Number :</b>	5
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	32
<b>Number of Questions to be attempted :</b>	32
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133892
<b>Question Shuffling Allowed :</b>	No

**Question Number : 91 Question Id : 640653903217 Question Type : MCQ Calculator : Yes**

**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 :**

6406533041651. ✓ YES

6406533041652. ✘ NO

**Sub-Section Number :** 2

**Sub-Section Id :** 640653133893

**Question Shuffling Allowed :** Yes

**Question Number : 92 Question Id : 640653903218 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following Python code snippet.

```

file.py
from jinja2 import Template
import sys
input_list = sys.argv
var_a, var_b = input_list[1], input_list[2]

if input_list[1]=="Meera":
    var_b = "Data Analyst"
elif input_list[1]=="Radha":
    var_b = "Scientist"
else:
    pass
template = "{{var_a}} is {{var_b}}"
t = Template(template)
print(t.render(var_a = var_a, var_b = var_b))

```

Map the commands in column A with the output on the terminal in column B.

Column A	Column B
a) python file.py Radha Data Analyst	1) Meera is Scientist
b) python file.py Meera Scientist	2) Sneha is Web
c) python file.py Sneha Web Developer	3) Meera is Data Analyst
	4) Radha is Data Analyst
	5) Radha is Scientist
	6) Sneha is Web developer

#### Options :

6406533041653. ✘ a - 4, b - 1, c - 6

6406533041654. ✘ a - 5, b - 3, c - 6

6406533041655. ✘ a - 5, b - 1, c - 2

6406533041656. ✓ a - 5, b - 3, c - 2

**Question Number : 93 Question Id : 640653903219 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following HTML document.

```

<!DOCTYPE html>
<html>
<head>
    <style>
        span {
            background-color: yellow;
            color: red;
        }
        #id {
            border: 2px solid purple;
            color: blue;
            display: inline-block;
        }
        .class {
            background-color: aqua;
            color: red;
            display: block;
            width: 20%;
        }
    </style>
</head>
<body>
    <span class="class" id="id">SPAN</span>
    <span class="class">SPAN</span>
    <span>SPAN</span>
</body>
</html>

```

How will the browser render above HTML file?

**Options :**

6406533041657. ✘ SPAN SPAN SPAN

6406533041658. ✘ SPAN SPAN SPAN

6406533041659. ✘ SPAN  
SPAN  
SPAN

6406533041660. ✓

SPAN

SPAN

SPAN

**Question Number : 94 Question Id : 640653903220 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following flask application.

app.py

```
from flask import Flask, request
app = Flask(__name__)
@app.route('/calculate')
def calculate():
    a = request.args.get('a')
    b = request.args.get('b')
    operator = request.args.get('operator')
    if a and b and operator:
        if operator == 'one':
            return f'{a} + {b} = {a+b}'
        elif operator == 'two':
            return f'{a} - {b} = {int(a) - int(b)}'
        elif operator == 'three':
            return f'{a} x {b} = {int(a)*b}'
    else:
        return 'Error: Insufficient arguments'
app.run(debug=True)
```

If the application is running locally on <http://127.0.0.1:5000> then match the URLs with their rendered output?

	URLs		Output
1	http://localhost:5000/calculate?a=4&b=2&operator=two	a	$4 \times 2 = 8$
2	http://localhost:5000/calculate?a=4&b=2&operator=three	b	$4 + 2 = 6$
3	http://localhost:5000/calculate?a=4&b=2&operator=one	c	$4 - 2 = 2$
		d	$4 + 2 = 42$
		e	$4 \times 2 = 2222$

**Options :**

640653041661. ✘ 1-c, 2-a, 3-b

640653041662. ✘ 1-c, 2-a, 3-d

6406533041663. ✓ 1-c, 2-e, 3-d

6406533041664. ✗ 1-c, 2-a, 3-e

**Question Number : 95 Question Id : 640653903229 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following flask view functions will return a 200 OK for the URL:

`http://127.0.0.1:5000/details/1001/Michael ?`

**Options :**

```
@app.route('/details/<int:id>/<string:name>')
def show(id, name):
    details = {'student_id': id, 'student_name': name}
    return details
```

6406533041693. ✗

```
@app.route('/details/<string:id>/<string:name>')
def show(id, name):
    details = {'student_id': id, 'student_name': name}
    return details
```

6406533041694. ✗

```
@app.route('/details/<id>/<name>')
def show(id, name):
    details = {'student_id': id, 'student_name': name}
    return details
```

6406533041695. ✗

6406533041696. ✓ All of these

**Question Number : 96 Question Id : 640653903230 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider a function func, and a set of test cases given below.

Filename: test\_file.py

```
import pytest
def func(x,y):
    out = x**2+y**2
    return out

class Test_class0():
    def test_case1(self):
        assert func(1,2) == 5

    def case_test2(self):
        assert func(2,3) == 13

    def case_test3(self):
        assert func(6,2) == 38

class Test_class1():
    def test_case1(self):
        assert func(5,2) == 29

    def case_test2(self):
        assert func(1,1) == 2
```

What will be the output on the terminal for the command below?

pytest test\_file.py -k Test\_class

**Options :**

6406533041697. ✘ == 1 failed, 4 passed in 0.17s ===

6406533041698. ✘ == 2 passed, 3 deselected in 0.17s ===

6406533041699. ✓ == 2 passed in 0.07s ===

6406533041700. ✘ == 3 failed, 2 passed in 0.17s ===

**Question Number : 97 Question Id : 640653903233 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

The lens of an HDD can read data on the rotating disk with the speed of 42,000 bits per second.

The disk is designed such that 600 bits pass under the lens for every revolution of the disk, what should be the maximum speed of disk in RPM so that the lens does not miss any data?

**Options :**

- 6406533041709. ✘ 70 RPM
- 6406533041710. ✘ 100 RPM
- 6406533041711. ✓ 4200 RPM
- 6406533041712. ✘ 6000 RPM

**Question Number : 98 Question Id : 640653903236 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the below two python files code snippets *app.py* and *test\_app\_route.py*.

app.py

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

@app.route("/greet/<string:name>")
def home(name):
    return "Hello, " + name

if __name__ == "__main__":
    app.run()
```

test\_app\_route.py:

```
import pytest, requests

@pytest.fixture
def get_response():
    resp = requests.get("http://127.0.0.1:5000/greet/IITM")
    return resp

def test_response(get_response):
    assert get_response.text == "Hello, IITM"
```

Assume that *app.py* and *test\_app\_route.py* are running on two different terminals. And also all required modules are installed. Which of the below statement(s) are True?

i) Executing the command `pytest test_app_route.py` on the terminal returns

`===== 1 passed =====`

ii) Executing the command `pytest test_app_route.py` on the terminal returns

`===== 1 failed =====`

iii) Executing the command `pytest test_app_route.py` on the terminal returns

`===== 1 selected, 1 passed =====`

iv) Executing the command `pytest test_app_route.py` on the terminal returns

`===== 1 deselected =====`

**Options :**

6406533041721. ✓ Only statement i is correct

6406533041722. ✗ Only statement ii is correct

6406533041723. ✗ Statements i and iii are correct

6406533041724. ✗ Statements ii and iv are correct

**Question Number : 99 Question Id : 640653903238 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

### Question Label : Multiple Choice Question

Consider the following flask resource created using flask\_restful.

```
from flask import Flask, request
from flask_restful import Api, Resource, reqparse

app = Flask(__name__)
api = Api(app)

parser = reqparse.RequestParser()
parser.add_argument("val")

class RestApi(Resource):
    def post(self, val):
        arg1 = parser.parse_args()
        arg2 = request.args
        return {
            "Course_1": arg1["val"],
            "Course_2": arg2["val"],
            "Course_3": val
        }

api.add_resource(RestApi, "/api/courses/<val>")
app.run(debug = True)
```

If the application is running locally on `http://127.0.0.1:5000`, What will be the output on the terminal for the command:

```
curl http://127.0.0.1:5000/api/courses/DBMS?val=JAVA -d
"{"val":"PDSA"}" -X POST -H "Content-Type: application/json"
```

### Options :

```
{
    "Course_1": "JAVA",
    "Course_2": "PDSA",
    "Course_3": "DBMS"
}
```

6406533041729. ✘

6406533041730. ✘

```
{  
    "Course_1": "DBMS",  
    "Course_2": "JAVA",  
    "Course_3": "PDSA"  
}
```

```
{  
    "Course_1": "PDSA",  
    "Course_2": "JAVA",  
    "Course_3": "DBMS"  
}
```

6406533041731. ✓

```
{  
    "Course_1": "PDSA",  
    "Course_2": "DBMS",  
    "Course_3": "JAVA"  
}
```

6406533041732. ✘

**Question Number : 100 Question Id : 640653903242 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

A flask application shown below is running locally on <http://127.0.0.1:5000>.

```
from flask import Flask, request, session, abort

app = Flask(__name__)
app.config['SECRET_KEY'] = "yekterces"

@app.route('/login')
def log_in():
    user = request.args['user']
    role = request.args['role'] if 'role' in request.args else
    'general'
    session['user'], session['role'] = user, role
    return "Logged in successfully!"

@app.route('/home')
def land():
    if 'user' in session:
        if session['role'] == 'admin':
            return f"Welcome {session['user']}"
        return abort(401)
    return abort(404)

@app.route('/logout')
def log_out():
    session.pop('user', None)
    session.pop('role', None)
    return "Logged out sucessfully!"

app.run(debug=True)
```

If the application is running locally on <http://127.0.0.1:5000>, What will be the correct sequence of response status codes if the client visits the URLs one by one in the sequence given below?

1. <http://127.0.0.1:5000/home>
2. <http://127.0.0.1:5000/login/admin>
3. <http://127.0.0.1:5000/login?user=admin>
4. <http://127.0.0.1:5000/home>
5. <http://127.0.0.1:5000/logout>

**Options :**

6406533041745. \*

401  
401  
200  
404  
200

404  
200  
200  
200

6406533041746. ✘ 200

404  
404  
200  
401  
200

6406533041747. ✓ 200

404  
200  
404  
200  
200

6406533041748. ✘ 200

**Question Number : 101 Question Id : 640653903243 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following flask application.

Python file: app.py

```
from flask import Flask, render_template, request

app = Flask(__name__)

emp = {'admin':'manoj', 'user':'sumit'}

@app.route('/profile/<user>')
def profile(user):
    access = request.args.get('access')
    if emp[access] != user:
        return render_template("profile.html", user = user,
                               access = access, error = True)
    return render_template("profile.html", user = user,
                           access = access, error = False)

app.run()
```

Template file: profile.html

```
<body>
    <div>
        {% if error %}
            <h3>Hi {{user}}, {{access}} access denied</h3>
        {% else %}
            <h3>Hi {{user}}, you are logged in as {{access}}.</h3>
        {% endif %}
    </div>
</body>
```

If the application is running locally on <http://127.0.0.1:5000>, then what will be rendered by the browser for URL,

<http://127.0.0.1:5000/profile/sumit?access=admin> ?

**Options :**

6406533041749. ✘ **Hi sumit, you are logged in as admin.**

6406533041750. ✘ **Hi sumit, you are logged in as user.**

6406533041751. ✓ **Hi sumit, admin access denied.**

6406533041752. ✘

**Hi sumit, user access denied.**

**Question Number : 102 Question Id : 640653903246 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following models Library and Book corresponding to tables library and book in SQLite database.

```
class Library(db.Model):
    id = db.Column(db.Integer(), primary_key = True)
    name = db.Column(db.String(), unique = True)

class Book(db.Model):
    id = db.Column(db.Integer(), primary_key = True)
    name = db.Column(db.String(), unique = True)
    library = db.Column(db.Integer(), db.ForeignKey("library.id"))
```

Based on the model schemas, what relationship do the classes Library and Book share?

**Options :**

640653041762. ✘ Many-to-Many

640653041763. ✓ One-to-Many

640653041764. ✘ One-to-One

640653041765. ✘ The tables are not at all related

**Question Number : 103 Question Id : 640653903249 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

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

**Statement 1:** 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 latest selector in order.

**Statement 2:** 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

**Options :**

640653041774. ✘ Both statements 1 and 2 are correct

640653041775. ✘ Both statements 1 and 2 are incorrect

640653041776. ✘ Statement 1 is correct but statement 2 is incorrect

640653041777. ✓ Statement 2 is correct but statement 1 is incorrect

**Sub-Section Id :**

640653133894

**Question Shuffling Allowed :**

Yes

**Question Number : 104 Question Id : 640653903232 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the following Python code snippet.

log.py

```
import logging
import sys

logging.basicConfig(level=logging.WARNING,
                    format='%(asctime)s - %(levelname)s - %(message)s')

def check_val(value):
    if value < 0:
        raise ValueError("Invalid value: Please enter a positive value.")
    else:
        logging.info("Value added: %s", value)

try:
    input_value = -int(sys.argv[1])
    check_val(input_value)
except ValueError as ve:
    logging.exception("Exception occurred: %s", str(ve))
```

What will be the output on the terminal for the command: python log.py -12 ?

**Options :**

6406533041705. ✘

2023-08-14 21:01:05,684 - INFO - Value added: 12

6406533041706. ✘

2023-08-14 21:01:05,684 - WARNING - Value added: -12

6406533041707. ✘

Error: Exception occurred: Invalid value: Please enter a positive value.

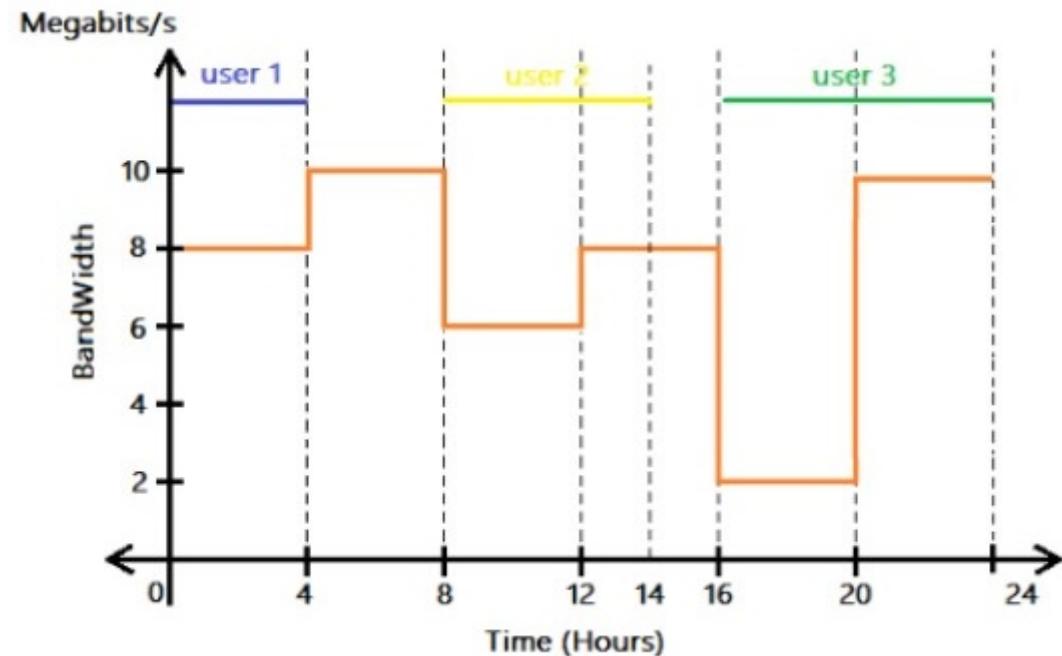
6406533041708. ✓ None of these

**Question Number : 105 Question Id : 640653903235 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the following graph that represents the variation in bandwidth of a network for an entire day (24 hours). Three users were connected to the network at three different times of the day. What is the total data consumed in GigaBytes by all the users in 24 hrs?



**Options :**

640653041717. ❌ 633.6 GB

640653041718. ✓ 54 GB

640653041719. ❌ 120 GB

640653041720. ❌ 432 GB

**Question Number : 106 Question Id : 640653903239 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the below flask application.

```
from flask_sqlalchemy import SQLAlchemy
from flask import Flask

app = Flask(__name__)
app.config['SQLALCHEMY_DATABASE_URI'] = 'sqlite:///testdb.sqlite3'
db = SQLAlchemy(app)
app.app_context().push()

class Material(db.Model):
    m_id = db.Column('m_id', db.Integer, primary_key=True)
    name = db.Column('name', db.String(100), unique=True)

db.create_all()
material1 = Material(name='Steel')
db.session.add(material1)
material2 = Material(name='Iron')
material3 = Material(name='Aluminium')
db.session.add(material2)
db.session.commit()
db.session.add(material3)

all_material = Material.query.all()
print([(x.m_id, x.name) for x in all_material])
```

If you run the flask application using a terminal. What will be the output in the terminal?

**Options :**

**[(1, 'Steel'), (2, 'Iron')]** will be displayed in the terminal and two records will be added in the “testdb” database.

**[(1, 'Steel'), (2, 'Iron'), (3, 'Aluminium')]** will be displayed in the terminal and three records will be added in the “testdb” database.

**[(1, 'Steel'), (2, 'Iron'), (3, 'Aluminium')]** will be displayed in the terminal and two records will be added in the “testdb” database.

**[(1, 'Steel', 2, 'Iron', 3, 'Aluminium')]** will be displayed in the terminal and two records will be added in the “testdb” database.

**Question Number : 107 Question Id : 640653903245 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

**Question Label : Multiple Choice Question**

A client machine C is 18000 kms away from the server machine S. A router R is situated somewhere in between the client C and the server S and is connected to client C with cable and makes aerial connection with the server S. What will be the round-trip latency (milliseconds) of the network if the router is placed at exactly midway from the client and the server? [Assume: The speed of light on cable is  $1.5 \times 10^8$  m/s and in air is  $3 \times 10^8$  m/s. The client, server and the router lie on a straight line]

**Options :**

6406533041758. ✘ 45

6406533041759. ✘ 90

6406533041760. ✓ 180

6406533041761. ✘ 270

**Sub-Section Number :**

4

**Sub-Section Id :**

640653133895

**Question Shuffling Allowed :**

Yes

**Question Number : 108 Question Id : 640653903227 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Consider the following flask app and Jinja2 template.

app.py

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

@app.route('/')
def index():
    return render_template("index.html", data=['Harry', 'Karl', 'John',
'Jason', 'Ros'])

app.run()
```

index.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Macro</title>
</head>
<body>
    {% macro unordered_list(items)%}
        <ul>
            {% for item in items %}
                {% if item|length >= 5 %}>
                    <li>{{item}}</li>
                {% endif %}
            {% endfor %}
        </ul>
    {% endmacro %}
    {{ unordered_list(data) }}
</body>
</html>
```

If the flask app is running locally on <http://127.0.0.1:5000>. What will be the output on the browser for the base URL?

**Options :**

- Harry
- Karl
- John
- Jason
- Ros

6406533041685. ❌

6406533041686. ❌

- Karl
- John

- Harry

6406533041687. ✓ • Jason

- Karl
- John
- Ros

6406533041688. ✗

**Question Number : 109 Question Id : 640653903228 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Match the following types of testing with their functionality.

A. Regression testing	1. Beta Testing
B. User Acceptance testing	2. one step beyond integration testing, includes server and environment
C. System Testing	3. Simulates actual user interaction, allows to script browser
D. System testing Automation	4. Type of testing that runs after every change to ensure that the change introduces no unintended breaks.

Which of the following is the correct matching?

**Options :**

6406533041689. ✗ A → 1, B → 2, C → 3, D → 4

6406533041690. ✗ A → 4, B → 3, C → 2, D → 1

6406533041691. ✓ A → 4, B → 1, C → 2, D → 3

6406533041692. ✗ A → 3, B → 2, C → 1, D → 4

**Question Number : 110 Question Id : 640653903231 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Consider the following python code snippet app.py, the HTML files, base.html and home.html residing in "templates" folder.

app.py

```
from flask import Flask, render_template
app = Flask(__name__)
@app.route('/')
def home():
    return render_template('home.html')
app.run(debug=True)
```

home.html

```
{% extends "base.html" %}
{% block content %}
<p>MAD I</p>
<span>MAD II</span>
<p>DBMS</p>
{% endblock %}
```

base.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>IITM</title>
</head>
<body>
    <h2 style="color: violet;"> Diploma Courses </h2>
    {% block content %}
    {% endblock %}
</body>
</html>
```

What will be the rendered output for base URL if flask app is running locally on  
<http://localhost:5000> ?

**Options :**

MAD I

MAD II

6406533041701. ✘ DBMS

6406533041702. ✓

## Diploma Courses

MAD I

MAD II

DBMS

## Diploma Courses

MAD I

6406533041703. ✘ MAD II DBMS

MAD I

6406533041704. ✘ MAD II DBMS

**Question Number : 111 Question Id : 640653903237 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

You have a DRAM module with bus width of 64 bits, clock speed of 2 GHz, and operating in DDR (double-data-rate or two values per clock cycle) mode. What is the maximum bandwidth (in Giga-bytes per second) of data transfer achievable with this module?

**Options :**

6406533041725. ✘ 16

6406533041726. ✘ 8

6406533041727. ✓ 32

6406533041728. ✘ 128

**Question Number : 112 Question Id : 640653903240 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

The hexadecimal equivalent of the IPv4 address 172.16.254.10 would be \_\_\_\_\_.

**Options :**

6406533041737. ✘ AC0A FE01

6406533041738. ✘ CA10 EF0A

6406533041739. ✘ AC01 0AEF

6406533041740. ✓ AC10 FE0A

**Question Number : 113 Question Id : 640653903248 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following is true about the term “stateless” in the client-server model?

**Options :**

6406533041770. ❌ The server keeps the state of the client to respond to the required request.
6406533041771. ❌ Server use variant HTTP methods to respond to the client's request.
6406533041772. ✓ Server ready to respond to the client's request without knowing anything about the client.
6406533041773. ❌ Server use the URL to convey context to the client.

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133896

**Question Shuffling Allowed :**

Yes

**Question Number : 114 Question Id : 640653903221 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following Python code snippet “code.py”.

Filename: code.py

```
import sys
from jinja2 import Template
vars = sys.argv

course_technologies = {'python': 'backend', 'javascript': 'frontend'}
template = Template("This course focuses on {{ technology }} development.")

if len(vars) > 2 and vars[2] in course_technologies:
    course = vars[1]
    technology = course_technologies[course]
    print(template.render(technology=technology))
else:
    print("Please specify a valid course name!")
```

Which of the following will be the correct command line input to the terminal to get the output: This course focuses on backend development. ?

**Options :**

6406533041665. ❌ python code.py course python

6406533041666. ✓ python code.py python javascript

6406533041667. ✓ python code.py python python

6406533041668. ✘ python code.py python backend

**Question Number : 115 Question Id : 640653903226 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following flask application.

app.py

```
from flask import Flask, abort, request
app = Flask(__name__)

data = {"CS2001": "DBMS", "CS2003": "MAD-I", "CS2006": "MAD-II"}
@app.route('/login')
def login():
    username = request.args.get('uname')
    if username not in data:
        abort(400, "Bad Request: Invalid Username")
    return f'{<h1>Welcome to {data[username]} course!</h1>'

app.run(debug=True)
```

Which of the following statements is/are true if the application is running locally on <http://127.0.0.1:5000> ?

**Options :**

For URL <http://127.0.0.1:5000?uname=CS2001> the browser will render  
6406533041681. ✘ **Welcome to DBMS course!**

For URL <http://127.0.0.1:5000/login> the browser will render  
6406533041682. ✘ **Welcome to MAD-I course!**

For URL <http://127.0.0.1:5000/login?uname> the browser will render  
6406533041683. ✓ **Bad Request: Invalid Username**

For URL <http://127.0.0.1:5000/login?uname=CS2006> the browser will  
6406533041684. ✓ render **Welcome to MAD-II course!**

**Sub-Section Number :**

6

**Sub-Section Id :**

640653133897

**Question Shuffling Allowed :**

Yes

**Question Number : 116 Question Id : 640653903222 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following flask application.

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

@app.route('/home')
def home():
    var_a = request.args.get('method')
    if var_a == "GET":
        return "Hello from GET method"

    elif var_a == "POST":
        return "Hello from POST method"

    else:
        return "Invalid Method"

app.run(debug=True)
```

If the application is running locally on `http://127.0.0.1:5000` then which of the following statements are correct?

**Options :**

The command `curl -X GET http://127.0.0.1:5000/home?method=GET` will give output  
**6406533041669.** ✓ as `Hello from GET method` on terminal

The command `curl -X POST http://127.0.0.1:5000/home?method=POST` will give output  
**6406533041670.** ✓ as `Method not Allowed` on terminal

The command `curl -X POST http://127.0.0.1:5000/home?method=POST` will give output  
**6406533041671.** ✗ output as `Hello from POST method` on terminal

The command `curl -X POST http://127.0.0.1:5000/home?method` will give output as  
**6406533041672.** ✗ `Invalid Method` on terminal

**Question Number : 117 Question Id : 640653903244 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following flask\_sqlalchemy data models "User" and "Role".

```
class User(db.Model):
    id = db.Column(db.Integer, primary_key=True)
    username= db.Column(db.String(), unique=True, nullable=False)
    password = db.Column(db.String(), nullable=False)
    email= db.Column(db.String())
    roles= db.relationship("Role", backref="bearer")

class Role(db.Model):
    id = db.Column(db.Integer, primary_key=True)
    r_name = db.Column(db.String(), unique=True, nullable=False)
    user = db.Column(db.Integer, db.ForeignKey("user.id"))
```

python shell:

```
>>> from app import *
>>> db.create_all()
>>> user1 = User(username="Rakesh",password="1234",email="user1@gmail.com")
>>> user2 = User(username="Suresh",password="123",email="user2@gmail.com")
>>> db.session.add_all([user1,user2])
>>> db.session.commit()
>>> r1=Role(r_name="instructor",user=1)
>>> r2=Role(r_name="admin",user=1)
>>> r3=Role(r_name="ops",user=2)
>>> r4=Role(r_name="student",user=2)
>>> db.session.add_all([r1,r2,r3,r4])
>>> db.session.commit()
>>> users = User.query.all()
>>> roles = Role.query.all()
```

If the above commands are run in the python shell then which of the following options is /are correct with respect to these models?

**Options :**

6406533041753. ❌ Command: >>> users  
Output: [ "Ramesh", "Suresh" ]

6406533041754. ✓ Command: >>> u1 = users[1]  
>>> u1.roles  
Output: [<Role 3>, <Role 4>]

6406533041755. ❌ Command: >>> roles[2].user  
Output: ["Suresh"]

Command: >>> roles[3].user  
6406533041756. ✓ Output: 2

Command: >>> roles[0].bearer  
6406533041757. ✓ Output: <User 1>

**Question Number : 118 Question Id : 640653903250 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Suppose a request <https://xyz.com?name=amey&age=34> generates the below response on the browser's console,

Name : amey

The definition of the flask endpoint which handles the above request is given below,

```
@app.route(code1)
def getData():
    data = code2
    print("Name :", data)
```

Which of the following options should be used to fill the placeholders "code1" and "code2", to achieve the desired result as shown above?

**Options :**

6406533041778. ❌ Code1: "/"  
Code2: request.form['name']

6406533041779. ❌ Code1: "/", methods = ['GET']
Code2: request.form['name']

6406533041780. ✓ Code1: "/", methods = ['GET', 'POST']
Code2: request.args['name']

6406533041781. ✓ Code1: "/"
Code2: request.args.get('name')

**Sub-Section Id :**

640653133898

**Question Shuffling Allowed :**

Yes

**Question Number : 119 Question Id : 640653903234 Question Type : MSQ Calculator : Yes**

**Correct Marks : 4.5 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the following function to be tested and test functions given in the Python code snippet below.

test\_file.py

```
import pytest

def square(x):
    sum = 0
    for counter in range(x):
        sum += x
    return sum

@pytest.mark.marker1
def testcase_1():
    assert square(10) == 100

@pytest.mark.marker2
def testcase_2():
    assert square(4) == 4

@pytest.mark.marker3
def testcase_3():
    assert square(5) == 25

@pytest.mark.marker4
def testcase_4():
    assert square(6) == 6
```

On running this file on the terminal using pytest, the summary of the output is;

```
===== 1 passed, 3 deselected, 4 warnings in 0.04s =====
```

What command will result into the outcome given above?

**Options :**

640653041713. ✓    pytest test\_file.py -m marker4

6406533041714. ❌

```
pytest test_file.py -m marker1
```

6406533041715. ✓

```
pytest test_file.py -m marker2
```

6406533041716. ❌

```
pytest test_file.py -m marker3
```

**Question Number : 120 Question Id : 640653903241 Question Type : MSQ Calculator : Yes**

**Correct Marks : 4.5 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the following flask application.

```

from flask import Flask, abort
app = Flask(__name__)
modules = ['python', 'react', 'node']

@app.route('/home/modules/')
def all_modules():
    return f"<h3>List of modules: {modules}</h3>"

@app.route('/get/<string:module_1>')
def get_module(module_1):
    if module_1 in modules:
        return f"<h3>One module found: {module_1}.</h3>"
    else:
        abort(400)

@app.errorhandler(400)
def module_error(error):
    return "<h3>Cannot find module</h3>"

@app.errorhandler(404)
def module_error(error):
    return "<h3>Incorrect Path</h3>"

app.run(debug=True)

```

If the application is running locally on `http://127.0.0.1:5000`, select the correct statement(s).

#### Options :

For the URL, `http://127.0.0.1:5000/home/modules`, the browser will render;  
✓ 6406533041741. **List of modules: ['python', 'react', 'node']**

For the URL, `http://127.0.0.1:5000/home/modules`, the browser will render;  
✗ 6406533041742. **Incorrect Path**

For the URL, `http://127.0.0.1:5000/get/vuejs`, the browser will render;  
✓ 6406533041743. **Cannot find module**

For the URL, `http://127.0.0.1:5000/get/react/`, the browser will render;  
✗ 6406533041744. **One module found: react.**

**Question Number : 121 Question Id : 640653903247 Question Type : MSQ Calculator : Yes**

**Correct Marks : 4.5 Max. Selectable Options : 0**

**Question Label : Multiple Select Question**

Consider the following code snippet.

```
@app.route('/student/<student_id>')
def profile(student_id):
    # CODE BLOCK HERE
```

Assume the database has a "student" table which has a TEXT column "student\_id". If we want the server to return a 404 status code when a user goes to the route '/student/<student\_id>' with a student\_id that does not exist in the database, which of the following lines would give us the desired output?

**Options :**

```
student = Student.query.filter_by(student_id=student_id).first()
if student is None:
    abort(404)
return render_template('profile.html', student=student)
```

6406533041766. ✓

```
student = Student.query.filter_by(student_id=student_id).first()
if student is None:
    return render_template("404.html")
return render_template('profile.html', student=student)
```

6406533041767. ✘

```
student = Student.query.filter_by(student_id=student_id).first_or_404()
return render_template('profile.html', student=student)
```

6406533041768. ✓

```
student = Student.query.filter_by(student_id=student_id).first()
if student is None:
    return render_template("404.html"), 404
return render_template('profile.html', student=student)
```

6406533041769. ✓

**Sub-Section Number :**

8

**Sub-Section Id :**

640653133899

**Question Shuffling Allowed :**

No

**Question Id : 640653903223 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (122 to 123)**

Question Label : Comprehension

Consider the following flask application running locally on

<http://127.0.0.1:5000>

app.py

```
from flask import Flask, request
import sys
app = Flask(__name__)
data = ["Java", "Application Development", "DBMS"]

@app.route('/course')
def home():
    course = request.args.get('course')
    if course in sys.argv[1]:
        if sys.argv[1] in data:
            return f"Welcome to {sys.argv[1]}!"

        return f"Welcome to {course}!"
    else:
        return "Invalid Data"

app.run(debug=True)
```

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 122 Question Id : 640653903224 Question Type : MSQ Calculator : Yes**

**Correct Marks : 4.5 Max. Selectable Options : 0**

Question Label : Multiple Select Question

What should be the code to run the application, and what should be the URL respectively such that the browser gives output as: [Welcome to Application Development!](http://127.0.0.1:5000/course?course=Application Development) ?

### Options :

Code: `python app.py Application Development DBMS`

640653041673. ✘ URL: <http://127.0.0.1:5000/course?course=Application Development>

640653041674. ✓

**Code:** python app.py "Application Development" Java

**URL:** http://127.0.0.1:5000/course?course=Application

**Code:** python app.py Application Development DBMS

6406533041675. ✖ **URL:** http://127.0.0.1:5000/course?course=Application

**Code:** python app.py "Application Development" DBMS

6406533041676. ✓ **URL:** http://127.0.0.1:5000/course?course=Application Development

**Question Number :** 123 **Question Id :** 640653903225 **Question Type :** MCQ **Calculator :** Yes

**Correct Marks :** 3

**Question Label :** Multiple Choice Question

What will be the output given by

browser if the application is

run with command

python app.py Application Development DBMS

on terminal with URL:

http://127.0.0.1:5000/course?course=Application Development ?

**Options :**

6406533041677. ✖ Welcome to Application Development!

6406533041678. ✖ Welcome to DBMS!

6406533041679. ✓ Invalid Data

6406533041680. ✖ Not Found

## MLF

**Section Id :** 64065364104

**Section Number :** 6

**Section type :** Online

**Mandatory or Optional :** 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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133900
<b>Question Shuffling Allowed :</b>	No

**Question Number : 124 Question Id : 640653903251 Question Type : MCQ Calculator : Yes**

**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 :**

640653041782. ✓ YES

640653041783. ✗ NO

<b>Sub-Section Number :</b>	2
<b>Sub-Section Id :</b>	640653133901
<b>Question Shuffling Allowed :</b>	No

**Question Id : 640653903252 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (125 to 126)**

Question Label : Comprehension

A company produces two types of products  $P_1$  and  $P_2$ . The cost price per unit of  $P_1$  and  $P_2$  are ₹2 and ₹3, respectively. The production process requires two types of resources: labor hours and machine hours. Each unit of  $P_1$  requires 2 labor hours and 1 machine hour, while each unit of  $P_2$  requires 1 labor hour and 3 machine hours. The company has constraints on the availability of labor and machine hours, which are 80 and 90 hours, respectively.

Use the above information to answer the given sub-questions.

**Sub questions**

**Question Number : 125 Question Id : 640653903253 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct **Primal** optimization problem from the following.

**Options :**

6406533041784. ❌ Minimize:  $3x + 2y$   
Subject to:  $2x + y \leq 80, x + 3y \leq 90, x \geq 0, y \geq 0$

6406533041785. ✓ Minimize:  $2x + 3y$   
Subject to:  $2x + y \leq 80, x + 3y \leq 90, x \geq 0, y \geq 0$

6406533041786. ❌ Minimize:  $3x + 2y$   
Subject to:  $2x + y \leq 90, x + 3y \leq 80, x \geq 0, y \geq 0$

6406533041787. ❌ Minimize:  $2x + 3y$   
Subject to:  $2x + y \leq 90, x + 3y \leq 80, x \geq 0, y \geq 0$

**Question Number : 126 Question Id : 640653903254 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Find the minimum cost price of the products.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

80

**Sub-Section Number :** 3

**Sub-Section Id :** 640653133902

**Question Shuffling Allowed :** Yes

**Question Number : 127 Question Id : 640653903255 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following scenarios involving geographical regions (w.r.t some reference of  $x$ - axis and  $y$ - axis ), which of the following regions represents the convex set in  $\mathbb{R}^2$ .

**Options :**

6406533041789. ✘ A circular park with one side boundary is a circle of radius of 200 meters and another side boundary is a circle of radius of 300 meters, both centered at the origin.

6406533041790. ✓ City district defined by the region above the x-axis within a radius of 10 miles from the origin, forming a semicircle.

6406533041791. ✓ A triangular region with vertices at (0, 0), (1, 0), and (0, 1).

6406533041792. ✘ A path consisting of two connected line segments (forming the boundaries of the path on either sides) formed a "V" shape with vertices at (0, 0), (2, 2), and (2, 0)

**Question Number : 128 Question Id : 640653903256 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following options is/are true?

**Options :**

6406533041793. ✘  $f(x) = (x^2 - 3x + 2)(x^2 - 7x + 12)$  is a convex function.

6406533041794. ✓  $f(v) = v^T Av$  is a convex function, where  $A = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$  and  $v = \begin{bmatrix} x \\ y \end{bmatrix}$ .

6406533041795. ✓  $f(x, y) = x^2 + y^2 + 3$  is a convex function.

6406533041796. ✓  $f(v) = v^T Av$  is a convex function, where  $A = \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$  and  $v = \begin{bmatrix} x \\ y \end{bmatrix}$ .

**Sub-Section Number :**

4

**Sub-Section Id :**

640653133903

**Question Shuffling Allowed :**

Yes

**Question Number : 129 Question Id : 640653903257 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

A farmer has 120 meters of fencing and wants to fence off a rectangular field that borders a straight river. The farmer does not need to fence along the river. Find the maximum possible fenced area of the field.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

**Question Number : 130 Question Id : 640653903261 Question Type : SA Calculator : None****Correct Marks : 3**

Question Label : Short Answer Question

Suppose a random variable  $X$  has a mean  $\mu$  of 70 and a standard deviation  $\sigma$  of 8. Using Chebyshev's inequality, determine the maximum probability that  $X$  will deviate from the mean by more than 16 units. Enter the answer correct to two decimal places.

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

0.25

**Question Number : 131 Question Id : 640653903265 Question Type : SA Calculator : None****Correct Marks : 3**

Question Label : Short Answer Question

Consider the following input data points:

x	y
[2, 3, 4]	9
[-1, 1, 2]	2
[4, 2, 2]	7
[0, -2, -1]	-4
[-3, 5, -2]	4

Suppose we fit a linear model  $f(\mathbf{x}) = x_1 + 2x_2 + x_3$ , where  $\mathbf{x} = (x_1, x_2, x_3)$ . Compute the value of the loss function  $L$  for this dataset which is defined as  $L = \frac{1}{n} \sum_{i=1}^n (f(\mathbf{x}^i) - y^i)^2$ .

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 :**

4.2

**Question Number : 132 Question Id : 640653903266 Question Type : SA Calculator : None****Correct Marks : 3**

**Question Label : Short Answer Question**

Let  $X$  and  $Y$  be two independent random variables, where  $X \sim \text{Normal}(-1, 1)$  and  $Y \sim \text{Normal}(1, 9)$ . Define  $U = 2X - 3Y$ . Find the value of  $P(U > 2)$ . Enter the answer correct to three decimal places.

**Hint:** Use the following values of  $F_Z$  if required.  $F_Z$  stands for the CDF of the standard normal.

- $F_Z(0.62) = 0.7343$
- $F_Z(-0.62) = 0.2656$
- $F_Z(1.25) = 0.8947$
- $F_Z(-1.25) = 0.1052$

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

0.262 to 0.268

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133904

**Question Shuffling Allowed :**

Yes

**Question Number : 133 Question Id : 640653903258 Question Type : MSQ Calculator : Yes****Correct Marks : 4 Max. Selectable Options : 0****Question Label : Multiple Select Question**

Consider a square matrix  $A$  of order 3 such that  $\text{trace}(A) = 3$  and  $\det(A) = 2$ . If 1 is an eigenvalue of  $A$ , then which of the following options is/are true?

**Options :**

640653041798. ❌ Matrix  $A$  is symmetric matrix.

640653041799. ❌ Matrix  $A$  is Hermitian matrix.

640653041800. ✓ 1 + i is an eigenvalue of  $A$ .

640653041801. ❌ 2 - i is an eigenvalue of  $A$ .

640653041802. ✓ Matrix  $A$  is diagonalizable.

**Question Number : 134 Question Id : 640653903260 Question Type : MSQ Calculator : Yes****Correct Marks : 4 Max. Selectable Options : 0****Question Label : Multiple Select Question**

Suppose we have 10 data points randomly distributed in space,  $\mathbb{R}^3$  given by  $D = \{x_1, x_2, \dots, x_{10}\}$ . Let  $g(p) = \sum_{i=1}^{10} \|p - x_i\|^2$  be a function defined to calculate the sum of the square of distances of data points from a fixed point, say  $p \in \mathbb{R}^3$ . If  $g(p)$

attains the minimum at  $q = \begin{bmatrix} 4 \\ 0 \\ 3 \end{bmatrix}$ , then which of the following options is true?

**Options :**

$$x_1 + x_2 + \dots + x_{10} = \begin{bmatrix} 30 \\ 0 \\ 40 \end{bmatrix}$$

6406533041807. \*

$$x_1 + x_2 + \dots + x_{10} = \begin{bmatrix} 40 \\ 0 \\ 30 \end{bmatrix}$$

6406533041808. ✓

6406533041809. ✓ The distance of point  $(x_1 + x_2 + \dots + x_{10})$  from the origin is 50.

6406533041810. \* The distance of point  $(x_1 + x_2 + \dots + x_{10})$  from the origin is 40.

**Sub-Section Number :**

6

**Sub-Section Id :**

640653133905

**Question Shuffling Allowed :**

Yes

**Question Number : 135 Question Id : 640653903259 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following is/are true about PCA?

**Options :**

6406533041803. ✓ PCA will transform the original data set onto a lower dimension subspace such that the variance of the project is maximized.

6406533041804. \* PCA calculates the mean of each data set to determine its significance.

6406533041805. ✓ PCA can be used to reduce the dimensionality of the dataset.

6406533041806. \* PCA will transform the original data set onto a lower dimension subspace such that the reconstruction error is maximized.

**Sub-Section Number :**

7

**Sub-Section Id :**

640653133906

**Question Shuffling Allowed :**

No

**Question Id : 640653903262 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix**

**Calculator : None**

**Question Numbers : (136 to 137)**

Question Label : Comprehension

Let  $X$  and  $Y$  have the following joint density function

$$f(x, y) = \begin{cases} 18x^2y^2 & x, y \geq 0, x + y \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 136 Question Id : 640653903263 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Find the conditional distribution  $f_{X|Y}(x | y)$ .

**Options :**

6406533041812. ❌  $f_{X|Y}(x | y) = \frac{3x^2}{(1-y)^3}, 0 < x < 1$

6406533041813. ✓  $f_{X|Y}(x | y) = \frac{3x^2}{(1-y)^3}, 0 < x < 1-y$

6406533041814. ❌  $f_{X|Y}(x | y) = 3x^2(1-y)^3, 0 < x < 1$

6406533041815. ❌  $f_{X|Y}(x | y) = 3x^2(1-y)^3, 0 < x < 1-y$

**Question Number : 137 Question Id : 640653903264 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

Find the value of  $P\left(X < \frac{1}{2} | Y = \frac{1}{2}\right)$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

<b>Sub-Section Number :</b>	8
<b>Sub-Section Id :</b>	640653133907
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 138 Question Id : 640653903267 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Let  $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \\ 0 & 1 & 2 \end{pmatrix}$ . Find the nullspace of  $A$ .

**Options :**

6406533041819. ✓  $\text{span} \left\{ \begin{pmatrix} 1 \\ -2 \\ 1 \end{pmatrix} \right\}$

6406533041820. ✗  $\text{span} \left\{ \begin{pmatrix} 1 \\ 1 \\ 1 \end{pmatrix} \right\}$

6406533041821. ✗  $\left\{ \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \right\}$

6406533041822. ✗  $\text{span} \left\{ \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}, \begin{pmatrix} 2 \\ 3 \\ 1 \end{pmatrix} \right\}$

## Java

<b>Section Id :</b>	64065364105
<b>Section Number :</b>	7
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	24
<b>Number of Questions to be attempted :</b>	24
<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</b>	<b>Mark for Review and Clear Response :</b>	No
<b>Maximum Instruction Time :</b>	0	
<b>Sub-Section Number :</b>	1	
<b>Sub-Section Id :</b>	640653133908	
<b>Question Shuffling Allowed :</b>	No	

**Question Number : 139 Question Id : 640653903268 Question Type : MCQ Calculator : Yes**

**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 :**

640653041823. ✓ YES

640653041824. ✘ NO

<b>Sub-Section Number :</b>	2
<b>Sub-Section Id :</b>	640653133909
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 140 Question Id : 640653903269 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
class Monitor {  
    public void screenSize() {  
        System.out.println("Normal screen size");  
    }  
    public void resolution() {  
        System.out.println("Normal resolution");  
    }  
}  
class LCD extends Monitor {  
    public void screenSize() {  
        System.out.println("Screen size is large");  
    }  
}  
class LED extends Monitor {  
    public void screenSize() {  
        System.out.println("Screen size is medium");  
    }  
    public void resolution() {  
        System.out.println("HD resolution");  
    }  
}  
public class Test {  
    static void show(Monitor[] monitors) {  
        for (int i = 0; i < monitors.length; i++) {  
            monitors[i].screenSize();  
            monitors[i].resolution();  
        }  
    }  
    public static void main(String[] args) {  
        Monitor[] monitors = {new LCD(), new LED()}; // LINE 1  
        show(monitors);  
    }  
}
```

Choose the correct option.

**Options :**

This code generates the output:

Screen size is medium  
HD resolution  
Screen size is medium

6406533041825. ✘ HD resolution

6406533041826. ✘

This code generates the output:

```
Normal screen size  
Normal resolution  
Normal screen size  
Normal resolution
```

This code generates the output:

```
Screen size is large  
Normal resolution  
Screen size is medium
```

6406533041827. ✓ HD resolution

Compilation error at LINE 1 because a reference variable of type Monitor can-

6406533041828. ❌ not refer to an object of class LED

**Question Number : 141 Question Id : 640653903270 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the code given below that checks whether two candidates are from the same college. Method `equals` is overridden to compare two `Candidate` objects as follows. If two candidates are from the same college then they are said to be equal. Based on the given information, answer the question that follows.

```
class Candidate {  
    private String name;  
    private String college;  
    // Constructor to initialize instance variables  
    public String toString() {  
        return name;  
    }  
  
    public boolean equals(Object obj) {  
        // CODE BLOCK  
    }  
}  
  
public class Test {  
    public static void main(String[] args) {  
        Candidate c1 = new Candidate("Shreya", "IITMadras");  
        Candidate c2 = new Candidate("Hari", "IITDelhi");  
        Candidate c3 = new Candidate("Aisha", "IITMadras");  
        if (c1.equals(c3)) {  
            System.out.println(c1 + " and " + c3 + " belong to the same college");  
        }  
        if (c2.equals(c3)) {  
            System.out.println(c2 + " and " + c3 + " belong to the same college");  
        }  
    }  
}
```

Choose the correct option to fill in place of CODE BLOCK so that the output is:

Shreya and Hari belong to the same college

#### Options :

- if(`obj instanceof Candidate`) {  
 if(`this.college.equals(obj.college)`)  
 return true;  
}
- 6406533041829. ✘ `return false;`
  
- if(`this.college.equals(obj.college)`)  
 return true;
- 6406533041830. ✘ `return false;`
  
- 6406533041831. ✓

```
if(obj instanceof Candidate) {  
    Candidate c = (Candidate) obj;  
    if(this.college.equals(c.college))  
        return true;  
}  
return false;  
  
if(obj instanceof Candidate) {  
    Candidate c = obj;  
    if(this.college.equals(c.college))  
        return true;  
}  
6406533041832. ✘ return false;
```

**Question Number : 142 Question Id : 640653903271 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
class Intern {  
    private String name;  
    public Intern(String n) {  
        name = n;  
    }  
    public Intern(Intern i) {  
        this.name = i.name;  
    }  
    public void setName(String n) {  
        name = n;  
    }  
    public String getName() {  
        return name;  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        Intern i1 = new Intern("Jaya");  
        Intern i2 = new Intern(i1);  
        Intern i3 = i1;  
        i1.setName("Subash");  
        System.out.println(i1.getName());  
        System.out.println(i2.getName());  
        System.out.println(i3.getName());  
    }  
}
```

What will the output be?

**Options :**

Subash  
Jaya

6406533041833. ❌ Jaya

Subash  
Jaya

6406533041834. ✓ Subash

Subash  
Subash

6406533041835. ❌ Subash

Subash  
Subash

6406533041836. ❌ Jaya

**Question Number : 143 Question Id : 640653903272 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the code given below.

```
class Device {  
    public void powerOn() {  
        System.out.println("Device is on");  
    }  
}  
  
class Mobile extends Device {  
    public void display() {  
        System.out.println("Mobile display");  
    }  
}  
  
class Smartphone extends Mobile {  
    public void display() {  
        System.out.println("Smartphone display");  
    }  
    public void connect() {  
        System.out.println("Connected to Internet");  
    }  
}  
  
public class TestDevice {  
    public static void main(String[] args) {  
        Device d = new Mobile();  
        Mobile m = new Smartphone(); // LINE 1  
        d.powerOn();  
        ((Mobile)d).display(); // LINE 2  
        m.connect(); // LINE 3  
    }  
}
```

Choose the correct option.

**Options :**

LINE 1 generates a compilation error because a variable of type `Mobile` cannot refer to an object of type `Smartphone`.  
**6406533041837. ✘**

LINE 2 generates a compilation error because a variable of type `Device` cannot be type cast to an object of type `Mobile`.  
**6406533041838. ✘**

**6406533041839. ✓**

LINE 3 generates a compilation error because the method `connect()` is not defined in class `Mobile`.

This code generates the output:

Device is on  
Mobile display  
**6406533041840. ✖ Connected to Internet**

**Question Number : 144 Question Id : 640653903273 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
import java.util.*;  
public class Test{  
    public static void main(String[] args) {  
        ArrayDeque<String> queue1 = new ArrayDeque<String>();  
        queue1.add("Violet");  
        queue1.addFirst("Yellow");  
        queue1.add("Pink");  
        queue1.addFirst("Blue");  
        queue1.add("Blue");  
        System.out.println(queue1);  
        TreeSet<String> set = new TreeSet<String>(queue1);  
        System.out.println(set);  
    }  
}
```

What will the output be?

**Options :**

This program generates the output:

[Blue, Yellow, Violet, Pink, Blue]

**6406533041841. ✓ [Blue, Pink, Violet, Yellow]**

This program generates the output:

[Blue, Pink, Violet, Yellow]

**6406533041842. ✖ [Blue, Yellow, Violet, Pink, Blue]**

This program generates the output:

[Blue, Pink, Violet, Yellow]

**6406533041843. ✖ [Blue, Pink, Violet, Yellow]**

This program generates the output:  
[Blue, Yellow, Violet, Pink, Blue]  
6406533041844. ✶ [Blue, Yellow, Violet, Pink, Blue]

**Question Number : 145 Question Id : 640653903274 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
class Chef {  
    String name;  
    public Chef(String n) {  
        name = n;  
    }  
}  
  
class Dish implements Cloneable {  
    String dishName;  
    Chef[] chefs;  
    public Dish(String name, Chef[] chefs) {  
        dishName = name;  
        this.chefs = chefs;  
    }  
    public Dish clone() throws CloneNotSupportedException {  
        Dish d = (Dish) super.clone();  
        d.chefs = this.chefs.clone();  
        return d;  
    }  
}  
  
public class Test {  
    public static void main(String[] args) throws CloneNotSupportedException {  
        Chef[] chefs1 = { new Chef("Ravi"), new Chef("Raju") };  
        Dish d1 = new Dish("Biryani", chefs1);  
        Dish d2 = d1.clone();  
        Chef[] chefs2 = d2.chefs;  
        chefs2[0].name = "Veena";  
        d2.dishName = "Fried Rice";  
  
        System.out.println(d1.dishName + " : " + d1.chefs[0].name);  
        System.out.println(d2.dishName + " : " + d2.chefs[0].name);  
    }  
}
```

What will the output be?

**Options :**

Biryani : Veena  
6406533041845. ❌ Biryani : Veena

FriedRice : Veena  
6406533041846. ❌ FriedRice : Veena

Biryani : Ravi  
6406533041847. ❌ FriedRice : Veena

Biryani : Veena  
6406533041848. ✓ FriedRice : Veena

**Question Number : 146 Question Id : 640653903275 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
import java.util.*;
public class Test {
    public static void main(String[] args) {
        List<String> list = new ArrayList<String>();
        list.add("Date");
        list.add("Durian");
        list.add("Banana");
        list.add("Cherry");
        list.add("Dragonfruit");

        list.stream().takeWhile(s -> s.startsWith("D"))
            .forEach(s -> System.out.print(s + " "));

        System.out.println();

        list.stream().dropWhile(s -> s.startsWith("D"))
            .forEach(s -> System.out.print(s + " "));

    }
}
```

What will the output be?

**Options :**

Date Durian Dragonfruit  
6406533041849. ❌ Banana Cherry

Date Durian

6406533041850. ✘ Banana Cherry

Date Durian

6406533041851. ✓ Banana Cherry Dragonfruit

6406533041852. ✘ Date Durian Banana Cherry Dragonfruit

**Question Number : 147 Question Id : 640653903278 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
1 class ClassOne{
2     public void methodOne(){
3         // ...
4         methodTwo();
5         // ...
6     }
7     public void methodTwo(){
8         // ...
9     }
10 }
11 class ClassTwo{
12     public static void methodThree(){
13         // ...
14         ClassOne c = new ClassOne();
15         c.methodOne();
16         // ...
17     }
18     public static void methodFour(){
19         // ...
20         methodThree();
21         // ...
22     }
23     public static void main(String[] args) {
24         // ...
25         methodFour();
26     }
27 }
```

During the execution of Line 16 in the above code, the activation record of which method is at the top of the stack of activation records?

**Options :**

6406533041861. ✘ main

6406533041862. ✘ methodOne

6406533041863. ✘ methodTwo

6406533041864. ✓ methodThree

6406533041865. ✘ methodFour

**Question Number : 148 Question Id : 640653903279 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
interface TransportService {  
    void bookRide();  
}  
class TransportApp {  
    public TaxiService getTaxiService() {  
        return new TaxiService();  
    }  
    public BusService getBusService() {  
        return new BusService();  
    }  
    private class TaxiService implements TransportService {  
        public void bookRide() {  
            System.out.println("Booking a taxi");  
        }  
    }  
    private class BusService implements TransportService {  
        public void bookRide() {  
            System.out.println("Booking a bus");  
        }  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        TransportApp t = new TransportApp();  
        //CODE BLOCK  
        obj1.bookRide();  
        obj2.bookRide();  
    }  
}
```

Choose the correct option to fill in place of CODE BLOCK so that the output is:

Booking a taxi  
Booking a bus

#### Options :

TaxiService obj1 = new TaxiService();  
**6406533041866. ❌ BusService obj2 = new BusService();**

**TransportService obj1 = t.getTaxiService();**  
**6406533041867. ✓ TransportService obj2 = t.getBusService();**

TaxiService obj1 = t.getTaxiService();  
**6406533041868. ❌ BusService obj2 = t.getBusService();**

TransportService obj1 = new TaxiService();  
6406533041869. ❌ TransportService obj2 = new BusService();

**Question Number : 149 Question Id : 640653903280 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
interface OnlineCourse {  
    default void showDetails() {  
        System.out.println("Course duration is 3 months");  
    }  
    default void enroll() {  
        System.out.println("Enrolled");  
    }  
}  
class CloudCourse implements OnlineCourse { //LINE 1  
    public void enroll() {  
        System.out.println("Enrolled in cloud course");  
    }  
}  
class MLCourse implements OnlineCourse { //LINE 2  
    public void showDetails() {  
        System.out.println("ML Course");  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        OnlineCourse courses[] = new OnlineCourse[2];  
        courses[0] = new CloudCourse();  
        courses[1] = new MLCourse();  
        for (OnlineCourse course : courses) {  
            course.showDetails();  
            course.enroll();  
        }  
    }  
}
```

Choose the correct option.

**Options :**

Compilation error at LINE 1 because method showDetails() is not overridden  
6406533041870. ❌ in class CloudCourse

Compilation error at LINE 2 because method `enroll()` is not overridden in  
**6406533041871.** ❌ class `MLCourse`

This program generates the output:

Enrolled in cloud course

**6406533041872.** ❌ ML Course

This program generates the output:

Course duration is 3 months

Enrolled in cloud course

`MLCourse`

**6406533041873.** ✓ Enrolled

**Question Number : 150 Question Id : 640653903281 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
abstract class Bag {  
    abstract void open();  
    void carry() { // LINE 1  
        System.out.println("Carrying bag");  
    }  
}  
class Backpack extends Bag {  
    void open() {  
        System.out.println("Opening backpack");  
    }  
    void carry() {  
        System.out.println("Wearing backpack");  
    }  
}  
class ToteBag extends Bag {  
    void open() {  
        System.out.println("Opening tote bag");  
    }  
    void carry() {  
        System.out.println("Holding tote bag");  
    }  
}  
public class Test {  
    public static void main(String[] args) {  
        Bag bag1 = new Backpack(); // LINE 2  
        Bag bag2 = new ToteBag(); // LINE 3  
        bag1.carry();  
        bag1.open();  
        bag2.carry();  
        bag2.open();  
    }  
}
```

Choose the correct option.

**Options :**

LINE 1 generates compilation error because abstract class must contain only  
**6406533041874.** ✘ abstract methods.

LINE 2 and LINE 3 generate compilation errors because reference variable of  
**6406533041875.** ✘ type Bag cannot store the objects of type Backpack and ToteBag.

**6406533041876.** ✓

This program generates the output:

Wearing backpack

Opening backpack

Holding tote bag

Opening tote bag

This program generates the output:

Carrying bag

Opening backpack

Carrying bag

6406533041877. ❌ Opening tote bag

**Question Number : 151 Question Id : 640653903282 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
interface Iterator{
    public boolean has_next();
    public Object get_next();
}

abstract class Printable{
    public abstract void print();
}

class ProductList{
    private final int limit = 3;
    private Product[] list = { new Product("Laptop", "P1001"),
        new Product("Smartphone", "P1002"),
        new Product("Smartwatch", "P1003")
    };
    private class Product extends Printable{
        private String name, productId;
        //Constructor to initialize instance variables
        public void print() {
            System.out.println(productId + ", " + name);
        }
    }
    private class ProdIter implements Iterator{
        private int indx;
        public ProdIter() {
            //constructor
        }
        public boolean has_next() {
            //if next element available in list return true;
            //else false
        }
        public Object get_next() {
            //return next element from list
        }
    }
    public Iterator getIterator() {
        return new ProdIter();
    }
}
```

```
public class IterTest {  
    public static void main(String[] args) {  
        ProdList pList = new ProdList();  
        Iterator iter = pList.getIterator();  
        while(iter.hasNext()) {  
            -----; //LINE 1  
        }  
    }  
}
```

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

P1001, Laptop  
P1002, Smartphone  
P1003, Smartwatch

**Options :**

6406533041878. ✓ ((Printable)iter.getNext()).print()

6406533041879. ✗ ((Product)iter.getNext()).print()

6406533041880. ✗ ((ProdList)iter.getNext()).print()

6406533041881. ✗ iter.getNext().print();

**Question Number : 152 Question Id : 640653903284 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
import java.util.*;
class ZeroValueException extends Exception {
    public String toString() {
        return "Zero encountered during update";
    }
}
public class Test {
    public static void update(int[] array, int index) throws ZeroValueException {
        if (array[index] == 0) {
            throw new ZeroValueException();
        }
        array[index] = array[index] * 5;
    }
    public static void main(String[] args) {
        int[] arr = {1, -1, 0, 2, -2};
        try {
            for (int i = 0; i < arr.length; i++) {
                update(arr, i);
            }
        } catch (ZeroValueException e) {
            System.out.println(e);
        }
        for (int n : arr) {
            System.out.print(n + " ");
        }
    }
}
```

What will the output be?

**Options :**

6406533041886. ❌ Zero encountered during update

6406533041887. ❌ 5 -5 0 2 -2

Zero encountered during update

6406533041888. ❌ 5 -5

Zero encountered during update

6406533041889. ✓ 5 -5 0 2 -2

## **Correct Marks : 4**

### **Question Label : Multiple Choice Question**

Method `Optional.ofNullable(T value)` returns an `Optional` that describes the specific value, if non-null; otherwise returns an empty `Optional`.

Based on this description, consider the code given below, and answer the question that follows.

```
import java.util.*;
class Movie {
    HashMap<String, String> actors = new HashMap<>();
    public Movie() {
        actors.put("Action", "Akshay");
        actors.put("Comedy", "Kapil");
    }
    public String getActor(String genre) {
        return actors.get(genre);
    }
}
public class Test {
    public static void main(String[] args) {
        Optional<String> a1 = Optional.ofNullable(new Movie().getActor("Action"));
        Optional<String> a2 = Optional.ofNullable(new Movie().getActor("Thriller"));
        a1.ifPresent(n ->System.out.println(n.toUpperCase()));
        a2.ifPresent(n -> System.out.println(n.toUpperCase()));
    }
}
```

Choose the correct option.

### **Options :**

This program generates the output:

6406533041890. ✓ AKSHAY

This program terminates due to `NullPointerException` after printing the message:

6406533041891. ✗ AKSHAY

This program generates the output:

AKSHAY

6406533041892. ✗ null

This program generates the output:

ACTION

6406533041893. ✗ AKSHAY

Correct Marks : 4

Question Label : Multiple Choice Question

Consider the Java code given below.

```
import java.io.*;
class HealthCard implements Serializable {
    private String cardNumber = "*****";
    private transient String insuranceProvider = "Unknown";
    private String issueDate = "00/00";
    public HealthCard(String cN, String iP, String iD) {
        cardNumber = cN;
        insuranceProvider = iP;
        issueDate = iD;
    }
    public String toString() {
        return cardNumber + ", " + insuranceProvider + ", " + issueDate;
    }
}
public class Test {
    public static void main(String[] args) throws Exception {
        var fos = new FileOutputStream("healthcard.txt");
        var os = new ObjectOutputStream(fos);
        os.writeObject(new HealthCard("H123456", "HIInsurance", "03/24"));
        os.close();
        var fis = new FileInputStream("healthcard.txt");
        var ois = new ObjectInputStream(fis);
        HealthCard card = (HealthCard) ois.readObject();
        ois.close();
        System.out.println(card);
    }
}
```

What will the output be?

Options :

6406533041894. ✘ null, null, null

6406533041895. ✓ H123456, null, 03/24

6406533041896. ✘ H123456, Unknown, 03/24

6406533041897. ✘ H123456, HIInsurance, 03/24

6406533041898. ✘ \*\*\*\*\*\*, Unknown, 00/00

**Question Number : 155 Question Id : 640653903287 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

**Question Label : Multiple Choice Question**

Consider the Java code given below.

```
import java.util.*;
import java.util.stream.*;
class Car {
    private String model;
    private double mileage;
    //Constructor to initialize instance variables
    public double getMileage() {
        return mileage;
    }
    public String toString() {
        return model;
    }
}
public class Test {
    public static void main(String[] args) {
        var carArr = new ArrayList<Car>();
        carArr.add(new Car("Toyota", 20.5));
        carArr.add(new Car("Ford", 25.3));
        carArr.add(new Car("Honda", 18.9));
        carArr.add(new Car("Chevrolet", 22.0));
        Map<Boolean, List<Car>> mileageMap;
        mileageMap = carArr.stream()
            .collect(Collectors.partitioningBy(c -> c.getMileage() >= 22.0));
        System.out.println(mileageMap.get(false));
    }
}
```

Choose the correct option.

**Options :**

6406533041899. ❌ This program generates the output: [Ford, Chevrolet]

6406533041900. ❌ This program generates the output: [Ford]

6406533041901. ✓ This program generates the output: [Toyota, Honda]

6406533041902. ❌ This program generates the output: [Toyota, Honda, Chevrolet]

**Question Number : 156 Question Id : 640653903288 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

**Question Label : Multiple Choice Question**

Consider the code given below. Assume that the file food.txt contains the following lines of text in it.

A balanced diet is key to good health.

Food provides essential nutrients for the body.

Food preparation is an art form.

```
import java.io.*;
import java.util.Scanner;
public class Example {
    public static void main(String[] args) {
        try {
            var in=new FileInputStream("food.txt");
            var scanner=new Scanner(in); //LINE 1
            System.out.println("Data from file:");
            System.out.println(scanner.nextLine());
            System.out.println(scanner.next());
            System.out.println(scanner.nextLine());
        }
        catch (FileNotFoundException e) {
            System.out.println("File does not exist.");
        }
        catch (IOException e) {
            System.out.println("Error in writing a file.");
        }
    }
}
```

Choose the correct option.

**Options :**

6406533041903. ❌ LINE 1 generates IOException.

This program generates the output:

Data from file:

A balanced diet is key to good health.

Food provides essential nutrients for the body.

6406533041904. ❌ Food preparation is an art form.

6406533041905. ✓

This program generates the output:

Data from file:

A balanced diet is key to good health.

Food

provides essential nutrients for the body.

This program generates the output:

Data from file:

A balanced diet is key to good health.

A

6406533041906. ❌ Food preparation is an art form.

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133910

**Question Shuffling Allowed :**

Yes

**Question Number : 157 Question Id : 640653903277 Question Type : MCQ Calculator : Yes**

**Correct Marks : 5**

Question Label : Multiple Choice Question

Consider the Java code given below.

```
import javax.swing.*;
import java.awt.*;
public class GUITest extends JFrame {
    JPanel pnlLbl, pnlTxt, pnlBtn;
    JLabel lblId, lblPwd;
    JTextField txtId, txtPwd;
    JButton btn;
    public GUITest() {
        lblId = new JLabel("Phone no:");
        lblPwd = new JLabel("OTP:");
        txtId = new JTextField(10);
        txtPwd = new JTextField(10);
        btn = new JButton("Login");
        pnlLbl = new JPanel();
        //add lblId and txtId to pnlLbl
        pnlTxt = new JPanel();
        //add lblPwd and txtPwd to pnlTxt
        pnlBtn = new JPanel();
        //add btn to pnlBtn

        //CODE BLOCK

        setVisible(true);
        setSize(300,200);
    }
    public static void main(String[] args) {
        new GUITest();
    }
}
```

Choose the correct option to be filled in place of CODE\_BLOCK such that the above program produces the GUI given below.



Figure 1

**Options :**

- add(pnlLbl, "Center");
  - add(pnlTxt, "North");
  - 6406533041857. ✘ add(pnlBtn, "South");
- 
- add(pnlLbl, "North");
  - add(pnlTxt, "South");
  - 6406533041858. ✘ add(pnlBtn, "Center");

```
    add(pnlLbl, "North");
    add(pnlTxt, "Center");
6406533041859. ✓ add(pnlBtn, "South");
```

```
    add(pnlLbl, "South");
    add(pnlTxt, "Center");
6406533041860. ✘ add(pnlBtn, "North");
```

**Sub-Section Number :** 4

**Sub-Section Id :** 640653133911

**Question Shuffling Allowed :** Yes

**Question Number : 158 Question Id : 640653903283 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the Java code given below that prints the highest priced stock among a set of given Stock objects. From among the options, identify the appropriate function header for the function printHighestPricedStock that takes as input an array of Stock objects and prints the highest priced stock.

```
import java.util.*;
interface Stock {
    public abstract double getPrice();
}
class AStock implements Stock {
    private double price;
    // Constructor
    // method getPrice() that returns price
}
class BStock implements Stock {
    private double price;
    // Constructor
    // method getPrice() that returns price
}
public class Test {
    // LINE 1: FUNCTION HEADER
    {
        // invokes method getPrice()
        // to print the value of highest priced stock
    }

    public static void main(String[] args) {
        Stock[] stocks = {
            new AStock(150.50),
            new BStock(200.75),
            new AStock(160.25)
        };
        printHighestPricedStock(stocks);
    }
}
```

Choose the correct option(s).

**Options :**

6406533041882. ❌ public static <T extends AStock> void printHighestPricedStock(T[] items)

6406533041883. ✓ public static <T extends Stock> void printHighestPricedStock(T[] items)

6406533041884. ❌ public static <T extends BStock> void printHighestPricedStock(T[] items)

6406533041885. ✓ public static void printHighestPricedStock(Stock[] items)

**Question Number : 159 Question Id : 640653903290 Question Type : MSQ Calculator : Yes  
Correct Marks : 5 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the Java code given below.

```
class Stadium {  
    int available = 1;  
    public synchronized void bookSeat(int n, String name) {  
        if (available >= n) {  
            available = available - n;  
            System.out.println(name + " booked " + n + " seat");  
        } else {  
            System.out.println(name + " cannot book " + n + " seat");  
        }  
    }  
}  
  
class SeatBooking implements Runnable {  
    private Stadium s;  
    private String name;  
    private int n_seats;  
    public SeatBooking(Stadium s, String n, int ns) {  
        this.s = s;  
        this.name = n;  
        this.n_seats = ns;  
    }  
    public void run() {  
        s.bookSeat(n_seats, name);  
    }  
}  
  
public class ThreadTest {  
    public static void main(String[] args) {  
        Stadium obj = new Stadium();  
        SeatBooking sb1 = new SeatBooking(obj, "Virat", 1);  
        SeatBooking sb2 = new SeatBooking(obj, "Saniya", 1);  
        Thread t1 = new Thread(sb1);  
        Thread t2 = new Thread(sb2);  
        t1.start();  
        t2.start();  
    }  
}
```

Which of the following options is/are possible result/s of the above code?

**Options :**

- Saniya booked 1 seat
- 6406533041911. ✓ Virat cannot book 1 seat

Saniya booked 1 seat

6406533041912. ✘ Virat booked 1 seat

Virat booked 1 seat

6406533041913. ✓ Saniya cannot book 1 seat

Virat cannot book 1 seat

6406533041914. ✘ Saniya cannot book 1 seat

**Question Number : 160 Question Id : 640653903291 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Choose the correct option.

```
import java.util.*;
import java.util.concurrent.*;
class Example extends Thread {
    Map cuMap;
    Example(Map m) {
        this.cuMap = m;
    }
    public void run() {
        cuMap.put("4", "Four");
    }
}
public class Test {
    public static void main (String[] args) {
        Map<Integer, String> cuMap = new ConcurrentHashMap();
        Integer[] iarr = {1, 2, 3};
        String[] arr = {"One", "Two", "Three"};
        for(int i = 0; i < iarr.length; i++) {
            cuMap.put(iarr[i], arr[i]);
        }
        Example t = new Example(cuMap);
        t.start();
        Set s = cuMap.entrySet();
        Iterator itr = s.iterator();
        while(itr.hasNext()) {
            Map.Entry m = (Map.Entry)itr.next();
            System.out.println(m.getKey() + " => " + m.getValue());
        }
    }
}
```

Which of the following is true about the given code.

**Options :**

6406533041915. ❌ This program may generate ConcurrentModificationException.

The program may generate the output:

1 => One  
2 => Two  
3 => Three

6406533041916. ✓ 4 => Four

The program may generate the output:

1 => One  
2 => Two

6406533041917. ✓ 3 => Three

The program always generate the output:

1 => One  
2 => Two  
3 => Three  
4 => Four

6406533041918. \*

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133912

**Question Shuffling Allowed :**

Yes

**Question Number : 161 Question Id : 640653903276 Question Type : MSQ Calculator : Yes**

**Correct Marks : 6 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the Java code given below.

```
import javax.swing.*;
import java.awt.event.*;
public class ButtonEventTest extends JFrame implements ActionListener{
    private JButton b1, b2;
    private JLabel l1;
    JPanel panel1, panel2;
    public ButtonEventTest() {
        b1 = new JButton("Encrypt");
        b2 = new JButton("Decrypt");
        panel1 = new JPanel();
        panel1.add(b1);
        panel1.add(b2);
        add(panel1, "South");

        l1 = new JLabel("");
        panel2 = new JPanel();
        panel2.add(l1);
        add(panel2, "North");

        setVisible(true);
        setSize(400, 400);

        b1.setActionCommand("action1");
        b2.setActionCommand("action2");

        b1.addActionListener(this);
        b2.addActionListener(this);
    }

    public void actionPerformed(ActionEvent e) {
        //CODE SEGMENT
    }
}

public static void main(String[] args) {
    new ButtonEventTest();
}
```

Choose the correct code segment(s) to be filled inside method `actionPerformed()` such that on clicking the Encrypt button, the label text changes to Text encrypted and on clicking the Decrypt button, the label text changes to Text decrypted.



#### Options :

```
if(e.getActionCommand().equals("action1"))
    l1.setText("Text encrypted");
else if(e.getActionCommand().equals("action2"))
    l1.setText("Text decrypted");
```

6406533041853. ✓      l1.setText("Text decrypted");

6406533041854. ✘

```
if(e.getActionCommand().equals("b1"))
    l1.setText("Text encrypted");
else if(e.getActionCommand().equals("b2"))
    l1.setText("Text decrypted");
```

```
        if(e.getSource().equals(b1))
            l1.setText("Text encrypted");
        else if(e.getSource().equals(b2))
            l1.setText("Text decrypted");
```

6406533041855. ✓

```
if(e.getSource().equals("action1"))
    l1.setText("Text encrypted");
else if(e.getSource().equals("action2"))
    l1.setText("Text decrypted");
```

6406533041856. ✘

**Question Number : 162 Question Id : 640653903289 Question Type : MSQ Calculator : Yes**

**Correct Marks : 6 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the Java code given below.

```
class Pattern implements Runnable {
    boolean stopRequested = false;
    String[] pattern = {"One", "Two", "Three", "Four", "Five"};
    int index = 0;
    public void run() {
        while (!stopRequested) {
            System.out.print(pattern[index] + " ");
            index = (index + 1) % pattern.length;
        }
    }
    public void setStop(boolean stop) {
        stopRequested = stop;
    }
}
public class Test {
    public static void main(String[] args) throws InterruptedException {
        Pattern p = new Pattern();
        Thread t1 = new Thread(p);
        t1.start();
        p.setStop(true);
    }
}
```

Choose the correct option(s).

**Options :**

6406533041907. ✘ The program will always generate the output: One Two Three Four Five

6406533041908. ✘ The program will always generate the output: One

The output can be One or One Two or One Two Three or One Two Three Four  
6406533041909. ✓ or One Two Three Four Five and can also cycle back and start again.

6406533041910. ✓ The program may not generate any output.

## AppDev2

<b>Section Id :</b>	64065364106
<b>Section Number :</b>	8
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	31
<b>Number of Questions to be attempted :</b>	31
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133913
<b>Question Shuffling Allowed :</b>	No

**Question Number : 163 Question Id : 640653903292 Question Type : MCQ Calculator : Yes**

**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 :**

6406533041919. ✓ YES

6406533041920. ✗ NO

**Sub-Section Number :**

2

**Sub-Section Id :**

640653133914

**Question Shuffling Allowed :**

Yes

**Question Number : 164 Question Id : 640653903293 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

What of the following is the primary objective of a CSRF token?

**Options :**

6406533041921. ✗ To encrypt the user's session

6406533041922. ✓ To validate that the request comes from the authenticated user

6406533041923. ✗ To store the user's password securely

6406533041924. ✗ To compress the HTTP request

**Question Number : 165 Question Id : 640653903297 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Suppose an application is being loaded from the origin https://example.com. Which of the following origins will the browser allow while making a fetch call, by default?

**Options :**

6406533041937. ✗ <https://api.example.com>

6406533041938. ✗ <http://example.com/api>

6406533041939. ✗ <https://example.com:8080>

6406533041940. ✓ <https://example.com/subdir>

**Question Number : 166 Question Id : 640653903322 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

What is the correct sequence of steps to update the state in Vuex when handling an asynchronous operation?

**Options :**

6406533042029. ✗ State → Dispatch an action → Commit a mutation → State change

6406533042030. ✓ Dispatch an action → Commit a mutation → State change

6406533042031. ✗ Commit a mutation → Dispatch an action → State change

640653042032. ❌ State change → Commit a mutation → Dispatch an action

**Sub-Section Number :** 3

**Sub-Section Id :** 640653133915

**Question Shuffling Allowed :** Yes

**Question Number : 167 Question Id : 640653903295 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Suppose you are developing an application for millions of users that will perform intensive data analysis and return the results asynchronously. Arrange the following set of actions/operations to achieve an efficient and scalable design.

- I) Save the result to a database
- II) Invoke a callback URL
- III) Queue the analysis job

**Options :**

640653041929. ❌ II, I, III

640653041930. ✓ III, I, II

640653041931. ❌ III, II, I

640653041932. ❌ I, II, III

**Question Number : 168 Question Id : 640653903298 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following statements about Redis is true?

**Options :**

640653041941. ❌ Redis is a relational database that uses SQL for querying data.

640653041942. ✓ Redis is an in-memory data structure store, commonly used as a database, cache, and message broker.

640653041943. ❌ Redis can only store string data types and does not support complex data structures like lists or sets.

640653041944. ❌ Redis cannot handle numerous operations per second.

**Question Number : 169 Question Id : 640653903299 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following scenarios is an example of a Cross-Site Request Forgery (CSRF) attack?

**Options :**

640653041945. ❌ A user receives an email containing a link to a phishing site that asks for their login credentials.

640653041946. ✓ A user clicks on a malicious link while logged into their bank account, and without their knowledge, a money transfer request is sent to the bank's server using the user's

authenticated session.

6406533041947. ❌ A hacker uses a brute-force attack to guess the password of a user's online account.

6406533041948. ❌ A user is tricked into downloading and installing malware that steals their sensitive information.

**Question Number : 170 Question Id : 640653903301 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Match the following technologies with their typical use cases:

1. Webhooks	A. Real-time communication in chat applications
2. Web Sockets	B. Fetching data periodically from an API endpoint
3. API	C. Receiving notifications when a specific event occurs
4. Polling	D. Exchanging data between client and server using HTTP requests
5. Pub/Sub	E. Broadcasting messages to multiple subscribers simultaneously

**Options :**

6406533041953. ✓ 1 - C, 2 - A, 3 - D, 4 - B, 5 - E

6406533041954. ❌ 1 - D, 2 - E, 3 - A, 4 - C, 5 - B

6406533041955. ❌ 1 - C, 2 - C, 3 - E, 4 - A, 5 - D

6406533041956. ❌ 1 - D, 2 - A, 3 - C, 4 - D, 5 - B

**Question Number : 171 Question Id : 640653903308 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the below javascript program.

```
function parent() {  
    var a = 1;  
    function child() {  
        console.log(a);  
    }  
    a = 2;  
    return child;  
}  
  
var closure = parent();  
closure();
```

What will be the output of the above program, if executed?

**Options :**

6406533041977. ✓ 2

6406533041978. ❌ 1

640653041979. ✘ undefined

640653041980. ✘ Error

**Question Number : 172 Question Id : 640653903318 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following JavaScript code snippet.

```
// Code Snippet 1
sessionStorage.setItem('username', 'course_user');
let storedUsername = sessionStorage.getItem('username');

// Code Snippet 2
sessionStorage.removeItem('username');
let removedUsername = sessionStorage.getItem('username');

// Code Snippet 3
sessionStorage.clear();
let clearedStorage = sessionStorage.username;
```

What will be the values of 'storedUsername', 'removedUsername', and 'clearedStorage' after the execution of the above code snippets?

**Options :**

640653042013. ✘ storedUsername: 'course\_user', removedUsername: null, clearedStorage: null

640653042014. ✘ storedUsername: 'course\_user', removedUsername: undefined, clearedStorage: null

640653042015. ✓ storedUsername: 'course\_user', removedUsername: null, clearedStorage: undefined

640653042016. ✘ storedUsername: 'course\_user', removedUsername: undefined, clearedStorage: undefined

**Question Number : 173 Question Id : 640653903321 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following javascript code

```
const obj = {
    num: 40,
    regularFunction: function() {
        return this.value;
    },
    arrowFunction: () => {
        return this.value;
    }
};

const regularResult = obj.regularFunction();
const arrowResult = obj.arrowFunction();
```

What are the values of `regularResult` and `arrowResult`?

**Options :**

6406533042025. ✘ `regularResult = 40, arrowResult = 40`

6406533042026. ✘ `regularResult = undefined, arrowResult = undefined`

6406533042027. ✓ `regularResult = 40, arrowResult = undefined`

6406533042028. ✘ `regularResult = undefined, arrowResult = 40`

**Question Number : 174 Question Id : 640653903323 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the below 2 approaches:

Approach 1:

```
<script>
    setInterval(() => document.title = "Title A", 2000)
    setInterval(() => document.title = "Title B", 1000)
</script>
```

Approach 2:

```
<script>
    setInterval(() => document.title = "Title A", 1000)
    setInterval(() => document.title = "Title B", 2000)
</script>
```

Choose the correct statement:

**Options :**

6406533042033. ✘ The approach 1 will toggle the page title between "Title A" and "Title B" after every 1 second (approx).

6406533042034. ✘ The approach 2 will toggle the page title between "Title A" and "Title B" after

every 1 second (approx).

6406533042035. ✓ None of the approaches will toggle the page title after every 1 second.

6406533042036. ✗ None of these

**Question Number : 175 Question Id : 640653903325 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the below JavaScript program.

```
<script>
  for (var i = 0; i <= 3; i++) {
    setTimeout(() => console.log(i), (i+1)*1500);
  }
</script>
```

What will be the output of the above program, if executed? Also, predict the minimum number of seconds the program will take to complete the execution?

**Options :**

0  
1  
2  
3

6406533042041. ✗ Minimum time taken will be: 15 sec

1  
2  
3  
4

6406533042042. ✗ Minimum time taken will be: 9 sec

3  
3  
3  
3

6406533042043. ✗ Minimum time taken will be: 6 sec

6406533042044. ✓

4  
4  
4  
4

Minimum time taken will be: 6 sec

<b>Sub-Section Number :</b>	4
<b>Sub-Section Id :</b>	640653133916
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 176 Question Id : 640653903294 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

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

**Options :**

6406533041925. ✓ Webhooks use HTTP requests to communicate events from one service to another.

6406533041926. ✗ Webhooks require the recipient service to periodically poll the sender for updates.

6406533041927. ✓ Webhooks are typically implemented using HTTP POST requests.

6406533041928. ✗ Webhooks guarantee that events will be delivered in order and exactly once.

**Question Number : 177 Question Id : 640653903296 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

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

**Options :**

6406533041933. ✓ Function declarations are hoisted along with their definitions.

6406533041934. ✗ Variable declarations with var are hoisted with their initializations.

6406533041935. ✓ let and const declarations are hoisted to the top of their block but remain uninitialized until execution reaches the declaration.

6406533041936. ✗ Only function declarations are hoisted, not function definition.

**Question Number : 178 Question Id : 640653903300 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following scenarios are best suited for using Celery tasks?

**Options :**

6406533041949. ✗ Handling real-time user interactions on a website.

6406533041950. ✓ Sending out periodic email notifications to users.

640653041951. ✨ Generating and displaying dynamic content on a web page.

640653041952. ✓ Performing long-running data processing tasks in the background.

**Question Number : 179 Question Id : 640653903319 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following statements is/are true regarding webhooks and server sent events (SSE)?

**Options :**

640653042017. ✓ Webhooks are typically used for server-to-server communication, while SSE is used for server-to-client communication.

640653042018. ✨ Webhooks require the client to maintain an open connection to receive updates, while SSE does not.

640653042019. ✓ Webhooks are initiated by the server, while SSE connections are initiated by the client.

640653042020. ✨ SSE supports bidirectional communication, whereas webhooks do not.

**Question Number : 180 Question Id : 640653903324 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following is/are the correct ways to achieve the following.

1. Always apply class named “errorClass”,
2. The class named “activeClass” should only be applied when the Vue data variable “isActive” is truthy

**Options :**

640653042037. ✓ <div :class="['activeClass', 'errorClass']"></div>

640653042038. ✨ <div :class="['activeClass', 'errorClass']"></div>

640653042039. ✨ <div :class="['errorClass', 'activeClass']"></div>

640653042040. ✓ <div :class="['errorClass', 'activeClass']"></div>

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133917

**Question Shuffling Allowed :**

Yes

**Question Number : 181 Question Id : 640653903302 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following is/are true about Server-Sent Events (SSE)?

**Options :**

6406533041957. ✓ SSE connections are established using HTTP.  
6406533041958. ✗ SSE supports bidirectional communication between client and server.  
6406533041959. ✗ SSE automatically switches to web socket if the connection is successful.  
6406533041960. ✓ SSE is suitable for sending updates to multiple clients simultaneously.

**Question Number : 182 Question Id : 640653903317 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following HTTP header(s) can be used to control caching behavior in web applications?

**Options :**

6406533042009. ✓ Cache-Control  
6406533042010. ✓ Expires  
6406533042011. ✗ Bearer  
6406533042012. ✗ Content-Type

**Question Number : 183 Question Id : 640653903326 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following statement(s) is/are true regarding long and short polling?

**Options :**

6406533042045. ✗ A webhook is the same as short polling.  
6406533042046. ✓ The short polling can be used to know the state of an asynchronous task, and trigger an action if the task gets completed.  
6406533042047. ✗ The long polling cannot be achieved using HTTP protocol.  
6406533042048. ✓ Long Polling can be used to achieve real time communication.

**Sub-Section Number :** 6

**Sub-Section Id :** 640653133918

**Question Shuffling Allowed :** Yes

**Question Number : 184 Question Id : 640653903303 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the following Vue.js 2 component using CDN.

```

<div id="app">
  <input v-model="newItem" placeholder="Add an item" />
  <button @click="addItem">Add</button>

  <ul>
    <li v-for="(item, index) in items" :key="index">
      {{ index + 1 }}. {{ item }}
    </li>
  </ul>
</div>

<script src="https://cdn.jsdelivr.net/npm/vue@2"></script>
<script>
  new Vue({
    el: '#app',
    data: {
      newItem: '',
      items: ['Apple', 'Banana']
    },
    methods: {
      addItem() {
        if (this.newItem) {
          this.items.push(this.newItem, this.newItem);
          this.newItem = '';
        }
      }
    }
  );
</script>

```

After entering "Orange" in the input box and clicking the "Add" button, what will be seen in the browser?

**Options :**

6406533041961. ✓ 1. Apple

2. Banana

3. Orange

4. Orange

6406533041962. ✗ 1. Apple

2. Banana

3. Orange

3. Orange

6406533041963. ✗ 1. Apple

2. Banana

3. Orange

3. Orange

6406533041964. ✗ 1. Apple

2. Banana

**Question Number : 185 Question Id : 640653903304 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the following javascript code running on browser

```
localStorage.setItem('counter', '0');
sessionStorage.setItem('total', '5');

for (let i = 0; i < 3; i++) {
    let counter = localStorage.getItem('counter');
    let total = sessionStorage.getItem('total');

    counter += 2;
    total *= 2;

    localStorage.setItem('counter', counter);
    sessionStorage.setItem('total', total);
}

sessionStorage.clear();

console.log(localStorage.getItem('counter'));
console.log(sessionStorage.getItem('total'));
```

What will be the output in the browser console?

**Options :**

6406533041965. ❌ 6

40

6406533041966. ❌ null

40

6406533041967. ❌ 6

null

6406533041968. ✓ 0222

null

**Question Number : 186 Question Id : 640653903309 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the below JavaScript program.

```
class Animal {
    constructor(name) {
        this.name = name;
    }

    speak() {
        console.log(` ${this.name} makes a noise.`);
    }
}

class Dog extends Animal {
    speak() {
        console.log(` ${this.name} barks`);
    }
}

const d = new Dog('Rex');
d.speak();
console.log(d.__proto__ === Dog.prototype);
console.log(d.__proto__.__proto__ === Animal.prototype);
```

What will be the output of the above program?

**Options :**

640653041981. ✓ Rex barks

true

true

640653041982. ✗ Rex barks

false

true

640653041983. ✗ Rex barks.

true

false

640653041984. ✗ Rex barks.

false

false

**Question Number : 187 Question Id : 640653903310 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the below flask application.

```

from flask import Flask
from flask_caching import Cache
from time import sleep

config = {
    "CACHE_TYPE": "SimpleCache",
    "CACHE_DEFAULT_TIMEOUT": 180
}

app = Flask(__name__)
app.config.from_mapping(config)
cache = Cache(app)

@cache.memoize(timeout=180)
def get_data(param):
    sleep(5)
    return f"Data for {param}"

@app.route('/data/<param>')
def data(param):
    result = get_data(param)
    return f"Result: {result}"

if __name__ == '__main__':
    app.run(debug=True)

```

If the application is running on “<http://127.0.0.1:5000>” and the user visits the URL “<http://127.0.0.1:5000/data/test>” three times in the following sequence:

1. First visit
2. Second visit after 2 minutes and 30 seconds
3. Third visit after 1 minute from the second visit

What will be the approximate difference in response times between the first and third requests?

**Options :**

6406533041985. ✘ 5 seconds

6406533041986. ✓ 0 seconds

6406533041987. ✘ 10 seconds

6406533041988. ✘ 180 seconds

**Question Number : 188 Question Id : 640653903311 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the below JavaScript program.

```
new Promise((resolve, reject) => {
    const num = 0.6;
    if (num > 0.5) {
        resolve(num);
    } else {
        reject(num);
    }
})
.then(data => {
    console.log("Step 1:", data);
    if (data > 0.75) {
        return data * 2;
    } else {
        return Promise.reject(new Error("Less than 0.75"));
    }
})
.then(data => {
    console.log("Step 2:", data);
    return data + 5;
})
.catch(error => {
    console.log("Step 3:", error.message);
    if (error.message === "Less than 0.75") {
        return 1;
    } else {
        throw error;
    }
})
.then(data => {
    console.log("Step 4:", data);
    if (data === 1) {
        throw new Error("Fallback value");
    } else {
        return data * 3;
    }
})
.catch(error => {
    console.log("Step 5:", error.message);
    return "Error handled";
})
.finally(() => {
    console.log("Step 6: Finally block executed");
})
```

What will be the output of the above program?

**Options :**

6406533041989. ❌ Step 1: 0.6

Step 2: 1.2

Step 4: 6.2

Step 6: Finally block executed

6406533041990. ✓ Step 1: 0.6

Step 3: Less than 0.75

Step 4: 1

Step 5: Fallback value

Step 6: Finally block executed

6406533041991. ❌ Step 1: 0.6

Step 2: 1.2

Step 3: Error

Step 4: 1

Step 5: Fallback value

Step 6: Finally block executed

6406533041992. ❌ Step 1: 0.6

Step 3: Less than 0.75

Step 4: 1

Step 6: Finally block executed

**Question Number : 189 Question Id : 640653903312 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

In a Vue CLI project with Vuex, you have the following configuration:

src/store/index.js:

```
import Vue from 'vue';
import Vuex from 'vuex';

Vue.use(Vuex);

export default new Vuex.Store({
  state: {
    value: " ",
  },
  mutations: {
    setValue(state, payload) {
      state.value = payload;
    }
  },
  actions: {
    async fetchValue({ commit }) {
      // Simulate async API call
      const response = await new Promise(resolve => setTimeout(() =>
        resolve('API Value'), 500));
      commit('setValue', response);
    }
  }
});
```

src/App.vue:

```
<template>
  <div>
    <p>{{ value }}</p>
    <button @click="updateValue">Update Value</button>
  </div>
</template>

<script>
export default {
  computed: {
    value() {
      return this.$store.state.value;
    }
  },
  methods: {
    async updateValue() {
      await this.$store.dispatch('fetchValue');
    }
}
</script>
```

After running “npm run serve”, if you click the "Update Value" button, what will be displayed in the <p> tag?

**Options :**

6406533041993. ✓ API Value

6406533041994. ✗ ""

6406533041995. ✗ undefined

6406533041996. ✗ null

**Question Number : 190 Question Id : 640653903313 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the below JavaScript code.

```
async function newFetch(url) {
  try {
    console.log(url)
    const res = await fetch(url)
    if (!res.ok) {
      throw new Error(`HTTP Error: ${res.status}`)
    }
    try {
      const data = await res.json()
      console.log(data)
    } catch {
      throw new Error('Error')
    }
  } catch {
    throw new Error('Data is not JSON serializable')
  }
}
newFetch('https://example.com/api/users/23').catch((err) => {
  console.error(err)
})
```

Suppose the API URL “<https://example.com/api/users/23>” returns a valid HTML output. What will be logged on to console?

**Options :**

- 6406533041997. ✖ “Network Error”
- 6406533041998. ✖ “HTTP Error: 404”
- 6406533041999. ✓ “Data is not JSON serializable”
- 6406533042000. ✖ Data returned by the API

**Question Number : 191 Question Id : 640653903320 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4.5**

Question Label : Multiple Choice Question

Consider the following Flask application with Redis caching. Redis is running normally on port 6379.

```
from flask import Flask, jsonify
from flask_caching import Cache

app = Flask(__name__)
app.config['CACHE_TYPE'] = 'redis'
app.config['CACHE_REDIS_HOST'] = 'localhost'
app.config['CACHE_REDIS_PORT'] = 6379
cache = Cache(app)

def compute_value(x, y):
    result = x * y
    return result

@app.route('/compute/<int:x>/<int:y>')
@cache.cached(timeout=60, key_prefix='compute')
def compute(x,y):
    result = compute_value(x, y)
    return jsonify({'result': result})

if __name__ == '__main__':
    app.run(debug=True, port=5000)
```

Two requests are given to localhost:5000/compute/10/20 and localhost:5000/compute/5/10 within 60 seconds. What would be the json response from the server respectively?

**Options :**

- 6406533042021. ✘ {"result": 200} and {"result": 50}
- 6406533042022. ✘ {"result": 50} and {"result": 200}
- 6406533042023. ✘ {"result": 100} and {"result": 100}
- 6406533042024. ✓ {"result": 200} and {"result": 200}

**Sub-Section Number :**

7

**Sub-Section Id :**

640653133919

**Question Shuffling Allowed :**

No

**Question Id : 640653903305 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (192 to 193)**

**Question Label : Comprehension**

Consider the following flask/python code snippets and answer the given subquestions

Note : The `yield` keyword makes a function return one value at a time, saving its place so it can continue from where it left off.

`requests.get()` makes a http GET request to a given url, like `fetch` in JavaScript.

Options:

A.

```
import requests

response = requests.get('https://some-api')
print(response.json())
```

B.

```
from flask import Flask, request

app = Flask(__name__)

@app.route('/server-route', methods=['POST'])
def server_route():
    data = request.json
    print(data)
    return 'OK', 200
```

C.

```
from flask import Flask, Response
import time

app = Flask(__name__)

def stream():
    while True:
        time.sleep(5)
        yield f'data: The time is {time.strftime("%Y-%m-%d %H:%M:%S")}\n\n'

@app.route('/server-route')
def server_route():
    return Response(stream(), mimetype='text/event-stream')

if __name__ == '__main__':
    app.run(debug=True, port=5000)
```

D.

```
import time
import requests

while True:
    response = requests.get('https://some-endpoint')
    print(response.json())
    time.sleep(10)
```

Based on the above data, answer the given subquestions.

#### Sub questions

**Question Number : 192 Question Id : 640653903306 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which code snippet represents a **Webhook receiver** implementation?

**Options :**

640653041969. ✘ A

640653041970. ✓ B

640653041971. ✘ C

640653041972. ✘ D

**Question Number : 193 Question Id : 640653903307 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which code snippet represents a **Pub/Sub** implementation?

**Options :**

6406533041973. ✘ A

6406533041974. ✘ B

6406533041975. ✓ C

6406533041976. ✘ D

**Question Id : 640653903314 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (194 to 195)**

Question Label : Comprehension

Consider the following HTML document and the script file shown below. Assuming the CDNs for Vue2 and VueRouter are correctly configured, answer the given subquestions

Filename: index.html

```
<div id="app">
    <router-view></router-view>
</div>
<script src="script.js"></script>
```

Filename: script.js

```
const Error = {template: `<div>Page Not Found</div>`}
const Profile = {
  template: `<div>
    <div v-if='user'>
      Name: {{user.name}}, State: {{user.state}}
    </div>
    <div v-else>
      Unknown User
    </div>
  </div>`,
  data() {
    return {
      profiles: [
        { id: '1234', name: 'Animesh', state: 'MP' },
        { id: '1235', name: 'Arnav', state: 'Goa' },
      ],
    }
  },
  computed: {
    user(){
      let user = this.profiles.find((profile) => {
        return profile.id == this.$route.params.id
      })
      return user
    },
  },
}
```

```

computed: {
  user(){
    let user = this.profiles.find((profile) => {
      return profile.id == this.$route.params.id
    })
    return user
  },
},
}

const routes = [
  { path: '/profile/:id', component: Profile },
  { path: '*', component: Error },
]

const router = new VueRouter({
  routes,
})

new Vue({
  el: '#app',
  router,
})

```

## Sub questions

**Question Number : 194 Question Id : 640653903315 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Suppose the application is running on port 8080.

What will be rendered inside router-view for the URL

<http://127.0.0.1:8080/#/profile/1235>?

**Options :**

640653042001. ❌ Page Not Found

640653042002. ❌ Unknown User

640653042003. ❌ Name: Animesh, State: MP

640653042004. ✓ Name: Arnav, State: Goa

**Question Number : 195 Question Id : 640653903316 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Suppose the application is running on port 8080. What will be rendered inside router-view for the URL

<http://127.0.0.1:8080/#/profile/Arnav>?

**Options :**

- 6406533042005. ✗ Page Not Found
- 6406533042006. ✗ Name: Animesh, State: MP
- 6406533042007. ✗ Name: Arnav, State: Goa
- 6406533042008. ✓ Unknown User

## MLT

<b>Section Id :</b>	64065364107
<b>Section Number :</b>	9
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	18
<b>Number of Questions to be attempted :</b>	18
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133920
<b>Question Shuffling Allowed :</b>	No

**Question Number : 196 Question Id : 640653903327 Question Type : MCQ Calculator : Yes**

**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 :**

6406533042049. ✓ YES

6406533042050. ✗ NO

**Sub-Section Number :**

2

**Sub-Section Id :**

640653133921

**Question Shuffling Allowed :**

Yes

**Question Number : 197 Question Id : 640653903328 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

The eigenvalues of the covariance matrix of a centered dataset in  $\mathbb{R}^5$  are 15, 5, 5, 0, 0. Standard PCA is performed on this dataset. What is the variance captured by the top two principal components expressed as a percentage of total variance?

**Options :**

6406533042051. ✓ 80%

6406533042052. ✗ 60%

6406533042053. ✗ 20%

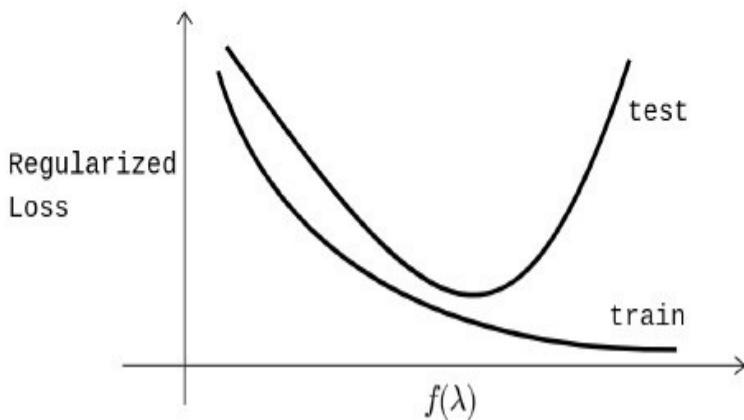
6406533042054. ✗ 15%

**Question Number : 198 Question Id : 640653903329 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider a regression problem that has a training and test dataset. Ridge regression is applied on the problem for various values of  $\lambda$ . The training and test loss are plotted against some function of  $\lambda$ , which we call  $f(\lambda)$ . Note that the continuous curves are obtained by connecting the points using a smooth curve. What is the most appropriate choice of  $f(\lambda)$ ? Recall that the regularized loss is the sum of the SSE and the regularization term. Note that SSE is the sum of squared errors.



**Options :**

1

6406533042055. ✓  $\frac{1}{\lambda}$

6406533042056. ✗  $\lambda$

6406533042057. ✘  $\lambda^2$

6406533042058. ✘  $\log(\lambda)$

**Question Number : 199 Question Id : 640653903330 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Match the characteristics given below with the appropriate ensemble technique.

1. Decision stumps
2. Deep decision trees
3. Parallel execution
4. Sequential execution

**Options :**

6406533042059. ✓ Bagging → (2), (3); Boosting → (1), (4)

6406533042060. ✘ Bagging → (1), (4); Boosting → (2), (3)

6406533042061. ✘ Bagging → (1), (3); Boosting → (2), (4)

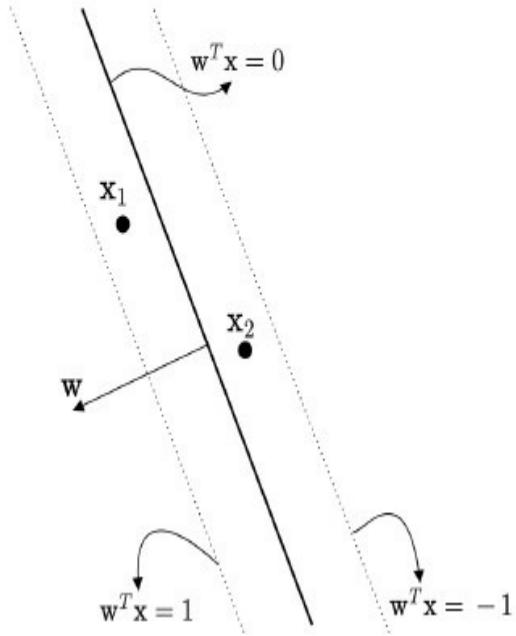
6406533042062. ✘ Bagging → (2), (4); Boosting → (1), (3)

**Question Number : 200 Question Id : 640653903331 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider a hard-margin SVM that has been trained on a linearly separable dataset with positive margin. Two test data-points are given below along with the decision boundary and the supporting hyperplanes. Which of the following is true?



**Options :**

6406533042063. ✓ The predicted labels for  $x_1$  and  $x_2$  are 1 and -1 respectively.  
 6406533042064. ✗ The predicted labels for  $x_1$  and  $x_2$  are -1 and 1 respectively.  
 6406533042065. ✗ The predicted label for both data-points is 1.  
 6406533042066. ✗ The predicted label for both data-points is -1.

**Question Number : 201 Question Id : 640653903332 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

For a dataset with features in  $\mathbb{R}^3$ , which of the following expresses the class conditional independence assumption in a Naive Bayes model?  $p(\cdot)$  denotes probability.

**Options :**

6406533042067. ✓  $p((x_1, x_2, x_3) | y) = p(x_1 | y) \cdot p(x_2 | y) \cdot p(x_3 | y)$   
 6406533042068. ✗  $p((x_1, x_2, x_3), y) = p(y) \cdot p(x_1) \cdot p(x_2) \cdot p(x_3)$

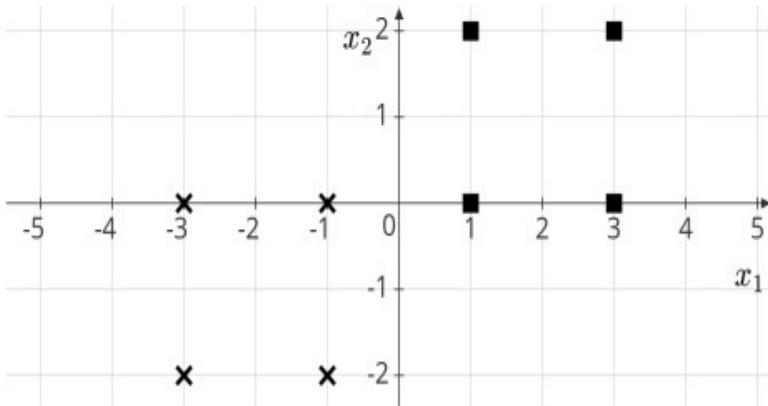
$$6406533042069. ✗ p((x_1, x_2, x_3) | y) = \frac{p((x_1, x_2, x_3), y)}{p(y)}$$

$$6406533042070. ✗ p(y | (x_1, x_2, x_3)) = \frac{p((x_1, x_2, x_3), y)}{p(x_1, x_2, x_3)}$$

**Question Number : 202 Question Id : 640653903333 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3****Question Label : Multiple Choice Question**

The result of k-means clustering on a dataset of eight points is displayed below. Four points belong to the cluster denoted by the ■ symbol and the rest belong to the cluster denoted by the ✕ symbol. The cluster boundary is a line such that all points on it could belong to either of the two clusters. Which of the following is the equation of the cluster boundary?

**Options :**6406533042071. ✓  $2x_1 + x_2 = 0$ 6406533042072. ✗  $x_1 - 2x_2 = 0$ 6406533042073. ✗  $x_1 + x_2 = 0$ 6406533042074. ✗  $x_1 + 2x_2 = 0$ **Sub-Section Number :**

3

**Sub-Section Id :**

640653133922

**Question Shuffling Allowed :**

Yes

**Question Number : 203 Question Id : 640653903338 Question Type : SA Calculator : None****Correct Marks : 3****Question Label : Short Answer Question**

A hard-margin SVM is trained on a linearly separable dataset with a positive margin. The features are in  $\mathbb{R}^2$ . The optimal weight vector is  $\begin{bmatrix} 3 \\ 4 \end{bmatrix}$ . Find the distance between the two supporting hyperplanes.

---

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

0.4

**Question Number : 204 Question Id : 640653903339 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider a dataset for an unsupervised learning problem in which each data-point is either 1 or 0. This dataset is modeled using a Bernoulli distribution with parameter  $p$ . The MLE for  $p$  is 0.25. If the number of ones in the dataset is 10, find the number of zeros.

---

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

30

**Question Number : 205 Question Id : 640653903340 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider a decision stump (parent with two children). The parent node has 200 data-points out of which 50 belong to the positive class. The left child has 100 data-points out of which 50 belong to the positive class. Find the information gain. Use  $\log_2$ . Enter your answer correct to three decimal places.

---

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

0.26 to 0.37

<b>Sub-Section Number :</b>	4
<b>Sub-Section Id :</b>	640653133923
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 206 Question Id : 640653903335 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider  $k : \mathbb{R}^d \times \mathbb{R}^d \rightarrow \mathbb{R}$ , a polynomial kernel of degree  $p$ . If the kernel always outputs a non-negative value, which of the following are possible values for  $p$ ?

**Options :**

6406533042079. ✓ 2

6406533042080. ✓ 4

6406533042081. ✗ 3

6406533042082. ✗ 5

**Question Number : 207 Question Id : 640653903336 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider a training dataset of 100 points for a binary classification problem with the following structure.

- The features are in  $\mathbb{R}^2$  and the labels are in  $\{-1, 1\}$
- For every data-point  $((x_1, x_2), y)$  in the training dataset,  $x_1 x_2 > 0$  and  $x_1 y > 0$ .

Which of the following statements are true?

**Options :**

6406533042083. ✓ The dataset is linearly separable with a positive margin.

6406533042084. ✓ The perceptron algorithm will terminate after a finite number of iterations when trained on this dataset.

6406533042085. ✗ The dataset is linearly separable, but the margin may be zero.

6406533042086. ✗ The dataset is not linearly separable.

**Question Number : 208 Question Id : 640653903337 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider a logistic regression model trained for a binary classification problem

with features in  $\mathbb{R}^2$  and labels in  $\{1, 0\}$ . The probability that the test point  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$  belongs

to class 1 is equal to  $\frac{1}{1 + e^2}$ . Which of the following could be the weight vector of the logistic regression classifier? Select all possible answers.

**Options :**

6406533042087. ✓  $\begin{bmatrix} -1 \\ -1 \end{bmatrix}$

6406533042088. ✓  $\begin{bmatrix} 1 \\ -3 \end{bmatrix}$

6406533042089. ✘  $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$

6406533042090. ✘  $\begin{bmatrix} 3 \\ -1 \end{bmatrix}$

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133924

**Question Shuffling Allowed :**

No

**Question Id : 640653903341 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (209 to 211)**

Question Label : Comprehension

Consider a linearly separable dataset with a positive margin. The symbol  $\alpha_i^*$  in the context of SVMs has its usual meaning. Are the following statements true or false?

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 209 Question Id : 640653903342 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

The weight vector output by the perceptron algorithm on this dataset can be expressed as a linear combination of the data-points where the coefficients of the linear combination are integers.

**Options :**

6406533042094. ✓ TRUE

6406533042095. ✘ FALSE

**Question Number : 210 Question Id : 640653903343 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

In the case of a hard-margin SVM,

if  $\alpha_i^* \geq 0$ , the point  $x_i$  is a support vector.

**Options :**

6406533042096. ✘ TRUE

**Question Number : 211 Question Id : 640653903344 Question Type : MCQ Calculator : Yes****Correct Marks : 1**

Question Label : Multiple Choice Question

If a soft-margin SVM is trained on this dataset, the optimal weight vector it returns will be the same as the one returned by a hard-margin SVM, irrespective of the value of the hyperparameter  $C$ .

**Options :**

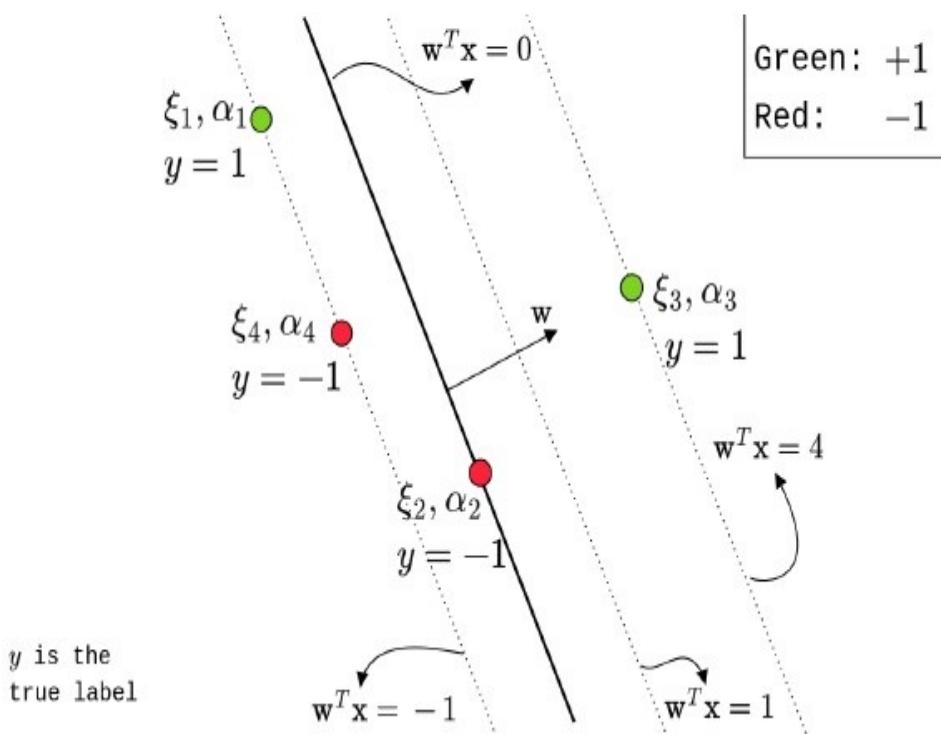
640653042098. ✘ TRUE

640653042099. ✓ FALSE

**Question Id : 640653903345 Question Type : COMPREHENSION Sub Question Shuffling****Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix****Calculator : None****Question Numbers : (212 to 217)**

Question Label : Comprehension

Consider a soft-margin SVM with  $C = 3$  that has been trained on a dataset with features in  $\mathbb{R}^2$ . The decision boundary and the supporting hyperplanes are displayed below. Four points from the training dataset are also displayed. Green data-points belong to class 1 and red data-points belong to class -1. Symbols  $\xi$  and  $\alpha$  have their usual meanings. Assume that  $w, \xi_i, \alpha_i$  represent the optimal values.



Based on the above data, answer the given subquestions.

**Sub questions****Question Number : 212 Question Id : 640653903346 Question Type : SA Calculator : None**

**Correct Marks : 0.5**

Question Label : Short Answer Question

What is  $\xi_1$ ? \_\_\_\_\_

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Question Number : 213 Question Id : 640653903347 Question Type : SA Calculator : None**

**Correct Marks : 0.5**

Question Label : Short Answer Question

What is  $\xi_2$ ? \_\_\_\_\_

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Number : 214 Question Id : 640653903348 Question Type : SA Calculator : None**

**Correct Marks : 0.5**

Question Label : Short Answer Question

What is  $\xi_3$ ? \_\_\_\_\_

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

0

**Question Number : 215 Question Id : 640653903349 Question Type : SA Calculator : None**

**Correct Marks : 0.5**

Question Label : Short Answer Question

What is  $\alpha_1$ ? If it cannot be determined exactly, enter -1. \_\_\_\_\_

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3

**Question Number : 216 Question Id : 640653903350 Question Type : SA Calculator : None**

**Correct Marks : 0.5**

Question Label : Short Answer Question

What is  $\alpha_3$ ? If it cannot be determined exactly, enter -1. \_\_\_\_\_

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

0

**Question Number : 217 Question Id : 640653903351 Question Type : SA Calculator : None**

**Correct Marks : 0.5**

Question Label : Short Answer Question

What is  $\alpha_4$ ? If it cannot be determined exactly, enter -1. \_\_\_\_\_

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

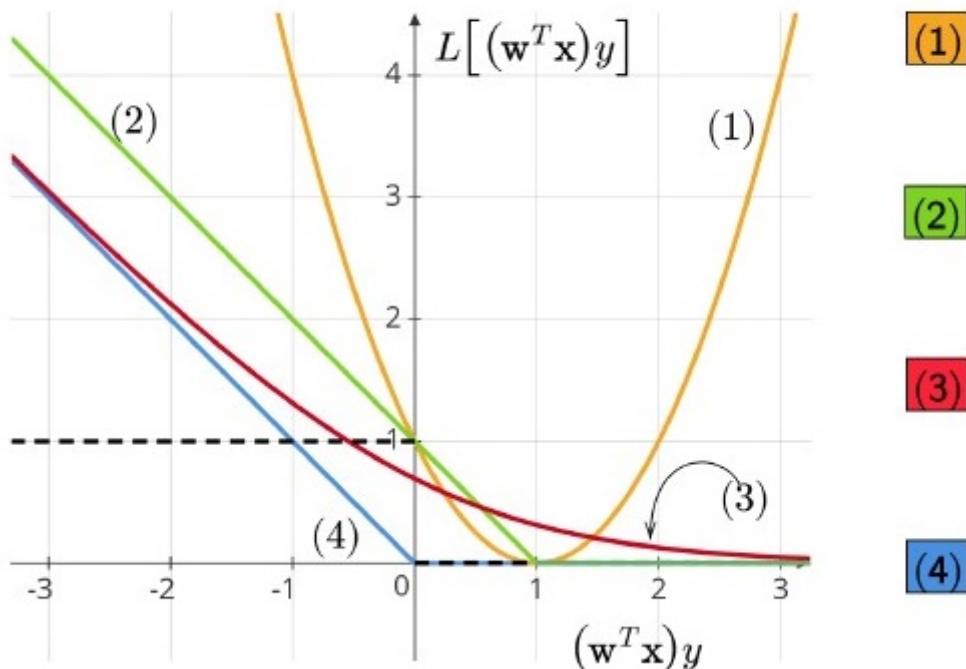
-1

**Question Id : 640653903352 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (218 to 222)**

Question Label : Comprehension

The convex surrogates for the 0-1 loss are displayed below:



Based on the above data, answer the given subquestions.

**Sub questions****Question Number : 218 Question Id : 640653903353 Question Type : SA Calculator : None****Correct Marks : 0.5**

Question Label : Short Answer Question

Enter the number corresponding  
to the logistic loss. \_\_\_\_\_**Response Type :** Numeric**Evaluation Required For SA :** Yes**Show Word Count :** Yes**Answers Type :** Equal**Text Areas :** PlainText**Possible Answers :**

3

**Question Number : 219 Question Id : 640653903354 Question Type : SA Calculator : None****Correct Marks : 0.5**

Question Label : Short Answer Question

Enter the number corresponding to the  
(SVM) hinge loss. \_\_\_\_\_

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Question Number :** 220 **Question Id :** 640653903355 **Question Type :** SA **Calculator :** None

**Correct Marks :** 0.5

Question Label : Short Answer Question

Enter the number corresponding to  
the perceptron loss. \_\_\_\_\_

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

4

**Question Number :** 221 **Question Id :** 640653903356 **Question Type :** SA **Calculator :** None

**Correct Marks :** 0.5

Question Label : Short Answer Question

Enter the number corresponding to the squared loss. \_\_\_\_\_

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Number :** 222 **Question Id :** 640653903357 **Question Type :** MCQ **Calculator :** Yes

**Correct Marks :** 1

Question Label : Multiple Choice Question

Which of the following statements is true?  $\ln = \log_e$ .

**Options :**

6406533042110. ✓

The logistic loss and the (SVM) hinge loss intersect when  $(\mathbf{w}^T \mathbf{x})y = \ln(e - 1)$ .

The logistic loss and the (SVM) hinge loss do not intersect.  
6406533042111. ❌

The logistic loss and the (SVM) hinge loss intersect when  $(\mathbf{w}^T \mathbf{x})y = \ln(1 - \frac{1}{e})$ .  
6406533042112. ❌

The logistic loss and the (SVM) hinge loss intersect when  $(\mathbf{w}^T \mathbf{x})y = \frac{1}{e}$ .  
6406533042113. ❌

**Question Id : 640653903358 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (223 to 225)**

Question Label : Comprehension

Consider the following architecture of a neural network for a binary classification problem:

Layer type	Number of neurons
Input	5
Hidden layer-1	10
Hidden layer-2	10
Output	1

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 223 Question Id : 640653903359 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

How many learnable parameters does this network have? Ignore the biases in the computation.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

160

**Question Number : 224 Question Id : 640653903360 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

What is the most appropriate choice of activation function for the output layer if the binary cross-entropy loss is used?

**Options :**

6406533042115. ✓ Sigmoid

6406533042116. ✗ Linear

6406533042117. ✗ ReLU

**Question Number : 225 Question Id : 640653903361 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

For a particular data-point, the activations after the first hidden layer in the forward pass is given to be

$[0.2 \ 0.1 \ 1.5 \ 0.3 \ 0.1 \ 0 \ 0.8 \ 1.2 \ 1 \ 0]^T$ .

What is the activation function used in the first hidden layer?

**Options :**

6406533042118. ✓ ReLU

6406533042119. ✗ Sigmoid

**Sub-Section Number :**

6

**Sub-Section Id :**

640653133925

**Question Shuffling Allowed :**

Yes

**Question Number : 226 Question Id : 640653903334 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Consider a linear regression problem. Which of the following is the gradient of the SSE function with respect to  $w \in \mathbb{R}^d$ , the weight vector, for a single data-point  $x \in \mathbb{R}^d$ ?  $y$  is the true label and  $\hat{y}$  is the predicted label. Note that SSE is the sum of squared errors.

**Options :**

6406533042075. ✓  $(\hat{y} - y)x$

6406533042076. ✗  $(w^T x)w$

6406533042077. ✗  $\hat{y}x$

6406533042078. ✗  $xy$

## MLP

<b>Section Id :</b>	64065364108
<b>Section Number :</b>	10
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	33
<b>Number of Questions to be attempted :</b>	33
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133926
<b>Question Shuffling Allowed :</b>	No

**Question Number : 227 Question Id : 640653903362 Question Type : MCQ Calculator : Yes**

**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 :**

640653042120. ✓ YES

640653042121. ✘ NO

**Sub-Section Number :**

2

**Sub-Section Id :**

640653133927

**Question Shuffling Allowed :**

No

**Question Id : 640653903363 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (228 to 232)**

Question Label : Comprehension

Consider following common data and answer the subquestions:

```
import pandas as pd
import numpy as np
columns = ["Glucose", "BloodPressure", "Insulin",
           "BMI", "Age"]
data = [[148, 72, 0, 33.6, 50],
        [85, 66, 0, 26.6, np.nan],
        [183, 64, 0, 23.3, 32],
        [89, 66, 94, 28.1, 21],
        [137, 40, 168, 43.1, 33]]
df = pd.DataFrame(data=data, columns=columns)
```

## Sub questions

**Question Number : 228 Question Id : 640653903364 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

What will be the output of the following code snippet?

```
print(df.shape[0]*df.shape[1] - df.isna().sum().sum())
```

Enter -1, if you think the above code snippet will generate an error.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

24

**Question Number : 229 Question Id : 640653903365 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

What will be the output of the following code snippet?

```
t = df.Insulin.value_counts()  
print(t.loc[0])
```

Enter -1, if you think the above code snippet will generate an error.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3

**Question Number : 230 Question Id : 640653903366 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

What will be the output of the following code snippet?

```
t= df.iloc[:,4]  
print(t.mean())
```

Enter -1, if you think the above code snippet will generate an error.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

34

**Question Number : 231 Question Id : 640653903367 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

How many columns have datatype as "float64"?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Question Number :** 232 **Question Id :** 640653903368 **Question Type :** SA **Calculator :** None

**Correct Marks :** 2

Question Label : Short Answer Question

What will be the output of the following code snippet?

```
t=(df
    .query("Glucose > 100")
    .head(2)
    .tail(1)
    .iloc[0,1])
print(t)
```

Enter -1, if you think the above code snippet will generate an error.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

64

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133928

**Question Shuffling Allowed :**

Yes

**Question Number :** 233 **Question Id :** 640653903369 **Question Type :** SA **Calculator :** None

**Correct Marks :** 2

Question Label : Short Answer Question

Consider following parameter grid for regression with RandomForest:

```
parameter_grid = [
    {'n_estimators':[10,20,30],
     'max_features': [2,3,4,5,6]},
    { 'bootstrap':[True, False],
      'min_samples_leaf':[1,2,3]}]
```

How many unique combinations of hyperparameters are there in the above parameter grid?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

21

**Sub-Section Number :** 4

**Sub-Section Id :** 640653133929

**Question Shuffling Allowed :** Yes

**Question Number :** 234 **Question Id :** 640653903376 **Question Type :** MCQ **Calculator :** Yes

**Correct Marks :** 1

Question Label : Multiple Choice Question

How to make SGDRegressor stop after 1000 epochs?

**Options :**

from sklearn.linear\_model import SGDRegressor  
6406533042153. ✘ linear\_regressor = SGDRegressor(max\_epoch=1000)

from sklearn.linear\_model import SGDRegressor  
6406533042154. ✘ linear\_regressor = SGDRegressor(stopping\_criteria=1000)

from sklearn.linear\_model import SGDRegressor  
6406533042155. ✓ linear\_regressor = SGDRegressor(max\_iter=1000)

from sklearn.linear\_model import SGDRegressor  
6406533042156. ✘ linear\_regressor = SGDRegressor(stop\_after\_iter=1000)

**Sub-Section Number :** 5

**Sub-Section Id :** 640653133930

**Question Shuffling Allowed :** Yes

**Question Number :** 235 **Question Id :** 640653903372 **Question Type :** MCQ **Calculator :** Yes

**Correct Marks :** 2

Question Label : Multiple Choice Question

Consider following data:

```
data = [{'age': 4, 'height':96.0},  
        {'age': 1, 'height':73.9},  
        {'age': 3, 'height':88.9},  
        {'age': 2, 'height':81.6}]
```

Which one of the following APIs can be used to extract features from the above data?

**Options :**

6406533042138. ✓ DictVectorizer

6406533042139. ✗ HashingVectorizer

6406533042140. ✗ FeatureHasher

**Question Number : 236 Question Id : 640653903373 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following is an example of an ordinal variable?

**Options :**

6406533042141. ✗ Blood type (A, B, AB, O)

6406533042142. ✓ Satisfaction rating (Very Unsatisfied, Unsatisfied, Neutral, Satisfied, Very Satisfied)

6406533042143. ✗ Height of individuals

6406533042144. ✗ Gender

**Question Number : 237 Question Id : 640653903381 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following method is used to find the predicted probability of each class of training samples using a trained model = SGDClassifier() ?

**Options :**

6406533042170. ✓ model.predict\_proba(X\_train)

6406533042171. ✗ model.predict(X\_train)

6406533042172. ✗ model.estimate\_

6406533042173. ✗ model.predict\_proba\_

**Question Number : 238 Question Id : 640653903386 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Consider following code snippet:

```
estimator = RidgeClassifier(normalize=False, _____=0)
pipe_ridge = make_pipeline(MinMaxScaler(),estimator)
pipe_ridge.fit(x,y)
```

If we want to apply the ridge classifier on  $X$  with no regularization, what will be the missing attribute.

**Options :**

6406533042177. ✘ cv

6406533042178. ✘ reg\_rate

6406533042179. ✓ alpha

6406533042180. ✘ tol

**Sub-Section Number :**

6

**Sub-Section Id :**

640653133931

**Question Shuffling Allowed :**

Yes

**Question Number : 239 Question Id : 640653903375 Question Type : MCQ Calculator : Yes**

**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()
loocv = LeaveOneOut()
score = cross_val_score(lin_reg, X, y, cv=loocv)
```

**Options :**

6406533042149. ✓ 1000

6406533042150. ✘ 100

6406533042151. ✘ 99

6406533042152. ✘ 999

**Question Number : 240 Question Id : 640653903377 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following code snippets correctly applies Lasso regression with a regularization strength of 0.1 on scaled dataset?

```
from sklearn.linear_model import Lasso
from sklearn.preprocessing import StandardScaler
from sklearn.pipeline import make_pipeline

lasso = make_pipeline(StandardScaler(), ?)
lasso.fit(X_train, y_train)
```

**Options :**

6406533042157. ✘ Lasso(alpha=0.5)

6406533042158. ✓ Lasso(alpha=0.1)

6406533042159. ✘ Lasso(alpha=0.01, max\_iter=500)

6406533042160. ✘ Lasso(alpha=1.0, tol=0.01)

**Question Number : 241 Question Id : 640653903378 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following polynomial regression model. What is the effect of the include\_bias parameter?

```
from sklearn.preprocessing import PolynomialFeatures
poly = PolynomialFeatures(degree=2, include_bias=False)
X_poly = poly.fit_transform(X)
```

**Options :**

6406533042161. ✓ It determines whether to include a bias term in the model.

6406533042162. ✘ It sets the degree of the polynomial features.

6406533042163. ✘ It controls the regularization strength.

6406533042164. ✘ It specifies the number of features to consider when fitting the model.

**Question Number : 242 Question Id : 640653903391 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following code snippet for training a decision tree classifier.  
What is the purpose of the `max_depth` parameter?

```
from sklearn.tree import DecisionTreeClassifier  
clf = DecisionTreeClassifier(max_depth=3, random_state=0)  
clf.fit(X_train, y_train)
```

**Options :**

- 6406533042194. ✘ To specify the maximum number of samples per leaf.
- 6406533042195. ✓ To limit the depth of the tree.
- 6406533042196. ✘ To set the minimum number of samples required to split an internal node.
- 6406533042197. ✘ To control the minimum impurity decrease required for a split.

**Question Number : 243 Question Id : 640653903392 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Given the code below, which of the following statements is true about the `criterion` parameter?

```
from sklearn.tree import DecisionTreeRegressor  
reg = DecisionTreeRegressor(criterion='mse', random_state=42)  
reg.fit(X_train, y_train)
```

**Options :**

- 6406533042198. ✓ It determines the function to measure the quality of a split.
- 6406533042199. ✘ It specifies the number of features to consider when looking for the best split.
- 6406533042200. ✘ It sets the strategy used to choose the split at each node.
- 6406533042201. ✘ It controls whether to use the Gini impurity or entropy.

**Question Number : 244 Question Id : 640653903394 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following code snippets correctly initializes a `RandomForestClassifier` with 100 trees and bootstrapping enabled?

```
from sklearn.ensemble import RandomForestClassifier  
clf = ?
```

**Options :**

- 6406533042207. ✘ `RandomForestClassifier(n_estimators=100, bootstrap=False)`
- 6406533042208. ✘ `RandomForestClassifier(n_features=100, bootstrap=False)`

6406533042209. ❌ RandomForestClassifier(estimators\_number=100, bootstrap=True)

6406533042210. ✓ RandomForestClassifier(n\_estimators=100, bootstrap=True)

**Question Number : 245 Question Id : 640653903395 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider below statements and choose the correct option:

**Statement1:**The bagging technique combines multiple models trained on different subsets of data

**Statement2:**The Boosting technique trains the model Parallelly, focusing on the error made by the other model.

**Options :**

6406533042211. ❌ Statement1 is True, Statement2 is True

6406533042212. ✓ Statement1 is True, Statement2 is False

6406533042213. ❌ Statement1 is False, Statement2 is True

6406533042214. ❌ Statement1 is False, Statement2 is False

**Question Number : 246 Question Id : 640653903398 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

How does agglomerative clustering handle outliers?

**Options :**

6406533042223. ❌ It ignores outliers during the clustering process.

6406533042224. ✓ It assigns outliers to the nearest cluster.

6406533042225. ❌ It creates separate clusters for outliers.

6406533042226. ❌ It removes outliers from the dataset before clustering.

**Question Number : 247 Question Id : 640653903399 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What is agglomerative clustering?

**Options :**

6406533042227. ✓ A hierarchical clustering technique that starts with each data point as its cluster and merges the closest clusters iteratively.

6406533042228. ❌ A method for partitioning data into a predefined number of clusters.

6406533042229. ❌ A clustering algorithm that uses centroids to iteratively assign data points to clusters.

6406533042230. ❌ A dimensionality reduction technique that projects data onto a lower-

dimensional space.

**Question Number : 248 Question Id : 640653903400 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

In K-Means clustering, what does the `inertia_` attribute represent?

**Options :**

640653042231. ❌ The distance between cluster centroids

640653042232. ❌ The number of clusters formed

640653042233. ✓ The within-cluster sum of squared distances

640653042234. ❌ The silhouette coefficient

**Sub-Section Number :**

7

**Sub-Section Id :**

640653133932

**Question Shuffling Allowed :**

Yes

**Question Number : 249 Question Id : 640653903371 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the following ML task/steps for a regression dataset:

1. Read the data from a file (named 'dataset.csv'). It has 7 columns. The last column is the target variable, all 6 features numerical.
2. Remove rows which has target values missing.
3. Split the data into training and test sets. Take randomly the 70% of rows in the training set and the rest of them into the test set.
4. Fill the missing values in the features by KNNImputer using 3 nearest neighbours.
5. Train a **LinearRegression** model on the training set.
6. Report R2 score on the test set.

Which of the following code snippets correctly accomplishes the above task? Assume necessary imports.

**Options :**

```
data = pd.read_csv('dataset.csv')
X, y = data[data.columns[:-1]], data[data.columns[-1]]
X = X[y.notna()]
y = y.dropna()
X_train, X_test, y_train, y_test = train_test_split(X,y,
                                                    train_size=0.7)
pipe = Pipeline([('imputer', KNNImputer(n_neighbors = 3)),
                 ('estimator', LinearRegression())])

pipe.fit(X_train,y_train)
print(pipe.score(X_test, y_test))
```

640653042132. ✓

```

data = pd.read_csv('dataset.csv')
data.dropna(inplace=True)
X, y = data[data.columns[:-1]], data[data.columns[-1]]
X = X[y.notna()]
y = y.dropna()
X_train, X_test, y_train, y_test = train_test_split(X,y,
                                                    train_size=0.7)
pipe = Pipeline([('imputer', KNNImputer(n_neighbors = 3)),
                 ('estimator', LinearRegression())])

pipe.fit(X_train,y_train)
print(pipe.score(X_test, y_test))

```

6406533042133. ✘

```

data = pd.read_csv('dataset.csv')
X, y = data[data.columns[:-1]], data[data.columns[-1]]
X_train, X_test, y_train, y_test = train_test_split(X,y,
                                                    train_size=0.8)
pipe = Pipeline([('imputer', KNNImputer(n_neighbors = 3)),
                 ('estimator', LinearRegression())])

pipe.fit(X_train,y_train)
print(pipe.score(y_test, y_test))

```

6406533042134. ✘

```

data = pd.read_csv('dataset.csv')
X, y = data[data.columns[:-1]], data[data.columns[-1]]
X = X[y.notna()]
y = y.dropna()
X_train, X_test, y_train, y_test = train_test_split(X,y,
                                                    train_size=0.7)
pipe = Pipeline([('imputer', KNNImputer(n_neighbors = 5)),
                 ('estimator', LinearRegression())])

pipe.fit(X_train,y_train)
print(pipe.score(X_test, y_test))

```

6406533042135. ✘

```

data = pd.read_csv('dataset.csv')
data = data.dropna()
X, y = data[data.columns[:-1]], data[data.columns[-1]]

X_train, X_test, y_train, y_test = train_test_split(X,y,
                                                    test_size=0.2)
pipe = Pipeline([('imputer', KNNImputer(n_neighbors = 3)),
                 ('estimator', LinearRegression())])
pipe.fit(X_train,y_train)
print(pipe.score(X_test, X_test))

```

6406533042136. ✘

6406533042137. ✘ None of these

**Question Number : 250 Question Id : 640653903390 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider two classifiers as shown in the following block of code:

```
from sklearn.datasets import load_wine
from sklearn.tree import DecisionTreeClassifier
from sklearn.model_selection import train_test_split
X,y = load_wine(as_frame = True,
                  return_X_y = True)
X_train,X_test,y_train,y_test = train_test_split(X, y,
                                                test_size = 0.2,
                                                random_state = 1)
clf1 = DecisionTreeClassifier(min_samples_split = 7,
                               min_samples_leaf = 4,
                               random_state = 5)
clf1.fit(X_train, y_train)

clf2 = DecisionTreeClassifier(min_samples_split = 4,
                               min_samples_leaf = 2,
                               random_state = 5)
clf2.fit(X_train, y_train)
```

Which of the following option is True?

**Options :**

6406533042190. ✘ `clf1.tree_.max_depth >= clf2.tree_.max_depth`

6406533042191. ✓ `clf1.tree_.max_depth <= clf2.tree_.max_depth`

6406533042192. ✘ `clf1.tree_.max_depth == clf2.tree_.max_depth`

6406533042193. ✘ Insufficient Information

**Question Number : 251 Question Id : 640653903393 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Given the following code using BaggingClassifier with KNeighborsClassifier as the base estimator:

```
from sklearn.ensemble import BaggingClassifier
from sklearn.neighbors import KNeighborsClassifier

base_knn = KNeighborsClassifier(n_neighbors=3, weights='distance')

bag_clf = BaggingClassifier(base_knn,
                            n_estimators=30,
                            max_samples=100,
                            bootstrap=False,
                            random_state=42)
```

Which of the following statements is correct?

**Options :**

6406533042202. ✘ Above code uses bootstrapping to generate samples for each base classifier.

6406533042203. ✘ model will be tested on out of the bags samples.

Due to `weights='distance'`, each base KNN classifier will treat all neighbors

6406533042204. ✘ equally in terms of voting power.

6406533042205. ✘ The ensemble will consist of 3 base KNN classifiers.

6406533042206. ✓ None of these

**Question Number : 252 Question Id : 640653903396 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the following code for a VotingClassifier. What is the effect of setting `voting='soft'`?

```
from sklearn.ensemble import VotingClassifier
clf1 = LogisticRegression()
clf2 = RandomForestClassifier()
clf3 = SVC(probability=True)
eclf = VotingClassifier(estimators= [('lr', clf1), ('rf', clf2), ('svc', clf3)],
                       voting='soft')
eclf.fit(X_train, y_train)
```

**Options :**

6406533042215. ✘ The predictions are based on the majority vote.

6406533042216. ✓ The predictions are based on the average of probabilities predicted by each classifier.

6406533042217. ✗ The predictions are based on the weighted sum of the predictions.

6406533042218. ✗ The predictions are based on the classifier with the highest accuracy

**Question Number : 253 Question Id : 640653903401 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Suppose that we use Kmeans clustering for a dataset having 100 samples.

The initial centroids for  $k$  clusters can be initialized in multiple ways. One such way is shown below

```
km = KMeans(n_clusters=5, init='random', n_init=10, random_state=42)
km.fit(X)
```

Choose the correct statements

**Options :**

6406533042235. ✓ 5 centroids are randomly initialized 10 times

6406533042236. ✗ 10 centroids are randomly initialized 5 times

6406533042237. ✗ 5 samples in the dataset are selected as initialization point such that they are at least 10 units away from each other

6406533042238. ✗ 10 samples in the dataset are selected as initialization point such that they are at least 5 units away from each other

**Sub-Section Number :**

8

**Sub-Section Id :**

640653133933

**Question Shuffling Allowed :**

Yes

**Question Number : 254 Question Id : 640653903370 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Data snooping:

**Options :**

6406533042128. ✓ Leads to biased estimation on test sets

6406533042129. ✓ Increases the risk of false positives

6406533042130. ✗ Leads to better estimation on training sets

6406533042131. ✗ Reduces the risk of false positives

**Question Number : 255 Question Id : 640653903374 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following algorithms may get impacted by feature scaling?

**Options :**

6406533042145. ✓ LinearRegression

6406533042146. ✗ DecisionTree

6406533042147. ✓ SVM

6406533042148. ✗ NaiveBayes

**Sub-Section Number :** 9

**Sub-Section Id :** 640653133934

**Question Shuffling Allowed :** Yes

**Question Number : 256 Question Id : 640653903380 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following code snippet that employs LogisticRegression from sklearn on a feature matrix X and corresponding label vector y:

```
from sklearn.linear_model import LogisticRegression  
model = LogisticRegression(class_weight='balanced', C=0.5)  
model.fit(X, y)
```

Given the code above, which of the following statements is true?

**Options :**

6406533042166. ✗ The logistic regression model will use equal weights for both the classes in an imbalanced dataset.

6406533042167. ✗ The model does not use any regularization because the parameter C is set.

6406533042168. ✓ The “balanced” mode uses the values of y to automatically adjust weights inversely proportional to class frequencies in the input data.

6406533042169. ✓ The value of C indicates that the model will apply a regularization.

**Question Number : 257 Question Id : 640653903387 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following statements are true?

**Options :**

6406533042181. ✗ KNeighborsClassifier with high values of n\_neighbors produces complex decision boundaries.

6406533042182. ✓ KNeighborsClassifier with high values of n\_neighbors produces smooth decision boundaries.

6406533042183. ✓ In KNeighborsClassifier the scale of the features(columns) can impact the decision boundaries.

6406533042184. ✗ None of these

**Question Number : 258 Question Id : 640653903389 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which options are correct for Support Vectors in SVM ?

**Options :**

- 6406533042186. ✓ Support vectors are the data points nearest to the hyperplane
- 6406533042187. ✓ Using these support vectors, we maximize the margin of the classifier.
- 6406533042188. ✗ Using these support vectors, we minimize the margin of the classifier.
- 6406533042189. ✗ None of these

**Question Number : 259 Question Id : 640653903397 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following are correct for **Kmeans** clustering algorithm?

**Options :**

- 6406533042219. ✓ It only finds spherical clusters.
- 6406533042220. ✓ The output of the algorithms depends upon initial cluster centroids.
- 6406533042221. ✗ It can automatically detect most appropriate value of  $k$ .
- 6406533042222. ✗ None of these.

**Sub-Section Number :**

10

**Sub-Section Id :**

640653133935

**Question Shuffling Allowed :**

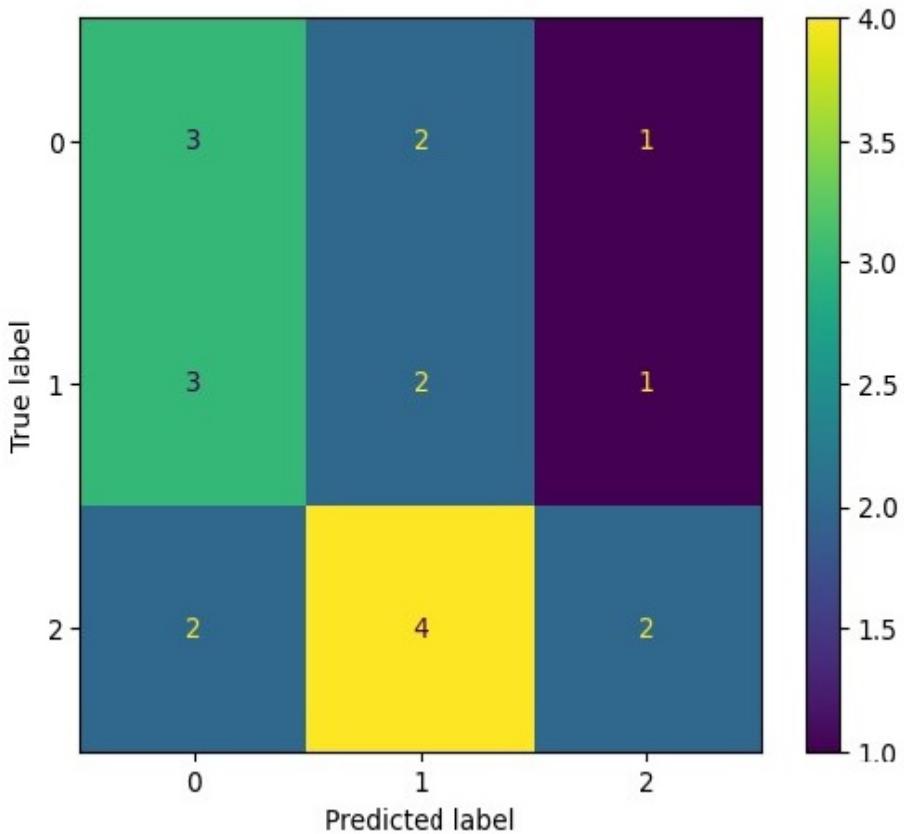
Yes

**Question Number : 260 Question Id : 640653903379 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Using the confusion matrix given below. What is the precision score for the label (class) 1 ?



**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

0.25

**Question Number : 261 Question Id : 640653903382 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

What will be the output of the following code snippet?

```
from sklearn.linear_model import Perceptron
# Sample data
X = [[0, 0], [0, 2], [2, 0], [2, 2]]
y = [1, 1, 1, 2]
clf = Perceptron(tol=None, shuffle=False)
clf.fit(X, y)
print(clf.predict([[0, 1.5]]))
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Number : 262 Question Id : 640653903388 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider the following code snippet:

```
from sklearn.neighbors import KNeighborsClassifier  
  
X_train = [[1, 2], [3, 4], [5, 6]]  
y_train = [0, 1, 2]  
  
knn = KNeighborsClassifier(n_neighbors=4)  
knn.fit(X_train, y_train)
```

What will be the output of the following code:

```
print(len(knn.classes_))
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3

**Sub-Section Number :** 11

**Sub-Section Id :** 640653133936

**Question Shuffling Allowed :** No

**Question Id : 640653903383 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (263 to 264)**

Question Label : Comprehension

Let  $X$  be a feature matrix with shape (1000,5) and  $y$  be the label vector with two classes: 0 and 1. Assume that 650 examples of training data belong to class 1. Consider following code:

```
base_clf = DummyClassifier(strategy='most_frequent')
base_clf.fit(X,y)
print(base_clf.score(X,y))
```

Based on the above data, answer the given subquestions.

### Sub questions

**Question Number : 263 Question Id : 640653903384 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

What will be the output of the following code?

```
print(recall_score(y, base_clf.predict(X)))
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Question Number : 264 Question Id : 640653903385 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

What will be the output of the following code?

```
print(precision_score(y, base_clf.predict(X)))
```

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

0.64 to 0.66

<b>Section Id :</b>	64065364109
<b>Section Number :</b>	11
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	25
<b>Number of Questions to be attempted :</b>	25
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133937
<b>Question Shuffling Allowed :</b>	No

**Question Number : 265 Question Id : 640653903402 Question Type : MCQ Calculator : Yes**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : SOFTWARE ENGINEERING (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 :**

6406533042239. ✓ YES

6406533042240. ✗ NO

<b>Sub-Section Number :</b>	2
<b>Sub-Section Id :</b>	640653133938
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 266 Question Id : 640653903403 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following is the primary responsibility of the data scientists at a software company?

**Options :**

6406533042241. ✗ To communicate with users and create prototypes.

6406533042242. ✗ To shape the terms of service of the software product, software licenses,

privacy policy etc.

6406533042243. ✓ To analyze data generated from various teams and users in order to assist the organization in making better decisions.

6406533042244. ✗ To address and resolve issues that clients encounter.

**Question Number : 267 Question Id : 640653903404 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following is the benefit of using project management tools?

**Options :**

6406533042245. ✗ It helps to document and archive the knowledge of one project that might be required in some other project.

6406533042246. ✓ It helps all members of the team to get a big picture as well as detailed view of progress.

6406533042247. ✗ It helps in easy migration of developers between different projects.

6406533042248. ✗ It helps the developers to become more productive by using tools like IDEs.

**Question Number : 268 Question Id : 640653903410 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

What is velocity from the agile project estimation perspective?

**Options :**

6406533042269. ✗ Number of user stories per sprint

6406533042270. ✓ Number of points per sprint

6406533042271. ✗ The time required to complete an agile project

6406533042272. ✗ The point assigned to each user story

**Question Number : 269 Question Id : 640653903417 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following diagrams models the sequence of message exchanges among parts of a system?

**Options :**

6406533042299. ✗ Class diagram

6406533042300. ✗ State machine diagram

6406533042301. ✗ Activity view

6406533042302. ✓ Interaction view

**Question Number : 270 Question Id : 640653903419 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

**Question Label :** Multiple Choice Question

Which of the following types of software metrics considers the number of lines of code which include code, comments, white spaces etc.?

**Options :**

6406533042307. ❌ Cyclomatic complexity

6406533042308. ✓ Raw Metrics

6406533042309. ❌ Halstead's Metrics

6406533042310. ❌ None of these

**Question Number : 271 Question Id : 640653903420 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider an eCommerce portal that has been integrated with a payment gateway with a set of APIs. Which of the following debugging strategies involves the task of searching the documentation and code examples to understand the correct use of the APIs?

**Options :**

6406533042311. ❌ Input manipulation

6406533042312. ❌ Backwards

6406533042313. ❌ Forwards

6406533042314. ✓ Blackbox debugging

**Question Number : 272 Question Id : 640653903427 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Heroku and Google App Engine are examples of \_\_\_\_\_.

**Options :**

6406533042335. ❌ Bare metal server

6406533042336. ❌ Infrastructure-as-a-service

6406533042337. ✓ Platform-as-a-service

6406533042338. ❌ Software-as-a-service

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133939

**Question Shuffling Allowed :**

Yes

**Question Number : 273 Question Id : 640653903405 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Which of the following is true about the production environment of deployment?

**Options :**

6406533042249. ❌ It is primarily created for performing integration and system testing.

6406533042250. ✓ It is also known as live environment where all the users can interact with the deployed system.

6406533042251. ✗ It is the local environment for individual developers that provides IDEs and other tools.

6406533042252. ✗ It exactly resembles the production environment, and it runs on a remote machine.

**Question Number : 274 Question Id : 640653903406 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

In which of the software deployment strategies are changes incrementally rolled out to a small subset of users?

**Options :**

6406533042253. ✗ Blue/Green deployment

6406533042254. ✓ Canary deployment

6406533042255. ✗ Versioned deployment

6406533042256. ✗ None of these

**Question Number : 275 Question Id : 640653903409 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider an embedded project that has an estimated 3,00,000 lines of code.

The values for the constants in the COCOMO model for the different types of the project are as follows:

- Organic project:  $a = 2.4, b = 1.05$
- Semi-organic project:  $a = 3.0, b = 1.12$
- Embedded project:  $a = 3.6, b = 1.20$

Considering that the salary of each staff is Rs. 50,000/-, what is the approximate cost of the project?

**Options :**

6406533042265. ✗ 4,80,00,000

6406533042266. ✗ 8,95,00,000

6406533042267. ✓ 16,90,00,000

6406533042268. ✗ 2,85,00,000

**Question Number : 276 Question Id : 640653903411 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Suppose you are creating a prototype for a web application which is presented on multiple papers

as handdrawn UIs of different screens.

In the above case, identify the type of prototype technique you have chosen.

**Options :**

- 6406533042273. ✘ Storyboards
- 6406533042274. ✓ Paper prototype
- 6406533042275. ✘ Digital mock-ups
- 6406533042276. ✘ Interactive prototype

**Question Number : 277 Question Id : 640653903412 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Suppose a software organization is designing the UI of a web application for an employee payroll system. For all the icons on the buttons and links, they have chosen various animal pictures. Which one of the following UI evaluation heuristics would be missing in this design?

**Options :**

- 6406533042277. ✘ Flexibility
- 6406533042278. ✓ Recognition over recall
- 6406533042279. ✘ Clean and functional design
- 6406533042280. ✘ Freedom

**Question Number : 278 Question Id : 640653903413 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider an EdTech company that decided to develop an educational portal based on GenAI services. However, there are some requirements that are ambiguous or conflicting. As a result, the company has arranged a meeting of all the managers of different departments to discuss the issues and requirements and reach some consensus on them. In the given scenario, which of the following requirement gathering techniques is in use?

**Options :**

- 6406533042281. ✘ Questionnaires
- 6406533042282. ✘ Interviews
- 6406533042283. ✓ Focus group
- 6406533042284. ✘ Documentations

**Question Number : 279 Question Id : 640653903414 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Which of the SMART characteristics of user stories specifies that if the implementation of a user story is not possible in one iteration, then subdivide the story into smaller ones?

**Options :**

6406533042285. ✘ Specific

6406533042286. ✘ Measurable

6406533042287. ✓ Achievable

6406533042288. ✘ Relevant

6406533042289. ✘ Timeboxed

**Question Number : 280 Question Id : 640653903415 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

A software company has to develop a job portal that will allow job seekers to apply for different organizations at different positions. Therefore, the entire task of the project is divided into different modules, and the interactions between the modules are outlined. Which phase of the SDLC is the software currently in?

**Options :**

6406533042290. ✘ Requirements gathering

6406533042291. ✓ Design

6406533042292. ✘ Development

6406533042293. ✘ Testing

6406533042294. ✘ Maintenance

**Question Number : 281 Question Id : 640653903416 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider a software is designed in the following manner:

- Each module has some functions which all are designed to achieve a single objective.
- Function calls between two different modules involve passing a large chunk of shared data.

Which of the following is true about the design of the software?

**Options :**

6406533042295. ✓ Has high coupling and high cohesion

6406533042296. ✘ Has high coupling and low cohesion

6406533042297. ✘ Has low coupling and high cohesion

6406533042298. ✘ Has low coupling and low cohesion

**Question Number : 282 Question Id : 640653903421 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the Python function below.

```
def ssort(items, n):
    for it in range(size):
        .
        min_i = it
        for i in range(it + 1, n):
            if items[i] < items[min_i]:
                min_i = i
        (items[it], items[min_i]) = (items[min_i], items[it])
```

What is the cyclomatic complexity of the function?

**Options :**

640653042315. ✘ 2

640653042316. ✘ 3

640653042317. ✓ 4

640653042318. ✘ 5

**Question Number : 283 Question Id : 640653903428 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider a mobile application for enhancing image quality. The image quality enhancement application is made up of several data filters. The filters are connected one after another. Each filter processes the data it receives and sends the output to the next filter in line. Which type of architecture is used to design the data processing software?

**Options :**

640653042339. ✘ Client-server

640653042340. ✓ Pipe and filter

640653042341. ✘ Model-view-controller

640653042342. ✘ Peer-to-peer

**Sub-Section Number :**

4

**Sub-Section Id :**

640653133940

**Question Shuffling Allowed :**

Yes

**Question Number : 284 Question Id : 640653903408 Question Type : MCQ Calculator : Yes**

**Correct Marks : 5**

Question Label : Multiple Choice Question

Consider the following table for risk assessment of a software project.

Risk	Impact	Assessed risk
Personnel shortfall	1	0.6
Lack of experience building banking applications	2	0.8
Budget slippage	3	0.9
Product not competitive in the market	2	0.8

Which of the following risks is most probable to occur in the project?

**Options :**

6406533042261. ✓ Personnel shortfall

6406533042262. ✗ Lack of experience building banking applications

6406533042263. ✗ Budget slippage

6406533042264. ✗ Product not competitive in the market

**Question Number : 285 Question Id : 640653903429 Question Type : MCQ Calculator : Yes**

**Correct Marks : 5**

Question Label : Multiple Choice Question

Consider the design of an e-shopping application. It has an `Order` class. In order to make payment for an order, the `Order` class interacts with `PaymentManager` class. Depending on the payment type selected by the customer, `PaymentManager` calls the payment method from `PayByCash` class or `PayByCheque` class. However, the designers want to add more payment types in the future without violating the open-close principle. Therefore, the designers plan to utilize a design pattern known as `X`. The designers have added an interface named `Payable` to the design, and any payment class, such as `PayByCash`, `PayByCheque`, and possibly `PayByUPI` or `PayByCard`, will need to implement this interface in the future. Instead of directly interacting with payment classes, the `PaymentManager` now interacts with the `Payable` interface, which enables the `PaymentManager` to use any payment class that is implementing the `Payable` interface.

Identify the design pattern referred to as `X`.

**Options :**

6406533042343. ✗ Iterator design pattern

6406533042344. ✗ Adapter design pattern

6406533042345. ✓ Strategy design pattern

6406533042346. ✗ Facade design pattern

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133941

**Question Shuffling Allowed :**

Yes

**Question Number : 286 Question Id : 640653903407 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following is/are considered as the primary objective(s) of monitoring tools for enhancing the performance of web applications?

**Options :**

6406533042257. ❌ It stores the results of common operations in memory.

6406533042258. ✓ It helps to understand customer behaviour.

6406533042259. ❌ It compresses static pages.

6406533042260. ✓ It can be used to analyze page resources, find optimization suggestions, check SEO and accessibility metrics and calculate your performance score.

**Question Number : 287 Question Id : 640653903426 Question Type : MSQ Calculator : Yes****Correct Marks : 4 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the following code base in Python.

```
def findInterest(months):
    if months <= 0:
        print("invalid input")
    elif months < 12:
        return 0.05
    elif months < 36:
        return 0.07
    else:
        return 0.06
```

Identify the set(s) of valid test cases for function `findInterest` using the equivalence class technique.

**Options :**

6406533042331. ❌ {months = -4, months = 0, months = 25}

6406533042332. ✓ {months = -4, months = 4, months = 25, months = 48}

6406533042333. ❌ {months = -4, months = 4, months = 40, months = 48}

6406533042334. ✓ {months = -4, months = 0, months = 4, months = 25, months = 48}

**Sub-Section Number :**

6

**Sub-Section Id :**

640653133942

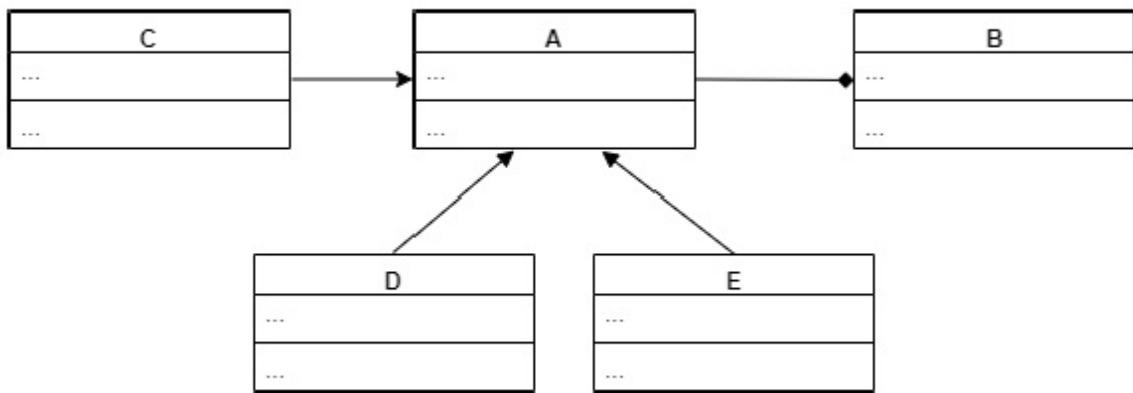
**Question Shuffling Allowed :**

Yes

**Question Number : 288 Question Id : 640653903418 Question Type : MSQ Calculator : Yes****Correct Marks : 5 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Consider the class diagram given below.



Which of the following statement(s) are true about the given class diagram?

**Options :**

- 6406533042303. ✘ A inherits from B
- 6406533042304. ✓ B is composition of A
- 6406533042305. ✘ B is associated C
- 6406533042306. ✓ D and E inherit from A

**Sub-Section Number :**

7

**Sub-Section Id :**

640653133943

**Question Shuffling Allowed :**

No

**Question Id : 640653903422 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (289 to 291)**

Question Label : Comprehension

Consider the Python function below.

```
def fact(n):  
    f = 1  
    if n < 0:  
        return -1    #invalid  
    else:  
        if n == 0 or n == 1:  
            f = 1  
        else:  
            for i in range(2, n):  
                f *= i  
    return f
```

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 289 Question Id : 640653903423 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Identify the set(s) of valid test cases for branch coverage.

**Options :**

6406533042319. ✘ {-5, 5}

6406533042320. ✓ {-5, 0, 2, 5}

6406533042321. ✘ {-5, 2, 5, 10}

6406533042322. ✓ {-5, 0, 1, 2, 5}

**Question Number : 290 Question Id : 640653903424 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Identify the set(s) of valid test cases for multiple condition coverage.

**Options :**

6406533042323. ✘ {-5, 5}

6406533042324. ✘ {-5, 0, 2, 5}

6406533042325. ✘ {-5, 2, 5, 10}

6406533042326. ✓ {-5, 0, 1, 2, 5}

**Question Number : 291 Question Id : 640653903425 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Identify the number of linearly independent paths in the code base.

**Options :**

6406533042327. ✘ 2

6406533042328. ✘ 3

6406533042329. ✓ 4

6406533042330. ✘ 5

## Intro to Big Data

**Section Id :** 64065364110

**Section Number :** 12

**Section type :** Online

**Mandatory or Optional :** Mandatory

**Number of Questions :** 31

**Number of Questions to be attempted :** 31

**Section Marks :** 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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133944
<b>Question Shuffling Allowed :</b>	No

**Question Number : 292 Question Id : 640653903430 Question Type : MCQ Calculator : Yes**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : INTRODUCTION TO BIG DATA (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 :**

6406533042347. ✓ YES

6406533042348. ✗ NO

<b>Sub-Section Number :</b>	2
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<b>Sub-Section Id :</b>	640653133945
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<b>Question Shuffling Allowed :</b>	Yes
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**Question Number : 293 Question Id : 640653903431 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

What best describes "hot potato principle" in the world of big data?

**Options :**

6406533042349. ✗ It is a rule-of-thumb where one program does all the work required to "cook" the data fully for the sake of completeness

6406533042350. ✗ It is a rule-of-thumb applicable mainly to batch processing of data where fresh data is prioritized for processing ahead of older data

6406533042351. ✓ It is a rule-of-thumb applicable only in the world of stream processing where a program does the minimal processing required to produce a logical output which is then handed off via a message store to the next program that is also designed similarly, and so on, until the bigger problem is solved.

6406533042352. ✗ It is a principle for network packet routing, and not really applicable in big data.

**Question Number : 294 Question Id : 640653903432 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Which of these are implementations of the divide-and-conquer paradigm?

**Options :**

- 6406533042353. ❌ Spark and Map
- 6406533042354. ❌ Serverless and Message Broker
- 6406533042355. ✓ Hadoop and Spark Streaming
- 6406533042356. ❌ MapReduce and Google Cloud Functions

**Question Number : 295 Question Id : 640653903434 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

A website sees 1 Billion hits every month. The website owner wants to count average hits per customer in the latest month, where a customer is denoted by the IP address of the device from which the customer is accessing the website. The owner has at his disposal a Hadoop cluster of 5 workers and 2 masters each with 1GB of RAM. Which of the following methods is the most likely to finish fastest?

**Options :**

- 6406533042362. ❌ Write a MapReduce program where the Map does nothing useful, Combine computes the aggregated hits per customer, Shuffle combined data based on IP address across workers, and in the Reduce, build hash table on each machine with hash key = IP address and hash value = counter, followed by another Reduce that finally computes the avg on top of all hash values.
- 6406533042363. ❌ Write a Spark program that forms a Dataframe as grouping by IP address with count as aggregate, followed by a take into a list in the Spark driver which further computes the average of all the individual counts in the list
- 6406533042364. ✓ Write a Spark program that forms a Dataframe as grouping by IP address with count as aggregate, followed by another stage that computes the avg on top of the Dataframe of the first stage
- 6406533042365. ❌ Write a MapReduce program where 2 pairs of Map Reduce are chained together: 1<sup>st</sup> pair is where the Map does nothing useful, Shuffle data based on IP address across workers, and in the Reduce, build hash table on each machine with hash key = IP address and hash value = counter, while the 2<sup>nd</sup> pair is another Map that does nothing useful followed by a Reduce that finally computes avg on top of all hash values.
- 6406533042366. ❌ All will finish in approximately the same time.

**Question Number : 296 Question Id : 640653903435 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

An enterprise software designer wants to leverage the best of Google cloud to minimize the number of administrative overheads associated with her big data pipeline while also getting on-

demand scalability without sacrificing flexibility. What option should she choose to best serve these needs?

**Options :**

6406533042367. ❌ Build the data pipeline using VMs – one for Python & one for storing files

6406533042368. ❌ Build the data pipeline using Python running on Google Cloud Functions where the data is stored on GCS

6406533042369. ❌ Build the data pipeline using MapReduce on, data storage on HDFS, and deploy both on Dataproc

6406533042370. ✓ Build the data pipeline using Dataflow on top of data stored on GCS

**Question Number : 297 Question Id : 640653903436 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Consider an application that can scale from handling 1000 users to handling 100 million users by simply making copies of itself, logs information about its workings on a central logger backed by Kafka, but has no automation to detect task failures and retry. Which of the following statements is true?

**Options :**

6406533042371. ❌ This application has adopted cloud-native design

6406533042372. ❌ This application cannot be called as cloud-native since it is not observable at all times

6406533042373. ❌ This application cannot be called as cloud-native since it is not manageable easily

6406533042374. ✓ This application cannot be called as cloud-native since it is not resilient

**Question Number : 298 Question Id : 640653903438 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Consider a file “data.bin” which is formatted as follows: every data record has 10 key-value pairs of the format “key:value”, with each pair separated by a comma. Every data record occurs in its own line. You are asked to write a data processing script using Python that scales with big data. Which of the following represents your approach?

**Options :**

6406533042379. ✓ Since data.bin is compliant with the RFC 4180, use PySpark’s read\_csv() to read the data as is.

6406533042380. ❌ Rename the file data.bin to data.csv to make it compliant with RFC 4180 and then use PySpark’s read\_csv() to read the data

6406533042381. ❌ The problem cannot be solved since the file cannot be converted to a valid format for reading consistently without additional information

6406533042382. ❌ Write PySpark code to read all lines in data.bin, use string split on "," as delimiter, and then collect all column names and corresponding values into a RDD for further processing

**Question Number : 299 Question Id : 640653903439 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Consider the program outline as below running on a Spark cluster of 1 driver and 4 worker nodes with 2 executors per worker node:

```
sc = pyspark.SparkContext()
train_master = ... #python dictionary of trains in India (about 1L trains
in total)
bookings_rdd = ... #Spark RDD that is having all ticket bookings of
format (train_no, date, seats, ticket_price)
bookings_rdd.map( train_no => train_master.has_key(train_no) ).count()
```

Consider the below mutually-exclusive characterisations about the program:

- i. Program will not run since RDD transformation operation map() runs on Executors that is referencing a variable train\_master which is declared in the Spark driver
- ii. Program will run successfully and produce the count of bookings that match for trains present in the train\_master

For either of the 2 characterizations, consider the following (one or more) actions you could carry out in order to improve on the characterizations:

1. Program will need to be changed to bring the train\_master into the Closure for executors to pick it up
2. Program will perform more poorly as the number of executors per worker node increases. Broadcast of train\_master will need to be used to make it perform better.
3. Program will perform more poorly as the number of worker nodes increases (keeping number of executors per worker node constant). Broadcast of train\_master will need to be used to make it perform better.

Which of the following combinations of statements are correct?

**Options :**

640653042383. ✘ i and 1

640653042384. ✘ i and 1 followed by 2

640653042385. ✘ i and 1 followed by 2 & 3

640653042386. ✘ ii and both 2 & 3

640653042387. ✓ ii and 2

640653042388. ✘ ii and 3

**Question Number : 300 Question Id : 640653903444 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

What happens when a Spark Structured Streaming pipeline operating with Kafka as source is subject to a failure of a machine in either of the Kafka cluster or the Spark cluster?

**Options :**

640653042411. ✘ Failure of a machine in the Kafka cluster will result in an Exception in the Spark pipeline which will then fail and halt.

6406533042412. ❌ The Spark pipeline will not be able to start again from previously committed offset by restarting itself, resulting in at least-once processing semantics
6406533042413. ❌ Irrespective of whatever machine fails, Spark will throw an error and halt.
6406533042414. ❌ Data that is being processed will not be processed again, resulting in atmost-once semantics.

6406533042415. ✓ The pipeline will be restarted automatically by Spark which is able to pick up the exact data from Kafka which was being processed at the time of error, resulting in exactly-once semantics.

**Question Number : 301 Question Id : 640653903445 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

A big data streaming application that uses Kafka as source is observed to be really lagging behind currently live data. The Kafka cluster has 2 broker nodes and this application is reading from 1 topic that has 10 partitions. On closer investigation, it was found that Kafka is not scaling to the velocity of input data coming in. What can you first try to do to scale Kafka further while incurring minimal overall costs?

**Options :**

6406533042416. ❌ Add disks to each broker in the cluster, and disks are the cheapest computer component

6406533042417. ✓ Increase memory in each of the brokers in the cluster. While cost of memory is more than cost of disks, it is still cheaper than adding brokers and helps to scale.

6406533042418. ❌ Add new brokers to the cluster, even though this is more expensive than the other options this is the only foolproof way to scale.

6406533042419. ❌ Create more topics and change input application to reroute data to all topics to be able to spread input data better. This is nearly the least expensive since only developer effort is required to change application.

6406533042420. ❌ Double the number of partitions for this single topic to be able to spread input data better. This is the least expensive since only administrator effort is required without changing application.

**Question Number : 302 Question Id : 640653903447 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

A company with headquarters (HQ) in the Middle East operates on a Sunday-Thursday weekday schedule with Friday & Saturday as weekend days. It computes end of week revenue numbers using an ETL pipeline by first computing sales for each day at 1AM local time of the next day, and then summing up the weekly sales every Sunday early morning at 3AM local time. This number gets reported to leadership every Sunday morning 9AM local time, so the ETL pipeline is scheduled to run every Sunday morning at 8AM local time. As a result of management change, it has decided to relocate its HQ to India. Which of the following changes will need to be done to its ETL pipeline to ensure the correct output continues to be produced?

**Options :**

6406533042426. ❌ The business time for the final weekly sum operation needs to be changed to

that of Monday 3AM India time instead of Sunday 3AM Middle East time.

6406533042427. ✓ There is zero change needed since neither event time nor business time is changing whereas only the operational time is changing.

6406533042428. ❌ Since time zone has changed as well as week definition too, the definition of business time has changed. So, the ETL has to be rewritten entirely.

6406533042429. ❌ Nothing needs to change since daily sales is available at 1AM Middle East time which is anyway behind India time and so the numbers will be available before leadership comes in at 9AM.

6406533042430. ❌ Event time has changed since the event of week ending has changed in definition, and so the ETL needs to be changed to consider the new event in the data.

**Question Number : 303 Question Id : 640653903448 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

You are appointed as a Data Engineer in a company that has a legacy reporting application written in Java which suffers from performance problems. The reporting application plots dashboards with near real-time refresh (once every minute) of key business indicators to help management take live decisions. The application reads data directly from the source database of MongoDB, aggregates using simple counts and shows them visually in a UI. The performance problem of this application comes because the source database is at times overloaded and therefore the dashboard is not able to refresh fast enough. Choose the best option that gives the best performance with minimal maintenance effort:

**Options :**

6406533042431. ❌ Since MongoDB is OLTP, it is not able to support business reporting. So, replace it with Hadoop which supports OLAP better

6406533042432. ❌ Convert the application from using plain Java to using Spark Streaming in Java

6406533042433. ✓ Extract raw data from MongoDB using Change Data Capture (CDC) once every minute into Kafka, and then use Spark Streaming to compute the KPIs and then populate into a NoSQL DB like Redis for the UI to consume.

6406533042434. ❌ Query MongoDB every 1 minute for new data using a check on document inserted timestamp, use Spark Streaming to compute the KPIs with the queried data, and then populate into a NoSQL DB like Redis for the UI to consume.

6406533042435. ❌ Convert application to using Python along with a NoSQL database for storing and retrieving the aggregated counts.

**Question Number : 304 Question Id : 640653903449 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Dhoni is on the crease with a bat in hand that has sensors embedded throughout. The sensors talk to the spider cam every second. The spider cam is itself a powerful ARM-based computer which has connectivity to the cloud through the wire on which it hangs. Using this connectivity, it can send as much or as little data as required and also receive instructions from the cloud. There is a machine learning model which suggests to the batsman to loosen the grip on his bat or tighten it based on the shots played using the sensor measurements. The way the suggestion happens is

using dynamic vibration intensity communicated to the sensors embedded in the bat handle. Your task is to design the data pipeline that enables such feedback to Dhoni ideally before every ball with as much accuracy as possible throughout the match. Which of the following options best satisfies the requirements?

**Options :**

6406533042436. ❌ Ingest all data into Pub/Sub, process using Google Cloud Dataflow, invoke the ML model, and then write back output from Cloud to the spider cam to relay to the bat.

6406533042437. ❌ Compress the ML model to fit into the spider cam's available resource, and write pipelines to execute the model in the spider cam itself

6406533042438. ✓ Compress the ML model to fit into the spider cam's available resource, and write pipelines to execute in the spider cam itself, with periodically data being sent to the cloud, retrain the model using Google Cloud ML and then redeploy the model to the spider cam.

6406533042439. ❌ Compress the data in the spider cam every 5 seconds, write to Pub/Sub the compressed data, invoke the ML model and then write back output from Cloud to the spider cam to relay to the bat.

**Question Number : 305 Question Id : 640653903450 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

In the class, we saw the UDF for mobilenet\_v2. By definition, UDFs are scalar. In Spark, there is another class of user defined routines called UDAFs, which stand for User Defined Aggregator Functions. UDAFs are meant to provide a means to write a custom aggregation function which aggregates over a grouping of values to arrive at a single value. UDAF structure differs saliently from UDFs in that it provides a buffer to keep track of intermediate state before finalizing aggregate output. Why is a buffer required for UDAF and not for a UDF?

**Options :**

6406533042440. ❌ A UDF is a scalar operation executing on 1 row at a time and producing output immediately, and therefore there is no intermediate output necessary. Whereas, a UDAF operates on multiple rows which will require multiple passes for the final output thereby requiring a buffer.

6406533042441. ✓ A UDF is a scalar operation executing on 1 row at a time and producing output immediately, and therefore there is no intermediate output necessary. Whereas, a UDAF operates on multiple rows of unbounded size requiring a divide-and-conquer approach for computing aggregates, which uses the intermediate buffer to store partial values before finalizing the result aggregate.

6406533042442. ❌ A UDF is a scalar operation executing on many rows at a time, grouped by a key and producing a single output, and therefore there is no intermediate output necessary. Whereas, a UDAF operates on multiple rows which will require multiple passes for the final output thereby requiring a buffer.

6406533042443. ❌ A UDF is a scalar operation executing on many rows at a time, grouped by a key and producing a single output, and therefore there is no intermediate output necessary. Whereas, a UDAF operates on multiple rows of unbounded size requiring a divide-and-conquer approach for computing aggregates, which uses the intermediate buffer to store partial values before finalizing the result aggregate.

**Question Number : 306 Question Id : 640653903451 Question Type : MCQ Calculator : Yes**

## **Correct Marks : 1**

### **Question Label : Multiple Choice Question**

In the class, we saw the UDF for mobilenet\_v2. Specifically, the predict() function contained the below lines of code

```
def predict(content_series_iter):
    model = model_fn()
    model.eval()
    ...
    ...
```

Suppose there's a new transformer model from Facebook that is orders of magnitude bigger than mobilenet\_v2 but that is able to provide better F1 score. Will these lines of code still be required in the pipeline?

### **Options :**

6406533042444. ❌ Yes, since they check the syntax of the model function so that there are no errors

6406533042445. ❌ Yes, they invoke PyTorch libraries that have already been setup for model scoring on GCP using APIs embedded within the function

6406533042446. ❌ No, since the primary function of these lines of code is to eliminate repeated DL model loads as DL models are large in size

6406533042447. ❌ Yes, they are Map-style UDFs that make it an embarrassingly parallel computation thus making the execution parallelized and fast.

6406533042448. ✓ Yes, since the new model will potentially have large load times.

## **Question Number : 307 Question Id : 640653903452 Question Type : MCQ Calculator : Yes**

### **Correct Marks : 1**

### **Question Label : Multiple Choice Question**

You are given a Spark Streaming pipeline that invokes a pre-trained DL model for every image it receives as input and produces the classification result in quick time. The model with the best recall rate from the PyTorch library already runs in under 3 seconds on an average, when executing on a single GPU Spark worker machine. However, your management has instructed you to reduce the cost of AI projects significantly. What is the best option to explore to meet the expectations without compromising on false negatives while also being within 10-20% of the average execution time?

### **Options :**

6406533042449. ✓ Build a custom model that compresses the highest recall rate model just enough to be able to execute within the stipulated time, and measure recall.

6406533042450. ❌ Use a different DL model from PyTorch that is already compressed to half the size.

6406533042451. ❌ Remove complexity associated with Spark Streaming and convert the model execution pipeline into a single threaded Python application running on the same GPU machine.

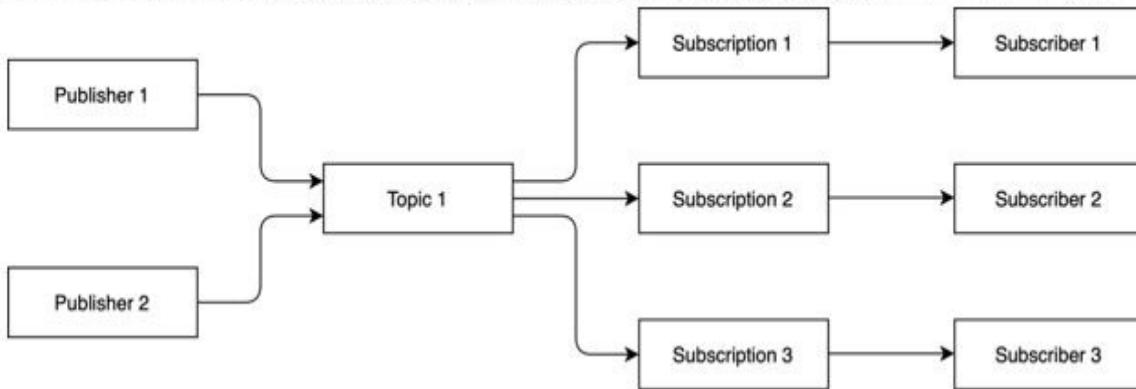
6406533042452. ❌ Change Spark machine to use CPUs and train a fresh pipeline to achieve objectives.

## **Question Number : 308 Question Id : 640653903453 Question Type : MCQ Calculator : Yes**

## Correct Marks : 1

Question Label : Multiple Choice Question

Observe the below image and select the options that are true.



### Options :

6406533042453. ❌ Each subscriber gets one third of all messages published into *Topic 1*.
6406533042454. ❌ Publisher 1 can safely send data only for Subscriber 1's consumption while restricting access to Subscribers 2 & 3.
6406533042455. ❌ Subscriber 2 gets all messages published into *Topic 1* by *Publisher 1* but only half of Publisher 2's messages.
6406533042456. ✓ Each subscriber gets all messages published into *Topic 1*.

**Question Number : 309 Question Id : 640653903454 Question Type : MCQ Calculator : Yes**

## Correct Marks : 1

Question Label : Multiple Choice Question

Consider a Structured Streaming application running on Google Dataproc firing up every 10 seconds, consuming any number of records from Kafka available since last read, and emitting some computed answers to another Kafka topic. Consider also that apart from the functional logic, the same application is also emitting into a file the start time and end time of every batch invocation for audit purposes.

Assume there is a failure in one of the Dataproc machines that results in a failure of a specific run. For the external world (i.e. anybody consuming the outputs of this application), will they see any change in output as a result of the failure at all, or will the only visible impact of failure be of slower performance for the failed-and-retried run?

### Options :

6406533042457. ❌ No, the failure is not visible. The only visible effect for the external world would be in the form of a slowdown in runtime for completion of that mini-batch as Structured Streaming retries the mini-batch that failed thus taking twice as much time as normal.
6406533042458. ❌ No, the failure is not visible since Structured Streaming uses transactions and idempotence to achieve exactly-once processing.
6406533042459. ❌ No, the failure is not visible since Structured Streaming can process the same data in a retry resulting in the same outputs again.
6406533042460. ✓ Yes, the failure is visible because the side effect of emitting timestamps in a batch will be visible as 2 consecutive Start timestamps without any end timestamp as Structured Streaming retries the failed batch.

6406533042461. ❌ Yes, the failure is visible since the logs in the backend of Spark Structured Streaming are also logging the state of the machine.

**Question Number : 310 Question Id : 640653903455 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Let us say we are using structured streaming for continuously reading data from Kafka and storing the results back into a Kafka topic using window function aggregates. Now, instead, we decide that we need to just perform a one-time batch operation using the same logic, where there is a need to read specific data from Kafka (i.e. using pre-determined offsets). How will we need to modify the code to make it work?

**Options :**

6406533042462. ❌ The read and write commands will remain the same, but the remaining code will need to be modified, as operations on streaming dataframes are not supported on static dataframes.

6406533042463. ❌ The entire code will need to be modified as the APIs for stream and batch processing are completely different.

6406533042464. ❌ The read and write commands need to be modified to specify that it's a batch operation. Further, the specific logic of window functions will also need to be modified since there are no time windows anymore in batch processing.

6406533042465. ✓ Only the read and write commands need to be modified to specify that it's a batch operation.

**Question Number : 311 Question Id : 640653903456 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Consider a Kafka system that has two brokers with the exact same resources. Let's consider a topic A with a single partition, whose two copies are being maintained in sync by Kafka. Consider the following cases:

Case 1: Each broker has one copy of the partition

Case 2: Both the copies reside in the same broker

Two of the key promises of Kafka are:

- (i) Availability
- (ii) Throughput

Regarding which of the above promises, case 1 is at an advantage as compared to case 2?

**Options :**

6406533042466. ❌ Only (ii)

6406533042467. ✓ Only (i)

6406533042468. ❌ Both (i) and (ii)

6406533042469. ❌ Neither (i) nor (ii)

**Question Number : 312 Question Id : 640653903457 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Kubernetes is an open-source system for automating deployment, scaling and management of containerized applications. Google Datastore and HBase are both highly-scalable NoSQL database systems for interactive, real-time applications. Consider the following pipeline choices for effecting the same outcome:

- (i) Shell producer on VM on GCP → Pub/Sub → Spark Streaming on Hadoop VMs on GCP → HBase on same Hadoop VMs on GCP
- (ii) Shell producer in Google Cloud Function → Kafka VM on GCP → Dataflow → Datastore
- (iii) Shell producer in Kubernetes on GCP → Pub/Sub → Spark Streaming on Google Dataproc → Datastore
- (iv) Shell producer on VM on GCP → Pub/Sub → Dataflow → Datastore
- (v) Shell producer in Kubernetes on GCP → Pub/Sub → Spark Streaming on Hadoop VMs on GCP → HBase on same Hadoop VMs on GCP

Which option below represents the correct order of pipeline options that has the “most IaaS” entry to the left and the “most PaaS” entry to the right?

**Options :**

640653042470. ✓ (i), (v), (iii), (iv), (ii)

640653042471. ✗ (i), (ii), (iii), (iv), (v)

640653042472. ✗ (ii), (iii), (i), (iv), (v)

640653042473. ✗ (v), (iii), (i), (iv), (ii)

640653042474. ✗ All are equally PaaS / IaaS

**Question Number : 313 Question Id : 640653903458 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

A Spark Streaming application is configured to execute once per minute. However, each run takes 10+ minutes consistently resulting in a never-ending backlog of work. The code in a nutshell looks as follows:

```
clicks = (      # schema - adId: String, clickTime: Timestamp,  
...  
    spark  
        .readStream  
        .format("kafka")  
        .option("subscribe", "clicks")  
        ...  
        .load()  
)  
  
clicks  
    .join(pages, "pageId")  
    .groupBy("pageName")  
    .count()
```

Your goal is to optimize the code to bring down execution of each iteration within 1 minute. Which of the following represent options that will help in this mission?

#### Options :

Convert to batch and use cron to schedule for every 1 minute since streaming  
6406533042475. ❌ computation has more overhead than batch processing

Ensure "pages" dataframe is broadcast before the streaming begins so that each  
6406533042476. ✓ executor has access to its own copy without having to reshuffle

Rewrite the join code as follows

```
clicks  
    .groupBy("pageId")  
    .count()  
    .join(pages, "pageId")  
    .select("pagename", "count")
```

6406533042477. ❌

Rewrite the join code as follows

```
pages  
    .join(clicks, "pageId")  
    .groupBy("pageName")  
    .count()
```

6406533042478. ❌

**Question Number : 314 Question Id : 640653903459 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

You are given a Spark program that runs on a Google Dataproc cluster on a daily schedule from 8PM-10PM to produce as output the total amount spent on purchases made by every customer

the previous day. The data is coming into GCS every minute from a variety of sources as standalone files. Therefore, the business leader now feels that having to wait till 10PM the next day is no longer acceptable and instead wants approximate purchase information for each customer at least every 5 minutes. What's more, she wants to be able to change this time window later without involving you. Which amongst the below represents the best option to achieve the above?

**Options :**

- 6406533042479. ✘ Change the code to run every 5 minutes, no other change required
- 6406533042480. ✘ Change the code to leverage Spark Streaming with streaming window as "5 minutes", & let her manage the execution of the code on Dataproc
- 6406533042481. ✓ Change the code to leverage Spark Streaming with streaming window as "5 minutes", convert from Dataproc to Dataflow, & let her manage the execution of the code on Dataflow
- 6406533042482. ✘ Write a Cloud Function to move all incoming per-minute standalone files from GCS to Pub/Sub, change the code to leverage Spark Streaming with streaming window as "5 mins", convert from Dataproc to Dataflow, point source to Pub/Sub, & let her manage the execution of the code on Dataflow

**Question Number : 315 Question Id : 640653903460 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

At the onset of every festive season, there is a surge in railway ticket bookings. The business head at IRCTC is interested in a real-time view of all of her stations irrespective of whether there were bookings or not. She wants to see this be presented in a monitor mounted in her office wall that refreshes with the latest info on an India map every 1 minute. Along with the info, there also needs to be the current time so that she gets a visual confirmation that this is the latest data. This dashboard allows her to plan for new summer-special trains as required. What solution option below best solves for the need?

**Options :**

- 6406533042483. ✘ Route a copy of the ticket purchase to a Kafka topic, use Spark Structured Streaming to continuously read from this topic and update the aggregates by destinations, and emit using output mode "Update".
- 6406533042484. ✓ Route a copy of the ticket purchase to a Kafka topic, use Spark Structured Streaming to periodically read from this topic every 1 minute and update the aggregates by destinations, and emit all aggregates using the output mode "Complete".
- 6406533042485. ✘ Route a copy of the ticket purchase to a Kafka topic, use Spark Structured Streaming to periodically read from this topic every 1 minute and count the destinations in that batch, and emit only all aggregates in that batch using the output mode "Append".

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133946

**Question Shuffling Allowed :**

Yes

**Question Number : 316 Question Id : 640653903433 Question Type : MSQ Calculator : Yes**

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

**Question Label :** Multiple Select Question

What option(s) best describe the differences between MapReduce and Spark?

**Options :**

6406533042357. ❌ MapReduce leverages memory heavily, while Spark optimizes for disk-based computations

6406533042358. ✓ MapReduce forces barrier synchronization after every step, while Spark uses directed acyclic graphs to execute as many steps as possible in parallel

6406533042359. ✓ MapReduce leverages disk heavily, while Spark optimizes for memory-based computations

6406533042360. ❌ MapReduce enables massively parallel computation, while Spark's driver program sequentially executes each worker

6406533042361. ❌ MapReduce is restricted in flexibility since only Map and Reduce are possible steps, while Spark has a variety of Actions possible making it highly flexible

**Sub-Section Number :**

4

**Sub-Section Id :**

640653133947

**Question Shuffling Allowed :**

Yes

**Question Number : 317 Question Id : 640653903437 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

You are provided with a Spark program that picks out a list of suspicious transactions. Its logic is based on both the financial value of the transaction and the geographic location of the transaction. If the financial value is higher than a threshold and the geographic location is from a set of suspected locations (provided as a 1MB file), then the program deems the transaction as suspicious. The version of the Spark program given to you is written in such a way that it pulls all the transactions from the Workers to the Driver and then applies the. Which 2 changes from the list below will get you the most benefit in performance?

**Options :**

6406533042375. ✓ Use broadcast variables for the 1MB file

6406533042376. ❌ Hardcode threshold value as a filter condition in the Driver program

6406533042377. ❌ Reorder operations on the Driver such that geographic location is checked first before filtering high value transactions

6406533042378. ✓ Hardcode threshold value as a filter condition in the Workers itself

**Question Number : 318 Question Id : 640653903440 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following types of data sources can you read successfully without missing data using a program that extracts once every day? If no data is missed, then all data in source will match data extracted successfully.

**Options :**

6406533042389. ✓ A MySQL table that is modelled as a Type II SCD where all Creates are new rows and all Updates are appended only, and these can happen anytime during the day.

6406533042390. ✓ A Linux machine's system.log file into which all processes append their events
6406533042391. ✘ Share transactions stored as facts & share prices updated in-place in a PostgreSQL database
6406533042392. ✘ A weather API that provides the temperature & rainfall readings for all its weather stations in India for the specific time instant when being queried
6406533042393. ✓ Google drive account that stores all historical census data for India

**Question Number : 319 Question Id : 640653903441 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following is true?

**Options :**

6406533042394. ✓ Snapshots of source systems can be created using an event capture tool like CDC and then replaying the events in sequence for that time period.
6406533042395. ✘ A data lake is a collection of data to be provided as input for data science algorithms.
6406533042396. ✓ Zookeeper is a library for ensuring that critical services used in big data are able to stay in sync with each other as to the health of those services.
6406533042397. ✘ A single Spark cluster can have multiple "leader" master nodes.
6406533042398. ✓ Spark is optimized for in-memory computation.
6406533042399. ✓ Given the RDD underlying a Dataframe, you can recreate the same Dataframe provided you know the schema

**Question Number : 320 Question Id : 640653903442 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

What are some capabilities common to both "streaming processing" & "batch processing" when using Spark for big data?

**Options :**

6406533042400. ✓ Batch operates on a set of data elements taken together while streaming can also operate on a set of data elements as determined by the window
6406533042401. ✘ Batch operates on data that is static while streaming operates on data that is dynamically changing
6406533042402. ✘ Batch processing can assume data as fully specified and complete while streaming cannot make that assumption
6406533042403. ✘ Batch processing is typically high latency while streaming processing is necessary for real-time latencies
6406533042404. ✓ Both Streaming & Batch processing can operate on massively large data sets
6406533042405. ✓ Both Streaming and Batch processing in Spark can use the same syntax for programming the main functional logic of the application

**Question Number : 321 Question Id : 640653903443 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following are best practices associated with Streaming applications?

**Options :**

6406533042406. ✓ Use a message store that supports message replay so that no data is lost in processing.

6406533042407. ✓ “Hot potato” principle is when the streaming application operates on the minimum amount of processing to produce valid output, which then becomes input for the next minimal processor, and so on, thus ensuring that no single process is doing too many things in one go.

6406533042408. ✗ Hadoop is best suited for executing Streaming applications.

6406533042409. ✓ Use checkpointing when faced with mission-critical workloads that require 100% accuracy.

6406533042410. ✗ Handle state pollution by restarting the persistent store software periodically.

**Question Number : 322 Question Id : 640653903446 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

You are given the task of improving the performance of a Spark SQL program that is doing a simple count after a series of transformations. You suspect that the culprit is the main transformation job in the program. When you run EXPLAIN on that SQL, you see that Spark wrongly estimates that there are only 10 values for the key on which the main transformation job is hinged upon, whereas in reality the underlying data has a million values for that key. What actions would you perform from the below to improve performance of the program?

**Options :**

6406533042421. ✗ Create all tables as external tables.

6406533042422. ✓ Ensure cost based optimizer (CBO) is ON.

6406533042423. ✗ Partition all tables on the same key on which the aggregate is happening.

6406533042424. ✓ Run ANALYZE on all tables to ensure the right estimates are available to the optimizer.

6406533042425. ✓ Cache the table in a step with actions ahead of the SQL statement that is the culprit.

## Sem1 Maths1

<b>Section Id :</b>	64065364111
<b>Section Number :</b>	13
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133948
<b>Question Shuffling Allowed :</b>	No

**Question Number : 323 Question Id : 640653903461 Question Type : MCQ Calculator : Yes**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER I: 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 :**

6406533042486. ✓ YES

6406533042487. ✗ NO

**Question Number : 324 Question Id : 640653903462 Question Type : MCQ Calculator : Yes**

**Correct Marks : 0**

Question Label : Multiple Choice Question

## Instructions:

- There are some questions that 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 :

6406533042488. ✓ Instructions has been mentioned above.

6406533042489. ✗ This Instructions is just for a reference & not for an evaluation.

**Sub-Section Number :**

2

**Sub-Section Id :**

640653133949

**Question Shuffling Allowed :**

Yes

**Question Number : 325 Question Id : 640653903463 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following is (are) correct?

## Options :

6406533042490. ✓ Floyd-Warshall algorithm is used for all pair shortest paths.

6406533042491. ✓ The Shortest path problem is not applicable to a graph with a negative weight cycle.

6406533042492. ✓ Bellman-Ford algorithm is used for single source shortest path.

6406533042493. ✗ Dijkstra's algorithm is used for all pair shortest paths.

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133950

**Question Shuffling Allowed :**

Yes

**Question Number : 326 Question Id : 640653903464 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following adjacency matrix

$$\begin{array}{c|ccccc} & A & B & C & D & E \\ \hline A & 0 & 1 & 0 & 1 & 1 \\ B & 1 & 0 & 1 & 0 & 1 \\ C & 0 & 1 & 0 & 0 & 1 \\ D & 1 & 0 & 0 & 0 & 1 \\ E & 1 & 1 & 1 & 1 & 0 \end{array}$$

which represents graph  $G$  which has 5 vertices  $A, B, C, D$  and  $E$ .

Which of the following is true about the graph  $G$ ?

**Options :**

6406533042494. ❌ The number of vertices in  $G$  of degree 3 are 3.

6406533042495. ✓ The total number of edges in  $G$  are 7.

6406533042496. ❌ The total number of edges in  $G$  are 14.

6406533042497. ✓ There is a cycle in  $G$ .

**Question Number : 327 Question Id : 640653903473 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following function:

$$f(x) = \begin{cases} \frac{x}{(x+1)(x+2)}, & x \geq 1, \\ \frac{1}{x-5}, & x < 1 \end{cases}$$

Which of the following options is (are) correct?

**Options :**

6406533042510. ❌  $\lim_{x \rightarrow -2^+} f(x) = \infty$

6406533042511. ❌ The function  $f$  is continuous.

6406533042512. ✓  $\lim_{x \rightarrow 5^+} f(x) = \lim_{x \rightarrow 5^-} f(x) = \frac{5}{42}$

6406533042513. ✓ At  $x = 1$ , the function  $f$  is discontinuous.

**Question Number : 328 Question Id : 640653903474 Question Type : MSQ Calculator : Yes**

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

**Question Label : Multiple Select Question**

Which of the following statements is/are true about the function  $f(x) = x^2 + 2x - 8$ ?

**Options :**

- 6406533042514. ❌  $f$  is one-one on its domain.
- 6406533042515. ❌  $f$  has an inverse on its domain.
- 6406533042516. ✓ The vertex of this parabola is at (-1, -9).
- 6406533042517. ✓  $y$ -intercept of the given parabola is -8.

**Question Number : 329 Question Id : 640653903477 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the following relations defined on the set of integers

- $R_1 = \{(x, y) | x, y \in \mathbb{Z} \text{ and } 7 \text{ divides } (x - y)\}$
- $R_2 = \{(x, y) | x, y \in \mathbb{Z} \text{ and } x + y = 2\}$

Choose the correct option(s).

**Options :**

- 6406533042526. ❌  $R_1$  is not transitive.
- 6406533042527. ✓  $R_2$  is symmetric.
- 6406533042528. ✓  $R_1$  is symmetric.
- 6406533042529. ❌  $R_2$  is transitive.

**Sub-Section Number :**

4

**Sub-Section Id :**

640653133951

**Question Shuffling Allowed :**

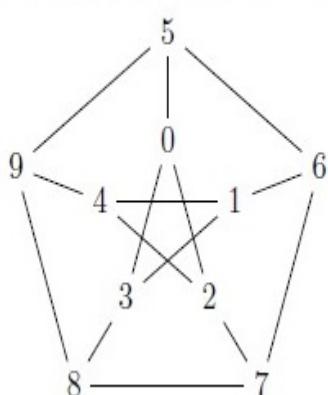
Yes

**Question Number : 330 Question Id : 640653903465 Question Type : SA Calculator : None**

**Correct Marks : 4**

Question Label : Short Answer Question

What is the minimum number of colours required to colour the graph given below?



**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

3

**Question Number : 331 Question Id : 640653903479 Question Type : SA Calculator : None**

**Correct Marks : 4**

**Question Label : Short Answer Question**

You have been closely monitoring your bike's mileage recently. Here is a table showing two rows representing the amount paid for fuel(in ₹) and the corresponding mileage (in Km). Consider  $y$  as the amount paid and  $x$  as the corresponding mileage in Km. You have noted down the distance traveled each time when the fuel meter falls back to a fixed reference mark and predicted that the equation of the best fit line is  $y = 5x - 21$ . What will be the value of SSE w.r.t the best fit line?

Amount paid (in ₹)	80	50	60	100	48
Distance (in Km)	20	15	16	25	14

Table: 1

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

35

**Sub-Section Number :** 5

**Sub-Section Id :** 640653133952

**Question Shuffling Allowed :** No

**Question Id : 640653903466 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (332 to 333)**

**Question Label : Comprehension**

Consider a weighted graph  $G$  with 7 vertices { rows and columns are in the order  $V_1, V_2, V_3, V_4, V_5, V_6, V_7$ }, which is represented by the following adjacency matrix.

Use the following information for given sub-questions

$$\begin{bmatrix} 0 & 24 & 0 & 0 & 36 & 0 & 28 \\ 24 & 0 & 0 & 32 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 4 & 12 \\ 0 & 32 & 0 & 0 & 8 & 0 & 0 \\ 36 & 0 & 0 & 8 & 0 & 0 & 0 \\ 0 & 0 & 4 & 0 & 0 & 0 & 20 \\ 28 & 0 & 12 & 0 & 0 & 20 & 0 \end{bmatrix}.$$

### Sub questions

**Question Number : 332 Question Id : 640653903467 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Suppose we perform Prim's algorithm on the graph  $G$  starting from vertex  $V_1$  to find an MCST. Then the order in which the vertices are added is

**Options :**

6406533042499. ✘  $V_1, V_3, V_6, V_7, V_2, V_4, V_5$

6406533042500. ✓  $V_1, V_2, V_7, V_3, V_6, V_4, V_5$

6406533042501. ✘  $V_1, V_2, V_4, V_5, V_7, V_3, V_6$

6406533042502. ✘  $V_1, V_3, V_6, V_7, V_5, V_4, V_2$

**Question Number : 333 Question Id : 640653903468 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

Find the value MCST.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

108

**Sub-Section Number :**

6

**Sub-Section Id :**

640653133953

**Question Shuffling Allowed :**

No

**Question Id : 640653903470 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (334 to 335)**

Question Label : Comprehension

Consider the following functions;

- $v(t) = 4t^2 + 2t$
- $s(t) = 20 + 4t - t^2$

Let  $[.]$  be the floor function (greatest integer function), e.g.,  $[2.34] = 2$ ,  $[5] = 5$ .

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 334 Question Id : 640653903471 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

If  $A$  and  $B$  are the areas under the curves  $v(t)$  and  $s(t)$  respectively, from  $t = 0$  to  $t = 1$  then what is the value of  $[A] + [B]$ .

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

23

**Question Number : 335 Question Id : 640653903472 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

If  $\alpha$  and  $\beta$  are the  $Y$ -coordinates of the points of intersection of the curves  $v(t)$  and  $s(t)$  then what is the value of  $10(\alpha + \beta)$ .

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

4

**Sub-Section Number :** 7

**Sub-Section Id :** 640653133954

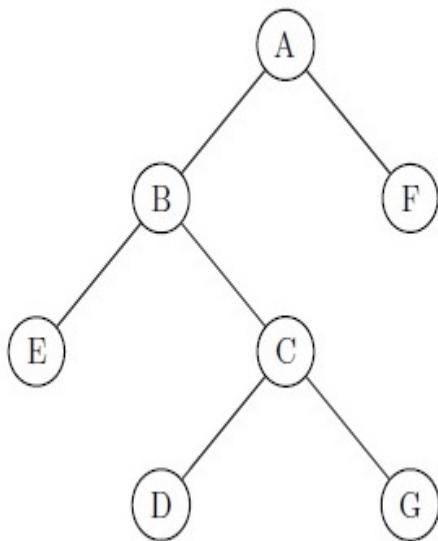
**Question Shuffling Allowed :** Yes

**Question Number :** 336 **Question Id :** 640653903469 **Question Type :** MCQ **Calculator :** Yes

**Correct Marks :** 3

Question Label : Multiple Choice Question

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



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

**Options :**

640653042504. ✓ (A,D)

640653042505. ✗ (E,C)

640653042506. ✗ (D,G)

640653042507. ✗ (B,F)

**Question Number :** 337 **Question Id :** 640653903475 **Question Type :** MCQ **Calculator :** Yes

**Correct Marks :** 3

Question Label : Multiple Choice Question

Choose the correct option(s).

**Options :**

640653042518. ✓  $\lim_{x \rightarrow 0} [x \times \sin(\frac{1}{x})] = 0$

6406533042519. ✳  $\lim_{x \rightarrow 0} \frac{e^{(1/x)}}{e^{(1/x)} + 1} = 0$

6406533042520. ✳  $\lim_{x \rightarrow 0} [x \times \sin(\frac{1}{x})] = 1$

6406533042521. ✳  $\lim_{x \rightarrow 0} \frac{e^{(1/x)}}{e^{(1/x)} + 1} = 1$

**Sub-Section Number :**

8

**Sub-Section Id :**

640653133955

**Question Shuffling Allowed :**

Yes

**Question Number : 338 Question Id : 640653903478 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Points  $A(4, 3)$ ,  $B(-3, -4)$  and  $C(m, n)$  are collinear. If points  $D(-1, 2)$ ,  $E(5, -4)$  and  $C$  are also collinear, the value of  $\frac{4m + 9n}{2m + 3n}$  is.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Sub-Section Number :**

9

**Sub-Section Id :**

640653133956

**Question Shuffling Allowed :**

Yes

**Question Number : 339 Question Id : 640653903476 Question Type : MCQ Calculator : Yes**

**Correct Marks : 4**

Question Label : Multiple Choice Question

Consider the functions  $f(x) = \sqrt{x+4}$  and  $g(x) = \log(1+x^2)$ . Which of the following options is/are true?

**Options :**

6406533042522. ✳  $(f \circ g)(x) = \log(2x+5)$  on its domain of definition.

6406533042523. ✳

The domain of the function  $(g \circ f)(x)$  is  $(-5, \infty)$ .

6406533042524. ❌ The domain of the function  $(g \circ f)(x)$  is  $[-6, -1]$ .

6406533042525. ✓  $(g \circ f)(x) = \log(x + 5)$  on its domain of definition.

**Sub-Section Number :** 10

**Sub-Section Id :** 640653133957

**Question Shuffling Allowed :** Yes

**Question Number : 340 Question Id : 640653903480 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider two polynomials  $p(x) = -x^5 + 5x^4 - 7x - 2$  and  $q(x) = -x^5 + 5x^4 - x^2 - 2$ .

Which of the following options is/are true?

**Options :**

6406533042532. ✓  $p(x)$  and  $q(x)$  intersect at two points.

6406533042533. ❌  $p(x) \rightarrow \infty$  as  $x \rightarrow \infty$ .

6406533042534. ❌  $p(x)$  has 5 turning points.

6406533042535. ✓  $q(x) \rightarrow -\infty$  as  $x \rightarrow \infty$ .

## Sem2 Maths2

**Section Id :** 64065364112

**Section Number :** 14

**Section type :** Online

**Mandatory or Optional :** Mandatory

**Number of Questions :** 17

**Number of Questions to be attempted :** 17

**Section Marks :** 50

**Display Number Panel :** Yes

**Section Negative Marks :** 0

**Group All Questions :** No

**Enable Mark as Answered Mark for Review and** No

**Clear Response :**

**Maximum Instruction Time :**

0

**Sub-Section Number :**

1

**Sub-Section Id :**

640653133958

**Question Shuffling Allowed :**

No

**Question Number : 341 Question Id : 640653903481 Question Type : MCQ Calculator : Yes**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER II:  
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 :**

6406533042536. ✓ YES

6406533042537. ✗ NO

**Sub-Section Number :**

2

**Sub-Section Id :**

640653133959

**Question Shuffling Allowed :**

Yes

**Question Number : 342 Question Id : 640653903482 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the two statements given below:

Statement-P: There exists a square matrix of order 2 such that  $A^2 = 0$ ,  $A^T = A$  and  $A \neq 0$ .

Statement-Q: There exists a square matrix of order 2 such that  $A^2 = 0$  and  $A \neq 0$ .

**Options :**

6406533042538. ✗ Statement-P is true, but statement-Q is false.

6406533042539. ✓ Statement-P is false, but statement-Q is true.

6406533042540. ✗ Both statements are true.

6406533042541. ✗ Both statements are false.

**Question Number : 343 Question Id : 640653903483 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Consider the following system of equations:

$$2x_1 - x_2 + x_3 = b_1$$

$$x_1 + x_2 - 2x_3 = b_2$$

$$-3x_2 + 5x_3 = b_3$$

Under which of the following conditions is the system consistent?

**Options :**

6406533042542. ✘  $b_2 = 0$

6406533042543. ✘  $b_1 = 2b_2$

6406533042544. ✓  $b_3 = b_1 - 2b_2$

6406533042545. ✘  $b_1 + b_2 + b_3 = 0$

**Question Number : 344 Question Id : 640653903484 Question Type : MCQ Calculator : Yes**

**Correct Marks : 3**

Question Label : Multiple Choice Question

Which of the following is an orthonormal basis for  $\text{span}\{(1, 1, -1), (1, 2, 0)\}$ ?

**Options :**

6406533042546. ✓  $\left\{ \frac{1}{\sqrt{3}}(1, 1, -1), \frac{1}{\sqrt{2}}(0, 1, 1) \right\}$

6406533042547. ✘  $\left\{ \frac{1}{\sqrt{3}}(1, 1, -1), \frac{1}{\sqrt{5}}(1, 2, 0) \right\}$

6406533042548. ✘  $\left\{ \frac{1}{\sqrt{2}}(1, 0, 1), \frac{1}{\sqrt{2}}(-1, 0, 1) \right\}$

6406533042549. ✘  $\left\{ \frac{1}{\sqrt{2}}(0, 1, 1), \frac{1}{\sqrt{2}}(0, -1, 1) \right\}$

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133960

**Question Shuffling Allowed :**

Yes

**Question Number : 345 Question Id : 640653903485 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Let  $S = \{u_1, u_2, u_3, u_4, u_5\}$  be a linearly independent subset of a vector space  $V$ . Select all true statements.

**Options :**

6406533042550. ✓ There exists a basis  $B$  for  $V$  such that  $S \subseteq B$

6406533042551. ✓  $\dim(V) \geq 5$

6406533042552. ✗  $\text{span}(S) = V$

6406533042553. ✗  $S$  is a subset of every basis  $B$

**Question Number : 346 Question Id : 640653903486 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Consider the function  $f$ :

$$f(x, y) = \begin{cases} \frac{y^4}{x^2 + y^2}, & (x, y) \neq (0, 0) \\ 0, & (x, y) = (0, 0) \end{cases}$$

If  $f_x, f_y$  denote the partial derivatives, select all true statements from the options given below.

**Options :**

6406533042554. ✗  $f_x(0, 0)$  does not exist.

6406533042555. ✗  $f_y(0, 0)$  does not exist.

6406533042556. ✓  $f_x(0, 0) = 0$

6406533042557. ✓  $f_y(0, 0) = 0$

**Sub-Section Number :**

4

**Sub-Section Id :**

640653133961

**Question Shuffling Allowed :**

Yes

**Question Number : 347 Question Id : 640653903487 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Find the dimension of the affine subspace corresponding to the set of all solutions to the following system:

$$\begin{bmatrix} 1 & 2 & 0 & 1 \\ 0 & 1 & 1 & 2 \\ 1 & 3 & 1 & 3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$$

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Question Number :** 348 **Question Id :** 640653903488 **Question Type :** SA **Calculator :** None

**Correct Marks :** 3

**Question Label :** Short Answer Question

Let  $v = (\sqrt{2}, -\sqrt{2}, 6) \in \mathbb{R}^3$ .  $(a, b, c)$  is the vector obtained from  $v$  after rotating the XY-plane anti-clockwise by  $45^\circ$  about the Z-axis. Find the value of  $a+b+c$ . Enter the nearest integer as your answer.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

8

**Question Number :** 349 **Question Id :** 640653903489 **Question Type :** SA **Calculator :** None

**Correct Marks :** 3

**Question Label :** Short Answer Question

Evaluate  $\lim_{(x,y) \rightarrow (0,0)} \frac{\sin(4x^2 + 4y^2)}{x^2 + y^2}$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

4

**Question Number : 350 Question Id : 640653903490 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

Consider the following function:

$$f(x, y) = \begin{cases} \frac{x^2 - xy}{\sqrt{x} - \sqrt{y}} & , \quad x \neq y \text{ and } x \geq 0 \text{ and } y \geq 0 \\ c & , \quad \text{otherwise} \end{cases}$$

For what value of  $c$  is the function  $f$  continuous at  $(0, 0)$ ?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

0

**Question Number : 351 Question Id : 640653903491 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

If the directional derivative of  $f(x, y) = x^3y + xy^2 + 8$  at the point  $(1, 2)$  in the direction  $\left(\frac{1}{\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$  is  $\frac{p}{\sqrt{2}}$ , find the value of  $p$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

5

**Question Number : 352 Question Id : 640653903492 Question Type : SA Calculator : None**

**Correct Marks : 3**

Question Label : Short Answer Question

The equation of the tangent plane to the function  $f(x, y) = e^x(x + y)$  at the point  $(1, 0)$  is given by  $Ax + By + C = z$ . Find the value of  $\frac{A + B + C}{e}$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

2

**Sub-Section Number :** 5

**Sub-Section Id :** 640653133962

**Question Shuffling Allowed :** Yes

**Question Number :** 353 **Question Id :** 640653903493 **Question Type :** SA **Calculator :** None

**Correct Marks :** 4

Question Label : Short Answer Question

If  $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 5 \\ -4 & 9 & 5 \end{bmatrix}$ , find the determinant of  $A^3 - 3A^2 + 2A$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

0

**Sub-Section Number :** 6

**Sub-Section Id :** 640653133963

**Question Shuffling Allowed :** No

**Question Id :** 640653903505 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix

**Calculator :** None

**Question Numbers :** (354 to 356)

Question Label : Comprehension

Consider a linear transformation  $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ :

$$T(x, y, z) = (x - y + z, x + z, y - 2z)$$

Use the given standard basis for both domain and co-domain for matrix representation ,

Answer the sub-questions

**Sub questions**

**Question Number :** 354 **Question Id :** 640653903506 **Question Type :** MCQ **Calculator :** Yes

**Correct Marks :** 1

Question Label : Multiple Choice Question

What is the matrix representation of  $T$ ?

**Options :**

6406533042582. ✓  $\begin{bmatrix} 1 & -1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & -2 \end{bmatrix}$

6406533042583. ✗  $\begin{bmatrix} 1 & 1 & 0 \\ -1 & 0 & 1 \\ 1 & 1 & -2 \end{bmatrix}$

6406533042584. ✗  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

6406533042585. ✗  $\begin{bmatrix} 1 & 0 & 1 \\ -1 & 1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$

**Question Number : 355 Question Id : 640653903507 Question Type : MSQ Calculator : Yes**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Select all true statements.

**Options :**

6406533042586. ✓ The kernel of  $T$  is  $\{(0, 0, 0)\}$

6406533042587. ✗ The kernel of  $T$  is  $\mathbb{R}^3$

6406533042588. ✗ The image of  $T$  is  $\{(0, 0, 0)\}$

6406533042589. ✓ The image of  $T$  is  $\mathbb{R}^3$

**Question Number : 356 Question Id : 640653903508 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

$T^{-1}$  is a linear transformation that is the inverse of  $T$ . That is, if  $T(x, y, z) = (a, b, c)$ , then  $T^{-1}(a, b, c) = (x, y, z)$ .

Find the matrix representation of  $T^{-1}$ ,

**Options :**

$$6406533042590. \checkmark \quad \frac{1}{2} \begin{bmatrix} 1 & 1 & 1 \\ -2 & 2 & 0 \\ -1 & 1 & -1 \end{bmatrix}$$

$$6406533042591. \times \quad \frac{1}{2} \begin{bmatrix} 1 & -2 & -1 \\ 1 & 2 & 1 \\ 1 & 0 & -1 \end{bmatrix}$$

$$6406533042592. \times \quad \begin{bmatrix} 1 & -1 & 1 \\ 1 & 0 & 1 \\ 0 & 1 & -2 \end{bmatrix}$$

$$6406533042593. \times \quad \begin{bmatrix} -1 & -1 & 1 \\ -1 & 0 & 1 \\ 2 & 1 & -1 \end{bmatrix}$$

**Sub-Section Number :**

7

**Sub-Section Id :**

640653133964

**Question Shuffling Allowed :**

No

**Question Id : 640653903494 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (357 to 358)**

Question Label : Comprehension

Let  $f : D \rightarrow \mathbb{R}$  be defined as follows:

$$f(x, y) = \sqrt{1 - x^2 - y^2}$$

where  $D \subset \mathbb{R}^2$  is the domain of  $f$ .

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 357 Question Id : 640653903495 Question Type : MCQ Calculator : Yes Correct Marks : 1**

Question Label : Multiple Choice Question

Choose the largest possible  $D$  that would be a valid domain from the options given below.

**Options :**

6406533042565. ✘  $\mathbb{R}^2$

6406533042566. ✘  $\{(x, y) : |x| \leq 1 \text{ and } |y| \leq 1; x, y \in \mathbb{R}\}$

6406533042567. ✘  $\mathbb{R}^2 \setminus \{(x, y) : x^2 + y^2 < 1; x, y \in \mathbb{R}\}$

6406533042568. ✘  $\mathbb{R}^2 \setminus \{(x, y) : x^2 + y^2 \leq 1; x, y \in \mathbb{R}\}$

6406533042569. ✓  $\{(x, y) : x^2 + y^2 \leq 1; x, y \in \mathbb{R}\}$

**Question Number : 358 Question Id : 640653903496 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following is the range of  $f$  using the domain chosen from the previous question? Recall that  $[a, b] = \{x : a \leq x \leq b; x \in \mathbb{R}\}$

**Options :**

6406533042570. ✓  $[0, 1]$

6406533042571. ✘  $[-1, 1]$

6406533042572. ✘  $\mathbb{R}$

6406533042573. ✘  $\mathbb{R}^2$

**Question Id : 640653903497 Question Type : COMPREHENSION Sub Question Shuffling**

**Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (359 to 361)**

Question Label : Comprehension

Consider the function  $f(x, y) = x^2 + xy + y^2 - 7x - 8y$ .

Based on the above data, answer the given subquestions.

## Sub questions

**Question Number : 359 Question Id : 640653903498 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

If  $f$  has a critical point at  $(a, b)$ ,  
find  $a + b$ .

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

5

**Question Number : 360 Question Id : 640653903499 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

Find the determinant of the  
Hessian at  $(a, b)$ .

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

3

**Question Number : 361 Question Id : 640653903500 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

What is the nature of the critical point?

**Options :**

640653042576. ✘ Local maximum

640653042577. ✓ Local minimum

640653042578. ✘ Saddle point

**Question Id : 640653903501 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (362 to 364)**

**Question Label : Comprehension**

Find three positive numbers  $x, y, z$  whose sum is 10 such that  $x^2yz^2$  is maximum.

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 362 Question Id : 640653903502 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

Enter the value of  $x$ .

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

4

**Question Number : 363 Question Id : 640653903503 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

Enter the value of  $y$ .

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

2

**Question Number : 364 Question Id : 640653903504 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

Enter the value of  $z$ .

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

## Industry 4.0

<b>Section Id :</b>	64065364113
<b>Section Number :</b>	15
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	22
<b>Number of Questions to be attempted :</b>	22
<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>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	640653133965
<b>Question Shuffling Allowed :</b>	No

**Question Number : 365 Question Id : 640653903509 Question Type : MCQ Calculator : Yes**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : INDUSTRY 4.0 (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 :**

640653042594. ✓ YES

640653042595. ✗ NO

<b>Sub-Section Number :</b>	2
<b>Sub-Section Id :</b>	640653133966
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 366 Question Id : 640653903510 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

Match Column A with Column B (country of origin)

Column A	Column B
A1. 1 <sup>st</sup> revolution	B1. England
A2. 2 <sup>nd</sup> revolution	B2. USA
A3. 3 <sup>rd</sup> revolution	B3. USA/Japan
A4. 4 <sup>th</sup> revolution	B4. Germany

**Options :**

6406533042596. ✓ A1:B1, A2:B2, A3:B3, A4:B4

6406533042597. ✗ A1:B2, A2:B1, A3:B3, A4:B4

6406533042598. ✗ A1:B3, A2:B1, A3:B4, A4:B2

6406533042599. ✗ A1:B3, A2:B1, A3:B2, A4:B4

**Sub-Section Number :**

3

**Sub-Section Id :**

640653133967

**Question Shuffling Allowed :**

Yes

**Question Number : 367 Question Id : 640653903512 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1.5**

Question Label : Multiple Choice Question

Geet Mobile manufactures mobile phones of various types. Their product portfolio comprises of 15 types of headsets. These headsets comprise of limited types of components. Only a few of the components need customization for different headsets. Which facility layout will best suit for Geet Mobile's production?

**Options :**

6406533042604. ✗ Product layout

6406533042605. ✓ Group layout

6406533042606. ✗ Fixed position layout

6406533042607. ✗ All of these

**Sub-Section Number :**

4

**Sub-Section Id :**

640653133968

**Question Shuffling Allowed :**

Yes

**Question Number : 368 Question Id : 640653903531 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Mahesh is shopping in a departmental store. He has a list of items which he prepared at home itself. He picked a few packets of tea as part of his list. He could see coffee packets and milk-powder packets in the neighbouring shelves. He picked a few milk-powder packets, however these are not part of his list. While standing in the queue for billing, he noticed Uncle Chips packets lying nearby and grabbed a couple of packets. Now map the scenarios with the items below:

Product	Scenario
P1) Tea : Coffee	S1) Complementary
P2) Tea: Milk-powder packet	S2) Substitution
P3) Uncle chips purchase	S3) Inventory dependant demand
	S4) Impulse buying

**Options :**

6406533042642. ✗ P1-S1, P2-S3, P3-S4

6406533042643. ✗ P1-S2, P2-S1, P3-S3

6406533042644. ✓ P1-S2, P2-S1, P3-S4

**Question Number : 369 Question Id : 640653903534 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

What is the name of the forecasting method represented by the following set of equations? The notations represent the usual meaning.

$$F_{t+1} = a_t + b_t$$

Where

$$a_t = \alpha D_t + (1 - \alpha)(a_{t-1} - b_{t-1});$$

$$b_t = \beta(a_t - a_{t-1}) + (1 - \beta)b_{t-1}$$

**Options :**

6406533042652. ✗ Exponential smoothing

6406533042653. ✗ Winter's model for seasonality

6406533042654. ✓ Holte's method for trend

6406533042655. ✗ None of these

**Question Number : 370 Question Id : 640653903536 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Which of the following is not an example of digitization?

**Options :**

6406533042661. ✗ Creating the e-copy of a book using Google-Lens

6406533042662. ✓ Generating an automated daily sales report across the retail outlets in a state.

6406533042663. ✗ Converting a physical 2D sheet to CAD drawing

6406533042664. ✗ Converting physical invoice to e-copy

**Question Number : 371 Question Id : 640653903537 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Select the correct form of internet from column B corresponding to the example in Column A.

Column A	Column B
A1. Smart metering	B1. Consumer
A2. Banking system	B2. Commercial
A3. Entertainment integrated devices	B3. Industrial
	B4. Private

**Options :**

6406533042665. ✘ A1: B3, A2: B2, A3: B4

6406533042666. ✓ A1: B3, A2: B2, A3: B1

6406533042667. ✘ A1: B2, A2: B3, A3: B1

**Sub-Section Number :**

5

**Sub-Section Id :**

640653133969

**Question Shuffling Allowed :**

Yes

**Question Number : 372 Question Id : 640653903516 Question Type : MSQ Calculator : Yes**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which are the two primary tasks of time series forecasting?

**Options :**

6406533042614. ✓ Identifying pattern

6406533042615. ✘ Identify variables of interest

6406533042616. ✓ Discovering relationships amongst variables of interest

**Question Number : 373 Question Id : 640653903517 Question Type : MSQ Calculator : Yes**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Select the correct statements from below:

**Options :**

6406533042617. ✘ Optimal solution in a facility location problem using Euclidean method will result in a region

6406533042618. ✓ Optimal solution in a facility location problem using Euclidean method rarely matches the center of gravity

6406533042619. ✓ Optimal solution in a facility location problem using Euclidean method will result in a point

**Question Number : 374 Question Id : 640653903532 Question Type : MSQ Calculator : Yes**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Which of the following example(s) can be referred as seasonal pattern?

**Options :**

6406533042645. ❌ Economic recession

6406533042646. ✓ Increases Ceiling Fan sales during winters

6406533042647. ✓ Increased tourist footfall towards the end of the year

**Sub-Section Number :**

6

**Sub-Section Id :**

640653133970

**Question Shuffling Allowed :**

Yes

**Question Number : 375 Question Id : 640653903511 Question Type : MSQ Calculator : Yes**

**Correct Marks : 1.5 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Select the appropriate purposes of facility layout from the list below:

**Options :**

6406533042600. ✓ Minimize delay in material handling

6406533042601. ✓ Enhance sales as appropriate in manufacturing and service facilities.

6406533042602. ✓ Provide for good maintenance

6406533042603. ❌ Funding a new project

**Question Number : 376 Question Id : 640653903515 Question Type : MSQ Calculator : Yes**

**Correct Marks : 1.5 Max. Selectable Options : 0**

Question Label : Multiple Select Question

There are four demand points at A(1,2), B(2,3), C(3,5), D(4,1). The respective demand at these points are 7, 1, 3, 5. Select the optimal location based on cross-median approach.

**Options :**

6406533042610. ✓ (2,2)

6406533042611. ✓ (3,2)

6406533042612. ✓ (2.5,2)

6406533042613. ❌ (2,3)

**Sub-Section Number :**

7

**Sub-Section Id :**

640653133971

**Question Shuffling Allowed :**

Yes

**Question Number : 377 Question Id : 640653903518 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Select the demerits of outsourcing from the following list.

**Options :**

6406533042620. ✓ Reduced customer/supplier contact.

6406533042621. ✓ Loss of supply chain visibility.

6406533042622. ✓ Leakage of sensitive data and information.

640653042623. ✓ Loss of internal capability and growth in third-party power.

**Question Number : 378 Question Id : 640653903533 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following is/are considered in the Vehicle Routing Problem but not considered in TSP?

**Options :**

640653042648. ✗ Subtour elimination

640653042649. ✓ Any capacity restrictions

640653042650. ✓ A specific starting point

640653042651. ✗ Distance travelled restriction

**Question Number : 379 Question Id : 640653903535 Question Type : MSQ Calculator : Yes**

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

Question Label : Multiple Select Question

Which of the following supply chain costs is/are affected by distribution network structure?

**Options :**

640653042656. ✓ Inventory

640653042657. ✓ Transportation

640653042658. ✓ Facilities and handling

640653042659. ✓ Information

640653042660. ✗ Price

**Sub-Section Number :** 8

**Sub-Section Id :** 640653133972

**Question Shuffling Allowed :** Yes

**Question Number : 380 Question Id : 640653903513 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

A factory works for two 8-hour shifts each day and produces a total of 24,000 electric bulbs using a set of workstations. There are 8 activities required to manufacture the bulb, such that the sum of all activity times is equal to 12 seconds. How many workstations are required to maintain the specified level of production (assuming that activities can be combined into those workstations in any order) (enter your answer in numeric value)?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

<b>Sub-Section Number :</b>	9
<b>Sub-Section Id :</b>	640653133973
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 381 Question Id : 640653903514 Question Type : SA Calculator : None**

**Correct Marks : 1.5**

Question Label : Short Answer Question

Calculate the Euclidean distance between two machines located at the coordinates A(5,10) and B(2,6) in a shop floor.

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

4.8 to 5.3

<b>Sub-Section Number :</b>	10
<b>Sub-Section Id :</b>	640653133974
<b>Question Shuffling Allowed :</b>	Yes

**Question Number : 382 Question Id : 640653903541 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

What is the full form of SAAS?

**NOTE:**Enter the exact answer without any space in the beginning or at the end.

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

Software as a service

<b>Sub-Section Number :</b>	11
<b>Sub-Section Id :</b>	640653133975
<b>Question Shuffling Allowed :</b>	No

**Question Id : 640653903538 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (383 to 384)**

Question Label : Comprehension

Suppose you need to accept reservation for a flight. There are total 100 seats in the aircraft. You have two classes of passengers - economy and business. One economy seat gets you 2,500 Rs of revenue while a business seat gets 7,500 Rs. From your experience, you know the demand for business travellers follows a uniform distribution in [10,20]. Then answer the given subquestions:

**Sub questions**

**Question Number : 383 Question Id : 640653903539 Question Type : SA Calculator : None**

**Correct Marks : 1.5**

Question Label : Short Answer Question

What is the Booking limit?

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

17

**Question Number : 384 Question Id : 640653903540 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

What is the protection level?

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

83

**Sub-Section Number : 12**

**Sub-Section Id : 640653133976**

**Question Shuffling Allowed : No**

**Question Id : 640653903523 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (385 to 388)**

Question Label : Comprehension

Limat Ltd. wants to determine its order quantity for one of its components. The annual

consumption for the component is 80,000 units and its purchasing price is Rs. 50 per unit. The cost of placing an order is Rs. 1,200 and carrying cost per unit is 6% of the purchasing price.

Based on the above data, answer the given subquestions.

### **Sub questions**

**Question Number : 385 Question Id : 640653903524 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

Calculate the Economic Order Quantity (EOQ).

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

8000

**Question Number : 386 Question Id : 640653903525 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

Calculate the number of orders per year.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

10

**Question Number : 387 Question Id : 640653903526 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

Calculate the annual order cost.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

12000

**Question Number : 388 Question Id : 640653903527 Question Type : SA Calculator : None**

**Correct Marks : 1**

Question Label : Short Answer Question

Calculate the annual inventory carrying cost.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

12000

**Sub-Section Number :** 13

**Sub-Section Id :** 640653133977

**Question Shuffling Allowed :** No

**Question Id : 640653903519 Question Type : COMPREHENSION Sub Question Shuffling**

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

**Calculator : None**

**Question Numbers : (389 to 391)**

Question Label : Comprehension

Suppose you want to invest \$4000 now and \$2000 at the start of years 2 to 4. The interest rate offered by First Bank is 8% compounded annually, and the bonuses over the next 4 years are 1.8%, 1.7%, 2.1% and 2.5%, respectively. The annual interest rate offered by Second Bank is 0.2% lower than that of First Bank, but its bonus is 0.5% higher. The objective is to maximize the accumulated capital at the end of 4 years. If you apply Dynamic Programming to this problem, answer the given subquestions:

**Sub questions**

**Question Number : 389 Question Id : 640653903520 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1**

Question Label : Multiple Choice Question

How is a stage represented by?

**Options :**

6406533042624. ✓ Year

6406533042625. ✗ Capital available for investment at the start of a year

6406533042626. ✗ Amounts invested in First Bank

6406533042627. ✗ Amounts invested in First Bank and Second Bank

**Question Number : 390 Question Id : 640653903521 Question Type : MCQ Calculator : Yes**

**Correct Marks : 1.5**

Question Label : Multiple Choice Question

What are the alternatives in a stage?

**Options :**

6406533042628. ✘ Year  
6406533042629. ✘ Capital available for investment at the start of a year  
6406533042630. ✘ Amounts invested in First Bank in a year  
6406533042631. ✓ Amounts invested in First Bank and Second Bank in a year

**Question Number : 391 Question Id : 640653903522 Question Type : MCQ Calculator : Yes**

**Correct Marks : 2**

Question Label : Multiple Choice Question

How state variable is defined for this problem?

**Options :**

6406533042632. ✘ Year  
6406533042633. ✓ Capital available for investment at the start of a year  
6406533042634. ✘ Amounts invested in First Bank in a year  
6406533042635. ✘ Amounts invested in First Bank and Second Bank in a year

**Sub-Section Number :** 14

**Sub-Section Id :** 640653133978

**Question Shuffling Allowed :** No

**Question Id : 640653903528 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None**

**Question Numbers : (392 to 393)**

Question Label : Comprehension

The owner of a newsstand wants to determine the number of newspapers of USA Now to be stocked at the start of each day. The owner pays 30 cents for a copy and sells it for 75 cents. The sale of the newspaper typically occurs between 7:00 and 8:00 am. Newspaper left at the end of the day are recycled for an income of 5 cents a copy. How many copies should the owner stock every morning, assuming that the demand for the day can be described as:

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 392 Question Id : 640653903529 Question Type : SA Calculator : None**

**Correct Marks : 2**

Question Label : Short Answer Question

A normal distribution with mean 300 copies and standard deviation 20 copies.

[Standard\_Norm\_inv(critical fractile)=0.643]

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Range

**Text Areas :** PlainText

**Possible Answers :**

307 to 308

**Question Number :** 393 **Question Id :** 640653903530 **Question Type :** SA **Calculator :** None

**Correct Marks :** 3

**Question Label :** Short Answer Question

A discrete distribution pdf,  $f(D)$ , defined as

D	200	220	300	320	340
$f(D)$	0.1	0.2	0.4	0.2	0.1

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

300