

**Correct Marks : 2**

Question Label : Multiple Choice Question

Define null hypothesis and alternative hypothesis

**Options :**

6406532041775. ✘  $H_0 : \mu = 98.5, H_A : \mu \neq 98.5$

6406532041776. ✔  $H_0 : \mu = 98.5, H_A : \mu > 98.5$

6406532041777. ✘  $H_0 : \mu = 98.5, H_A : \mu < 98.5$

6406532041778. ✘  $H_0 : \mu \neq 98.5, H_A : \mu = 98.5$

**Question Number : 44 Question Id : 640653611405 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 3**

Question Label : Short Answer Question

Find the  $P$ -value. Enter the answer correct to two decimal places.

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Range**

**Text Areas : PlainText**

**Possible Answers :**

0.01 to 0.07

## Sem2 Maths2

**Section Id :**

64065341321

<b>Section Number :</b>	3
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	15
<b>Number of Questions to be attempted :</b>	15
<b>Section Marks :</b>	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>	Yes
<b>Maximum Instruction Time :</b>	0
<b>Sub-Section Number :</b>	1
<b>Sub-Section Id :</b>	64065388146
<b>Question Shuffling Allowed :</b>	No
<b>Is Section Default? :</b>	null

**Question Number : 45 Question Id : 640653611406 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : SEMESTER 2: MATHEMATICS FOR DATA SCIENCE 2 (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 :**

6406532041780. ✓ YES

6406532041781. ✗ NO

**Sub-Section Number :** 2  
**Sub-Section Id :** 64065388147  
**Question Shuffling Allowed :** Yes  
**Is Section Default? :** null

**Question Number : 46 Question Id : 640653611407 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

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

Question Label : Multiple Select Question

Which of the following statement(s) is/are true for an  $n \times n$  matrix  $A$ ?

**Options :**

6406532041782. ✗ Let  $\det(A) \neq 0$ . Determinant of  $A$  is unaltered by all the elementary row operations of  $A$ .

6406532041783. ✓ Rank of  $A$  is unaltered by elementary row operations of  $A$ .

6406532041784. ✓ Suppose any row  $R_i$  of  $A$  is replaced by a scalar multiple  $\alpha R_i$ , then determinant of  $A$  is  $\alpha \det(A)$ .

6406532041785. ✗ If  $AB = BA$  for some  $n \times n$  matrix  $B$ , then  $\det(A) = \det(B)$ .

**Question Number : 47 Question Id : 640653611408 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

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

Question Label : Multiple Select Question

Which of the following statement(s) is/are true for a system of linear equations  $Ax = b$ ?

Options :

6406532041786. ✓ The system  $Ax = b$  has a solution if  $b$  can be expressed as a linear combination of the columns of  $A$ .

6406532041787. ✘ For any  $b$  in the column space of  $A$ , if  $x_1$  and  $x_2$  are solutions of the linear equation  $Ax = b$ , then  $\alpha x_1 + \beta x_2$  is also a solution of  $Ax = b$ .

6406532041788. ✘ If the columns of  $A$  are linearly dependent, then the system has no solution.

6406532041789. ✓ If the system  $Ax = 0$  has a unique solution, then the columns of  $A$  are linearly independent.

Question Number : 48 Question Id : 640653611410 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Let  $V$  be the vector space of all  $2 \times 2$  matrices with usual addition and scalar multiplication.

Which of the following set(s) form a subspace of  $V$ ?

Options :

6406532041794. ✓  $W_1 = \left\{ \begin{pmatrix} a & b \\ c & d \end{pmatrix} \in M_2(\mathbb{R}) : \text{trace}(A) = 0 \right\}$

6406532041795. ✘  $W_2 = \left\{ \begin{pmatrix} a & b \\ c & d \end{pmatrix} \in M_2(\mathbb{R}) : ad = bc \right\}$

6406532041796. ✖  $W_3 = \left\{ \begin{pmatrix} a & b \\ c & d \end{pmatrix} \in M_2(\mathbb{R}) : A \text{ is invertible} \right\}$

6406532041797. ✔  $W_4 = \left\{ \begin{pmatrix} a & b \\ c & d \end{pmatrix} \in M_2(\mathbb{R}) : a = d = 0, b = -c \right\}$

**Question Number : 49 Question Id : 640653611411 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

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

Question Label : Multiple Select Question

Let  $V$  be a subspace of  $\mathbb{R}^4$  defined as  $V = \{(a, b, c, d) : a + b = c + d\}$  with usual addition and scalar multiplication. Then which of the following set(s) form a basis for  $V$ ?

**Options :**

6406532041798. ✖  $\{(1, 0, 0, 0), (0, 0, 1, 0), (0, 0, 0, 1)\}$

6406532041799. ✖  $\{(1, 0, -1, 0), (0, 1, -1, 0), (-1, 0, 0, 1)\}$

6406532041800. ✔  $\{(1, -1, 0, 0), (1, 0, 1, 0), (1, 0, 0, 1)\}$

6406532041801. ✔  $\{(0, 1, 1, 0), (1, 0, 1, 0), (0, 0, 1, -1)\}$

**Sub-Section Number :** 3  
**Sub-Section Id :** 64065388148  
**Question Shuffling Allowed :** Yes  
**Is Section Default? :** null

**Question Number : 50 Question Id : 640653611409 Question Type : MSQ Is Question**

**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

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

Question Label : Multiple Select Question

Let  $A = \begin{pmatrix} -1 & 1 & -2 \\ 1 & 2 & -2 \\ 6 & c & d \end{pmatrix}$ . Which of the following statement(s) is/are true for  $A$ ?

**Options :**

6406532041790. ✓  If  $c = 3$  and  $d = 0$ , then the system  $Ax = 0$  does not have a unique solution.

6406532041791. ✗  If  $c = 0$  and  $d = 4$ , then the homogeneous system  $Ax = 0$  has a unique solution.

6406532041792. ✗  If  $c = 3$  and  $d = 0$ , then the columns of  $A$  are linearly independent.

6406532041793. ✓  If  $c = 0$  and  $d = 4$ , then the homogeneous system  $Ax = 0$  has infinitely many solutions.

**Question Number : 51 Question Id : 640653611416 Question Type : MSQ Is Question**

**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

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

Question Label : Multiple Select Question

Which of the vector spaces in the options below have dimension 2.

**Options :**

6406532041811. ✓   $\text{span}\{(1, -1, 1), (1, 0, 2), (3, -2, 4)\}$

6406532041812. ✗

The solutions of the homogeneous system  $Ax = 0$  where  $A = \begin{pmatrix} 1 & -1 & 1 \\ 1 & 0 & 1 \end{pmatrix}$

6406532041813. ✓  $\{(x, y, z) \in \mathbb{R}^3 : x - 2y + z = 0\}$

6406532041814. ✗  $\{(x, y, z) \in \mathbb{R}^3 : x + y = 2, y + 3z = -5\}$

6406532041815. ✓  $\left\{ \begin{pmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{pmatrix} : a, b, c \in \mathbb{R}, a + b + c = 0 \right\}$

<b>Sub-Section Number :</b>	4
<b>Sub-Section Id :</b>	64065388149
<b>Question Shuffling Allowed :</b>	No
<b>Is Section Default? :</b>	null

**Question Id : 640653611412 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Question Numbers : (52 to 54)**

Question Label : Comprehension

Let  $L: \mathbb{R}^4 \rightarrow \mathbb{R}^4$  be a linear transformation given by

$$L(x_1, x_2, x_3, x_4) = (x_2, x_3, x_4, 0) \text{ and } R: \mathbb{R}^4 \rightarrow \mathbb{R}^4$$

be a linear transformation given by  $R(x_1, x_2, x_3, x_4) = (0, x_1, x_2, x_3)$ .

$$\text{Let } \mathcal{B} = \{(1, 0, 0, 0), (0, 1, 0, 0), (0, 0, 1, 0), (0, 0, 0, 1)\}$$

be the standard ordered basis.

Using the above information answer the given subquestions.

**Sub questions**



Question Number : 52 Question Id : 640653611413 Question Type : MSQ Is Question

Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction

Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

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

Options :

$$\begin{pmatrix} 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$
 is the matrix corresponding to

$L$  with respect to the basis  $\mathcal{B}$  for both domain and codomain.

6406532041802. ✖

$$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$
 is the matrix corresponding

to  $R$  with respect to the basis  $\mathcal{B}$  for both domain and codomain.

6406532041803. ✖

$$\begin{pmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$
 is the matrix corresponding to

$L$  with respect to the basis  $\mathcal{B}$  for both domain and codomain.

6406532041804. ✔

$$\begin{pmatrix} 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{pmatrix}$$
 is the matrix corresponding to

$R$  with respect to the basis  $\mathcal{B}$  for both domain and codomain.

6406532041805. ✔



**Question Number : 53 Question Id : 640653611414 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

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

Question Label : Multiple Select Question

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

**Options :**

6406532041806. ✘ If  $v \in \mathbb{R}^4$  such that  $Lv = 0$ , then  $v = 0$ .

6406532041807. ✔  $\text{rank}(L) = \text{rank}(R) = 3$

6406532041808. ✘ If  $v \in \mathbb{R}^4$  such that  $Rv = 0$ , then  $v = 0$ .

6406532041809. ✔ Neither  $L$  nor  $R$  is injective.

**Question Number : 54 Question Id : 640653611415 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Short Answer Question

Find the smallest number  $k$  such that

$L^k$  and  $R^k$  become the zero

transformation.

( $L^k = L \circ L \circ \dots \circ L$ ,  $k$  times and

$R^k = R \circ R \circ \dots \circ R$ ,  $k$  times )

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

4

**Question Id :** 640653611417 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix **Calculator :** None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction Time :** 0 **Question Numbers :** (55 to 57)

**Question Label :** Comprehension

Let  $L_U$  denote an affine subspace with the associated subspace  $U$  of  $\mathbb{R}^3$ .

	Affine Subspace $L_U$		Associated subspace $U$		Dimension of $L_U$
(i)	$\{(x, y, z) \in \mathbb{R}^3 : x - y + z = 1, -2x + 2y - 2z = -2, x - z = 1\}$	(a)	$\text{span}\{(1, -1, 0), (0, 2, 1)\}$	(1)	2
(ii)	$\{(x, y, z) \in \mathbb{R}^3 : x + y - 2z = 5\}$	(b)	$\text{span}\{(2, -1, 3)\}$	(2)	1
(iii)	$\{(x, y - 2, z + 1) \in \mathbb{R}^3 : x + 2y = 0, 3y + z = 0\}$	(c)	Nullspace of $A = \begin{pmatrix} 1 & -1 & 1 \\ -2 & 2 & -2 \\ 1 & 0 & -1 \end{pmatrix}$	(3)	1

Table: M2ES1

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number :** 55 **Question Id :** 640653611418 **Question Type :** MCQ **Is Question Mandatory :** No **Calculator :** None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction Time :** 0

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct option to match the affine subspace of Row 1 with the associated subspaces and dimension.

**Options :**

6406532041816. ✘  $(i) \rightarrow (c) \rightarrow (1)$

6406532041817. ✘  $(i) \rightarrow (b) \rightarrow (1)$

6406532041818. ✔  $(i) \rightarrow (c) \rightarrow (2)$

6406532041819. ✘  $(i) \rightarrow (a) \rightarrow (1)$

**Question Number : 56 Question Id : 640653611419 Question Type : MCQ Is Question**

**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct option to match the affine subspace of Row 2 with the associated subspaces and dimension.

**Options :**

6406532041820. ✘  $(ii) \rightarrow (a) \rightarrow (3)$

6406532041821. ✔  $(ii) \rightarrow (a) \rightarrow (1)$

6406532041822. ✖ (ii) → (c) → (2)

6406532041823. ✖ (ii) → (b) → (1)

**Question Number : 57 Question Id : 640653611420 Question Type : MCQ Is Question**

**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction**

**Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct option to match the affine subspace of Row 3 with the associated subspaces and dimension.

**Options :**

6406532041824. ✖ (iii) → (a) → (3)

6406532041825. ✖ (iii) → (c) → (1)

6406532041826. ✖ (iii) → (a) → (2)

6406532041827. ✔ (iii) → (b) → (3)

**Sub-Section Number :**

5

**Sub-Section Id :**

64065388150

**Question Shuffling Allowed :**

Yes

**Is Section Default? :**

null

**Question Number : 58 Question Id : 640653611421 Question Type : MSQ Is Question**

**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

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

Question Label : Multiple Select Question

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

**Options :**

6406532041828. ✖  $\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$  and  $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$  are similar.

6406532041829. ✔  $\begin{pmatrix} 1 & 6 \\ 3 & 4 \end{pmatrix}$  and  $\begin{pmatrix} -2 & 0 \\ 0 & 7 \end{pmatrix}$  are equivalent.

6406532041830. ✖ If  $A^2$  is similar to  $B^2$ , then  $A$  is similar to  $B$ .

6406532041831. ✔ If  $A$  and  $B$  are similar, then  $A^2 = A$  implies  $B^2 = B$ .

**Sub-Section Number :** 6  
**Sub-Section Id :** 64065388151  
**Question Shuffling Allowed :** No  
**Is Section Default? :** null

**Question Id : 640653611422 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Question Numbers : (59 to 63)**

Question Label : Comprehension

Let  $v_1 = (1, 2, 1)$ ,  $v_2 = (2, 1, -4)$  and  $v_3 = (3, -2, 1)$  be vectors in  $\mathbb{R}^3$  equipped with usual inner product. Using this information, answer the given subquestions

**Sub questions**

**Question Number : 59 Question Id : 640653611423 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

Suppose  $v = (7, 1, 9)$  and  
 $v = \alpha v_1 + \beta v_2 + \gamma v_3$ , then  $\alpha =$

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

3

**Question Number : 60 Question Id : 640653611424 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

Suppose  $v = (7, 1, 9)$  and  
 $v = \alpha v_1 + \beta v_2 + \gamma v_3$ , then  $\beta =$

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

-1

**Question Number : 61 Question Id : 640653611425 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**



**Correct Marks : 1**

Question Label : Short Answer Question

Suppose  $v = (7, 1, 9)$  and  
 $v = \alpha v_1 + \beta v_2 + \gamma v_3$ , then  $\gamma =$

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

2

**Question Number : 62 Question Id : 640653611426 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

Let  $u_1 = \frac{v_1}{\|v_1\|}$ ,  $u_2 = \frac{v_2}{\|v_2\|}$  and  $u_3 = \frac{v_3}{\|v_3\|}$

be the columns of the matrix  $A$ .

Then  $|\det(A)| =$

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

1

**Question Number : 63 Question Id : 640653611427 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Short Answer Question

$$\text{Let } u_1 = \frac{v_1}{\|v_1\|}, u_2 = \frac{v_2}{\|v_2\|} \text{ and } u_3 = \frac{v_3}{\|v_3\|}$$

be the columns of the matrix  $A$ . Then

Sum of the squares of the elements  
of every row of  $A$  is ?

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

<b>Sub-Section Number :</b>	7
<b>Sub-Section Id :</b>	64065388152
<b>Question Shuffling Allowed :</b>	No
<b>Is Section Default? :</b>	null

**Question Id :** 640653611428 **Question Type :** COMPREHENSION **Sub Question Shuffling Allowed :** No **Group Comprehension Questions :** No **Question Pattern Type :** NonMatrix **Calculator :** None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction Time :** 0

**Question Numbers :** (64 to 65)

Question Label : Comprehension

Let  $T: \mathbb{R}^3 \rightarrow \mathbb{R}^3$  be the projection of  $\mathbb{R}^3$  onto the space  
 $W = \{(x, y, z): x + y + z = 0\}$ .

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number :** 64 **Question Id :** 640653611429 **Question Type :** MCQ **Is Question Mandatory :** No **Calculator :** None **Response Time :** N.A **Think Time :** N.A **Minimum Instruction**

**Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

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

**Options :**

6406532041837. ✓  $T(x, y, z) = \frac{1}{3}(2x - y - z, -x + 2y - z, -x - y + 2z)$

6406532041838. ✗  $T(x, y, z) = \frac{1}{3}(-2x - y - z, -x - 2y - z, -x - y - 2z)$

6406532041839. ✗  $T(x, y, z) = \frac{1}{3}(2x - y - z, -x - 2y - z, -x - y - 2z)$

**Question Number : 65 Question Id : 640653611430 Question Type : MCQ Is Question**

**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction**

**Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

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

**Options :**

6406532041840. ✗ The set of vectors  $\{(1, -1, 0), (1, 1, -2)\}$  forms a basis for the null space of  $T$ .

6406532041841. ✓ The set of vectors  $\{(1, -1, 0), (1, 1, -2)\}$  forms a basis for the range of  $T$ .

6406532041842. ✗ The rank of  $T$  is 1.

**Sub-Section Number :** 8  
**Sub-Section Id :** 64065388153  
**Question Shuffling Allowed :** Yes  
**Is Section Default? :** null

**Question Number : 66 Question Id : 640653611431 Question Type : SA Calculator : None**  
**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Short Answer Question

Consider the function  $f(x, y, z) = z(\cos x + \sin y)$  at the point  $(0, 0, 3)$ . Find the directional derivative in the direction of  $(6, 3, -2)$ .

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

1

**Sub-Section Number :** 9  
**Sub-Section Id :** 64065388154  
**Question Shuffling Allowed :** Yes  
**Is Section Default? :** null

**Question Number : 67 Question Id : 640653611432 Question Type : MCQ Is Question**  
**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction**  
**Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

The function  $T = x^2 + 2y^2 + 2z^2$  gives the temperature at each point in space. At the point  $P = (1, 1, 1)$ , in which direction should you go to get the most rapid decrease in  $T$  ?

**Options :**

6406532041844. ✓  $(-\frac{1}{3}, -\frac{2}{3}, -\frac{2}{3})$

6406532041845. ✖  $(\frac{1}{3}, \frac{2}{3}, \frac{2}{3})$

6406532041846. ✖ (1, 2, 2)

6406532041847. ✖  $(-\frac{1}{3}, \frac{2}{3}, \frac{2}{3})$

**Sub-Section Number :** 10  
**Sub-Section Id :** 64065388155  
**Question Shuffling Allowed :** No  
**Is Section Default? :** null

**Question Id : 640653611433 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0 Question Numbers : (68 to 71) Question Label : Comprehension**

Let  $f(x, y) = x^3 - 3x + y^3 - 3y^2$ .

	Critical points (Column A)		$D = \text{determinant of Hessian}/f_{xx}$ (Column B)		Extrema (Column C)
i)	(1, 2)	a)	$D > 0$ and $f_{xx} < 0$	1)	Saddle point
ii)	(-1, 2)	b)	$D > 0$ and $f_{xx} > 0$	2)	local maximum
iii)	(-1, 0)	c)	$D < 0$	3)	local minimum

Table: M2ES2

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 68 Question Id : 640653611434 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Short Answer Question

The number of critical points of the function  $f$  is

**Response Type : Numeric**

**Evaluation Required For SA : Yes**

**Show Word Count : Yes**

**Answers Type : Equal**

**Text Areas : PlainText**

**Possible Answers :**

4

**Question Number : 69 Question Id : 640653611435 Question Type : MCQ Is Question**

**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction**



**Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct entries from columns B and C in table M2ES2 corresponding to the critical point (1, 2).

**Options :**

6406532041849. ✘  $b \rightarrow 2$

6406532041850. ✘  $c \rightarrow 1$

6406532041851. ✔  $b \rightarrow 3$

6406532041852. ✘  $a \rightarrow 2$

**Question Number : 70 Question Id : 640653611436 Question Type : MCQ Is Question**

**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction**

**Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct entries from columns B and C in table M2ES2 corresponding to the critical point (-1, 2).

**Options :**

6406532041853. ✘  $b \rightarrow 2$

6406532041854. ✔  $c \rightarrow 1$

6406532041855. ✘  $b \rightarrow 3$

6406532041856. ✖  $a \rightarrow 2$

**Question Number : 71 Question Id : 640653611437 Question Type : MCQ Is Question**

**Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Choose the correct entries from columns B and C in table M2ES2 corresponding to the critical point  $(-1, 0)$ .

**Options :**

6406532041857. ✖  $b \rightarrow 2$

6406532041858. ✖  $c \rightarrow 1$

6406532041859. ✖  $b \rightarrow 3$

6406532041860. ✔  $a \rightarrow 2$

## Sem2 Intro to Python

<b>Section Id :</b>	64065341322
<b>Section Number :</b>	4
<b>Section type :</b>	Online
<b>Mandatory or Optional :</b>	Mandatory
<b>Number of Questions :</b>	15