CHAPTER-3

MATRICES

05 MARK TYPE QUESTIONS

<table>
<tr><th>Q. NO</th><th>QUESTION</th><th>MARK</th></tr>
<tr><td>1.</td><td>A manufacture produces three stationery products Pencil, Eraser and Sharpener which he sells in two markets. Annual sales are indicated below.
Market Products (in numbers)
Pencil Eraser Sharpener
A 10,000 2,000 18,000
B 6,000 20,000 8,000

If the unit sale price of Pencil, Eraser and Sharpener are Rs.2.50, Rs.1.50and Rs.1.00 respectively, and unit cost of the above three commodities are Rs.2.00, Rs.1.00 and Rs.0.50 respectively, then
1) Total revenue of market A
A) Rs.64,000 B) Rs.60,400 C) Rs.46,000 D) Rs.40,600
2) Total revenue of market B is
A) Rs.35,000 B) Rs.53,000 C) Rs.50,300 D) Rs.30,500
3) Cost incurred in market A :
A) Rs.13,000 B) Rs.30,100 C) Rs.10,300 D) Rs.31,000
4) Cost incurred in market B :
A) Rs.13,000 B) Rs.30,100 C) Rs.10,300 D) Rs.31,000
5) Profits in market A and B respectively are
A) (Rs,15,000, Rs.17,000) B) (Rs.17,000, Rs.15,000)
C) (Rs.51,000, Rs.71,000) C) (Rs.10,000, Rs.20,000)</td><td>5</td></tr>
<tr><td>2.</td><td>Three school DPS, CVC and KVS decided to organize a fair for collecting money for helping the flood victims. They sold handmade fans, mats and plates from recycled material at a cost of Rs.25, Rs.100 and Rs.50 each respectively. The number of articles sold are given as
<table>
<tr><td>School/Article</td><td>DPS</td><td>CVC</td><td>KVS</td></tr>
<tr><td>Handmade fans</td><td>40</td><td>25</td><td>35</td></tr>
<tr><td>Mats</td><td>50</td><td>40</td><td>50</td></tr>
<tr><td>Plates</td><td>20</td><td>30</td><td>40</td></tr>
</table>
1. What is the total money collected by the school DPS?
A) Rs.700 B) Rs.7000 C) Rs.6125 D) Rs.7875
2. What is the total amount of money collected by schools CVC and KVS?
A) Rs.14000 B) Rs.15,725 C) Rs.21000 D) 13,125
3. What is the total amount of money collected by all three school DPS, CVC and KVS?
A) Rs.15775 B) Rs.14,000 C) Rs.21,000 D) Rs.17125
4. How many articles are sold by three schools?
A) 230 B) 130 C) 430 D) 330
5. What is the total amount of money collected by all three school DPS, CVC?
A) Rs.14875 B) Rs.13000 C) Rs.14975 D) Rs.13875</td><td>5</td></tr>
<tr><td>3.</td><td>PROMOTING AWARENESS FOR WOMEN
To promote the making of toilet for women, an organization tried to generate awareness through
➢ House call
➢ Letters</td><td>5</td></tr>
</table>

➢ Announcement

The cost for each attempt is given bellow

- Rs.50
- Rs.20
- Rs.40

The number of attempts made in three villages X, Y and Z are given bellow

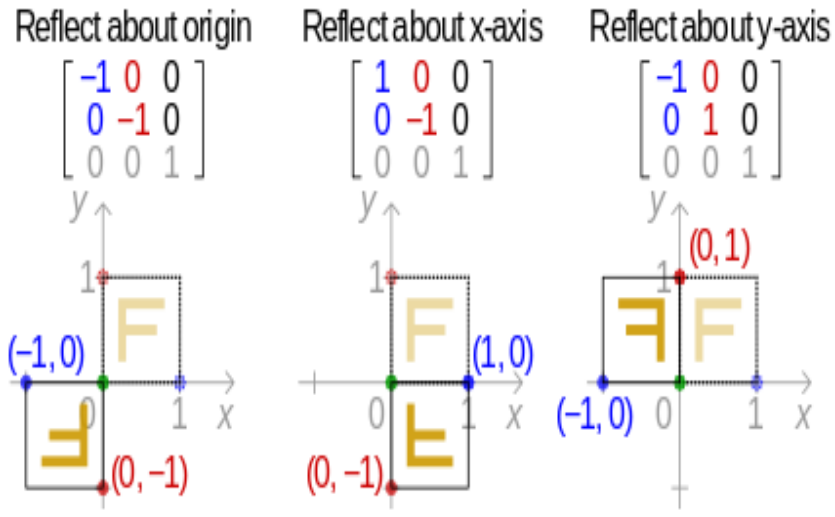
	House call	Letters	Announcements
X	400	300	100
Y	300	250	75
Z	500	400	150

Find the total cost incurred by the organization for three villages using matrices`

4. GEOMETRICAL TRANSFORMATION:- 5

Matrices allow arbitrary linear transformations to be displayed in a consistent format, suitable for computation. This also allows transformations to be composed easily (by multiplying their matrices).

Linear transformations like stretching, squeezing, rotation, shearing, reflection, orthogonal projection are not the only ones that can be represented by matrices.



- REFLECTION IN X-AXIS

If P(X,Y) is a point then its reflection in X-axis is P'(X',Y') where X'=X and Y'=-Y

Which can also be given by $\begin{pmatrix} X' \\ Y' \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} X \\ Y \end{pmatrix}$

- REFLECTION IN Y-AXIS

If P(X,Y) is a point then its reflection in Y-axis is P'(X',Y') where X'=-X and Y'=Y

	Which can also be given by $\begin{pmatrix} X' \\ Y' \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} X \\ Y \end{pmatrix}$ **REFLECTION IN ORIGIN** If P(X,Y) is a point then its reflection in origin is P'(X',Y') where X'=-X and Y'=-Y Which can also be given by $\begin{pmatrix} X' \\ Y' \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix} \begin{pmatrix} X \\ Y \end{pmatrix}$ Using this concept of transformation find the reflection of the following points (a) (2,-3) in X-axis (b) (-5,7) in Y-axis (c) (11,23) in origin	
5.	 On her birthday, Seema decided to donate some money to children of an orphanage home. If there were 8 children less, everyone would have got Rs. 10 more. However, if there were 16 Children more, everyone would have got Rs. 10 less. Let the no. Of children be *x* and the amount of money distributed be *y* (in Rs.) I. Find the equation in term of *x* and *y* and represent it in the form of Matrix. II. Find the number of children who were given some money by seema. III. How much money is given to each child by Seema. OR How much money Seema spends in distributing the money to all the students of orphanage?	5
6.	 The monthly incomes of two brother Rakesh and Rajesh are in the ratio 3:4 and the monthly expenditures are in the ratio 5:7.Each brother save ₹15000 per month. Read the above instruction and answer the following questions. (i) If monthly income of Rakesh and Rajesh are ₹3x and ₹4x and their expenditure are ₹ 5y and ₹ 7y respectively, write the system of linear equations for the above problem. (ii) write the matrix equation for question (i). (iii) If AX = B, where A, B, X are matrices then, X is (a) AB (b) AB^{-1} (c) $A^{-1}B$ (d) BA^{-1} (iv) If A= $\begin{bmatrix} 3 & -5 \\ 4 & -7 \end{bmatrix}$ then, find A^{-1}. (v) Find the monthly income of Rakesh & Rajesh respectively?	5
7.	The monthly incomes of two brothers Rakesh and Rajesh are in the ratio 3:4 and the monthly expenditures are in the ratio 5:7. Each brother saves Rs. 15000 per month. For the above data, answer the following questions:	5

	(i) If monthly income of Rakesh and Rajesh are 3x and 4x and their expenditure are 5y and 7y respectively, then identify the system of linear equations for the above problem. (a) x – y = 15000, x + y = 15000 (b) 3x + 5y = 15000, 4x + 7y = 15000 (c) 3x - 5y = 15000, 4x - 7y = 15000 (d) 5x - 3y = 15000, x - 4y = 15000 (ii) Identify the matrix equation for the above situation. (a) AX=B, where A = $\begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$, $X = (x\ y)^T$, $B = (15000\ 15000)^T$ (b) AX=B, where A = $\begin{bmatrix} 3 & 5 \\ 4 & 7 \end{bmatrix}$, $X = (x\ y)^T$, $B = (15000\ 15000)^T$ (c) AX=B, where A = $\begin{bmatrix} 5 & -3 \\ 1 & -4 \end{bmatrix}$, $X = (x\ y)^T$, $B = (15000\ 15000)^T$ (d) AX=B, where A = $\begin{bmatrix} 3 & -5 \\ 4 & -7 \end{bmatrix}$, $X = (x\ y)$T, $B = (15000\ 15000)^T$ (iii) Monthly incomes of Rakesh and Rajesh respectively are (a) 90,000 each (b) 90,000 and 1,20,000 (c) 1,20,000 and 90,000 (d) 30000 and 15000	
8.	Three friends Ravi, Raju and Rohit were buying and selling stationery items in a market. The price of per dozens of Pen, notebooks and toys are Rupees x, y and z respectively. Ravi purchases 4 dozen of notebooks and sells 2 dozen pens and 5 dozen toys. Raju purchases 2 dozen toys and sells 3 dozen pens and 1 dozen of notebooks. Rohit purchases one dozen of pens and sells 3 dozen notebooks and one dozen toys. In the process, Ravi, Raju and Rohit earn ₹ 1500, ₹ 100 and ₹400 respectively.  Answer the following questions using the matrix method: 1. What is the price of one dozen of pens? 2. What is the total price of one dozen of pens and one dozen of notebooks?	5

3. What is the sale amount of Ravi?
4. What is the amount of purchases made by all three friends?
5. What is the price of sales made by all three friends?

9. For the matrix A=$\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$, show that $A^2 - 5A + 4I = 0$. Hence find A^{-1}. — 5

10. For what value of x ,$\begin{bmatrix} 1 & 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 0 \\ 2 & 0 & 1 \\ 1 & 0 & 2 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \\ x \end{bmatrix} = 0$. — 5

11. **Read the text carefully and answer the questions:** Three schools A, B and C organized a mela for collecting funds for helping the rehabilitation of flood victims. They sold handmade fans, mats, and plates from recycled material at a cost of₹ 25, ₹ 100 and ₹ 50 each. The number of articles sold by school A, B, C are given below. — 5

Article	School	A	B	C
Fans		40	25	35
Mats		50	40	50
Plates		20	30	40

1. Represent the sale of handmade fans, mats and plates by three schools A, B and C and the sale prices (in₹) of given products per unit, in matrix form.
2. Find the funds collected by school A, B and C by selling the given articles.
3. If they increase the cost price of each unit by 20%, then write the matrix representing new price.
4. Find the total funds collected for the required purpose after 20% hike in price.

12. **Read the text carefully and answer the questions:** The nut and bolt manufacturing business has gained popularity due to the rapid Industrialization and introduction of the Capital - Intensive Techniques in the Industries that are used as the Industrial fasteners to connect various machines and structures. Mr. Suresh is in Manufacturing business of Nuts and bolts. He produces three types of bolts, x, y, and z which he sells in two markets. Annual sales (in₹) indicated below: — 5

Markets	Products		
	x	y	z
I	10000	2000	18000
II	6000	20000	8000

1. If unit sales prices of x, y and z are₹ 2.50, ₹ 1.50 and ₹ 1.00 respectively, then find the total revenue collected from Market - I &II.
2. If the unit costs of the above three commodities are₹ 2.00, ₹ 1.00 and 50 paise respectively, then find the cost price in Market I and Market II.
3. If the unit costs of the above three commodities are₹ 2.00, ₹ 1.00 and 50 paise respectively,

	then find gross profit from both the markets. 4. If matrix A = $[a_{ij}]_{2\times2}$ where a_{ij} = 1, if i ≠ j and a_{ij} = 0, if i = j then find A^2 .	
13.	If A = $\begin{bmatrix} 0 & -tan\alpha/2 \\ tan\alpha/2 & 0 \end{bmatrix}$ and I is the identity matrix of order 2, show that I + A = (I – A) $\begin{bmatrix} cos\alpha & -sin\alpha \\ sin\alpha & cos\alpha \end{bmatrix}$	5
14.	Express the following matrix A as the sum of a symmetric and a skew symmetric matrix A= $\begin{bmatrix} 3 & 2 & 5 \\ 4 & 1 & 3 \\ 0 & 6 & 7 \end{bmatrix}$.	5
15.	A manufacturer produces three products x, y, z which he sells in two markets. Annual sales are indicated below: Market Products I 10000 2000 18000 II 6000 20000 8000 (a) If unit sales prices o x, y and z are Rs. 2.50, Rs. 1.50 and Rs. 1.00 respectively, find the total revenue in each market with the help of matrix algebra. (b) If the unit costs of the above three commodities are Rs. 2.00, Rs. 1.00 and 50 paise respectively. Find the gross profit.	5
16.	Two farmers Ram and Shyam cultivates only three varieties of rice namely Basmati, Permal and Naura. The sale (in rupees) of these varieties of rice by both the farmers in the month of October and November are given by the following matrices A and B October sales (in rupees) Basmati Permal Naura A = $\begin{bmatrix} 10000 & 20000 & 30000 \\ 50000 & 30000 & 10000 \end{bmatrix}$ $\begin{matrix} Ram \\ Shyam \end{matrix}$ November sales (in rupees) Basmati Permal Naura B = $\begin{bmatrix} 5000 & 10000 & 6000 \\ 20000 & 10000 & 10000 \end{bmatrix}$ $\begin{matrix} Ram \\ Shyam \end{matrix}$ (i) Find the combined sales in October and November for each farmer in each variety. (ii) Find the decrease in sales October to November. (iii) If both farmers receive2 % profit on gross sales, compute the profit for each farmer and for each variety sold in November.	5

ANSWERS:

Q. NO	ANSWER	MARKS
1.	1-C, 2-B 3-D 4-C 5-A	5
2.	1-B 2-A 3-C 4-D 5-A	5
3.	Ans:- The above problem can be represented by matrices as- Cost matrix A =$[house\ call \quad letters \quad announcement]$ $= [50 \quad 20 \quad 40]$ X Y Z No. of attempts in villages B =$\begin{bmatrix}400 & 300 & 500\\300 & 250 & 400\\100 & 75 & 150\end{bmatrix}$ The total cost in making the awareness is given by AB i.e AB=$[50 \quad 20 \quad 40]\begin{bmatrix}400 & 300 & 500\\300 & 250 & 400\\100 & 75 & 150\end{bmatrix}$ =$\begin{bmatrix}30000\\23000\\39000\end{bmatrix}$ Thus the cost incurred to the promote making toilets for women in villages X, Y and Z are RS.30000 ,RS.23000 and RS.39000 respectively.	5
4.	Ans:- **(a)** The reflection of P(2,-3) is $\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}1 & 0\\0 & -1\end{pmatrix}\begin{pmatrix}2\\-3\end{pmatrix}=\begin{pmatrix}2\\3\end{pmatrix}$;P'(2,3) **(b)** the reflection of Q(-5,7) is $\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}-1 & 0\\0 & 1\end{pmatrix}\begin{pmatrix}-5\\7\end{pmatrix}=\begin{pmatrix}5\\7\end{pmatrix}$;Q'(5,7) **(c)** the reflection of R(11,23) is $\begin{pmatrix}x\\y\end{pmatrix}=\begin{pmatrix}-1 & 0\\0 & -1\end{pmatrix}\begin{pmatrix}11\\23\end{pmatrix}=\begin{pmatrix}-11\\-23\end{pmatrix}$;R'(-11,-23)	5
5.	(i) $5x-4y=40$ $5x-8y=-80$ $A=\begin{bmatrix}5 & -4\\5 & -8\end{bmatrix}, X=\begin{bmatrix}x\\y\end{bmatrix}, \mathrm{B}=\begin{bmatrix}40\\-80\end{bmatrix}$ (ii) 33 (iii)30 or 960	5
6.	(i) $3x-5y=15000; 4\,\mathrm{x}-7\,\mathrm{y}=15000$ (ii) AX=B Where A = $A=\begin{bmatrix}3 & -5\\4 & -7\end{bmatrix}, X=\begin{bmatrix}x\\y\end{bmatrix}, \mathrm{B}=\begin{bmatrix}15000\\15000\end{bmatrix}$ (iii) (c) (iv) $\begin{bmatrix}7 & -5\\4 & -3\end{bmatrix}$	5

	$X = A^{-1}B$ (v) $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 7 & -5 \\ 4 & -3 \end{bmatrix} \begin{bmatrix} 15000 \\ 15000 \end{bmatrix} = \begin{bmatrix} 30000 \\ 15000 \end{bmatrix}$ Monthly income of Rajesh= 120000 Monthly income of Rakesh= 90000	
7.	The equations are, 3x - 5y = 15000, 4x - 7y = 15000 In matrix form AX=B, where A = $\begin{pmatrix} 3 & -5 \\ 4 & -7 \end{pmatrix}$, $X = \begin{pmatrix} x \\ y \end{pmatrix}$,$B = \begin{pmatrix} 15000 \\ 15000 \end{pmatrix}$ $A^{-1} = \begin{pmatrix} 7 & -5 \\ 4 & -3 \end{pmatrix}$ $X = A^{-1} B = \begin{pmatrix} 7 & -5 \\ 4 & -3 \end{pmatrix} \begin{pmatrix} 15000 \\ 15000 \end{pmatrix} = \begin{pmatrix} 30000 \\ 15000 \end{pmatrix}$ Answers: (i) c (ii) d (iii) b	5
8.	Given, The price of per dozen of Pen, Notebook and toys are Rupees x. y and z respectively A/Q, 2x - 4y + 5z = 1500 3x + y - 2z = 100Type equation here. -x + 3y + z = 400 In matrix form, **AX=B , i.e** $\begin{bmatrix} 2 & -4 & 5 \\ 3 & 1 & -2 \\ -1 & 3 & 1 \end{bmatrix} \begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = \begin{bmatrix} 1500 \\ 100 \\ 400 \end{bmatrix}$ Implies $\begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = \boldsymbol{A^{-1}B}$ Implies X=200 Y=100 Z=300 (1) Rupees 100 (2) rupees 300(100+200) (3) Sell amount of Ravi= Rupees 1900 (4) Total amount of purchases= rupees 1100 (5) Total price of sells= rupees 3200	5
9.	Here A=$\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ now LHS A^2-5A +4I=$\begin{bmatrix} 6 & -5 & 5 \\ -5 & 6 & -5 \\ 5 & -5 & 6 \end{bmatrix} - 5\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix} + 4\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} =$ $0\ PROVED$	5

10.	Here $[1\ \ 2\ \ 1]\begin{pmatrix}1 & 2 & 0\\ 2 & 0 & 1\\ 1 & 0 & 2\end{pmatrix}\begin{bmatrix}0\\2\\x\end{bmatrix}$=0 or$[6\ \ 2\ \ 4]\begin{bmatrix}0\\2\\x\end{bmatrix}$=0 or 4+4x=0 or 4x=-4 or x=-1	5
11.	(i) Let P = $\begin{bmatrix}40 & 50 & 20\\25 & 40 & 30\\35 & 50 & 40\end{bmatrix}$ and Q = $\begin{bmatrix}25\\100\\50\end{bmatrix}$ (ii) Clearly, total funds collected by each school is given by the matrix PQ = = $\begin{bmatrix}40 & 50 & 20\\25 & 40 & 30\\35 & 50 & 40\end{bmatrix}\begin{bmatrix}25\\100\\50\end{bmatrix}$ = = $\begin{bmatrix}7000\\6125\\7875\end{bmatrix}$ So, funds collected by school A is Rs. 7000 funds collected by school B is Rs. 6125 funds collected by school C is Rs. 7875 (iii) New price matrix Q = 120% of $\begin{bmatrix}25\\100\\50\end{bmatrix}$ = $\begin{bmatrix}25x1.2\\100x1.2\\50x1.2\end{bmatrix}$ = $\begin{bmatrix}30\\120\\60\end{bmatrix}$ (iv) Now, PQ = $\begin{bmatrix}40 & 50 & 20\\25 & 40 & 30\\35 & 50 & 40\end{bmatrix}\begin{bmatrix}30\\120\\60\end{bmatrix}$ = $\begin{bmatrix}8400\\7350\\9450\end{bmatrix}$ Total fund collected = 8400+7350+9450 = Rs. 25200	5
12.	(i) $Let\ A = \begin{bmatrix}10000 & 2000 & 18000\\6000 & 20000 & 8000\end{bmatrix}$ and B= $\begin{bmatrix}2.5\\1.5\\1\end{bmatrix}$ Now, Revenue = Sale price x Number of items sold = $\begin{bmatrix}10000 & 2000 & 18000\\6000 & 20000 & 8000\end{bmatrix}\begin{bmatrix}2.5\\1.5\\1\end{bmatrix}$ = $\begin{bmatrix}46000\\53000\end{bmatrix}$ So, revenue from Market I = Rs. 46,000 and revenue from Market II = Rs. 53000 (ii) Now, let C = $\begin{bmatrix}2\\1\\0.5\end{bmatrix}$ Then total Cost = AC = $\begin{bmatrix}10000 & 2000 & 18000\\6000 & 20000 & 8000\end{bmatrix}\begin{bmatrix}2\\1\\0.5\end{bmatrix}$ = $\begin{bmatrix}31000\\36000\end{bmatrix}$ Cost price in market I = Rs. 31000 and cost price in market II = Rs. 36000 (iii) So, Profit matrix = Revenue matrix – Cost matrix = $\begin{bmatrix}46000\\53000\end{bmatrix}$ - $\begin{bmatrix}31000\\36000\end{bmatrix}$ = $\begin{bmatrix}15000\\17000\end{bmatrix}$ Therefore, gross profit = Rs. 15000 + Rs. 17000 = Rs. 32000 (iv) A = $\begin{bmatrix}0 & 1\\1 & 0\end{bmatrix}$ A^2 = $\begin{bmatrix}0 & 1\\1 & 0\end{bmatrix}\begin{bmatrix}0 & 1\\1 & 0\end{bmatrix}$ = $\begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$ = I	5
13.	Verification.	5
14.	1. Now , A can be written as A= ½(A+A′)+ ½ (A-A′)	5

	½ (A+A′)= $\begin{bmatrix} 3 & 3 & 5/2 \\ 3 & 1 & 9/2 \\ 5/2 & 9/2 & 7 \end{bmatrix}$ = P, say P′= P , So P is symmetric ½ (A-A′)= $\begin{bmatrix} 0 & -1 & 5/2 \\ 1 & 0 & -3/2 \\ -5/2 & 3/2 & 0 \end{bmatrix}$ = Q say, Q′= -Q, So Q is skew symmetric Now , we can check P + Q =A	
15.	(a) Let A = $\begin{bmatrix} 10000 & 2000 & 18000 \\ 6000 & 20000 & 8000 \end{bmatrix}$ and B = $\begin{bmatrix} 2.50 \\ 1.50 \\ 1.00 \end{bmatrix}$ Now Revenue, AB = $\begin{bmatrix} 10000 & 2000 & 18000 \\ 6000 & 20000 & 8000 \end{bmatrix} \begin{bmatrix} 2.50 \\ 1.50 \\ 1.00 \end{bmatrix}$ = $\begin{bmatrix} 46000 \\ 53000 \end{bmatrix}$ Hence, revenue for market I is Rs. 46000 and revenue for market II is Rs. 53000 (b) Let P = $\begin{bmatrix} 10000 & 2000 & 18000 \\ 6000 & 20000 & 8000 \end{bmatrix}$ and Q = $\begin{bmatrix} 2.00 \\ 1.00 \\ 0.50 \end{bmatrix}$ Then total cost, PQ = $\begin{bmatrix} 10000 & 2000 & 18000 \\ 6000 & 20000 & 8000 \end{bmatrix} \begin{bmatrix} 2.00 \\ 1.00 \\ 0.50 \end{bmatrix}$ = $\begin{bmatrix} 31000 \\ 36000 \end{bmatrix}$ Gross profit for market I = Revenue – total cost = Rs. 46000 – Rs. 31000 = Rs, 15000 Gross profit for market II = Revenue – total cost = Rs. 53000 – Rs. 36000 = Rs, 17000	5
16.	(i) Combined sales in October and November for each farmer is given by A + B = $\begin{bmatrix} 15000 & 30000 & 36000 \\ 70000 & 40000 & 20000 \end{bmatrix}$ (ii) Change in sale from October to November is given by A – B = $\begin{bmatrix} 5000 & 10000 & 24000 \\ 30000 & 20000 & 0 \end{bmatrix}$ (iii) 2% of B = $\frac{2}{100}\begin{bmatrix} 5000 & 10000 & 6000 \\ 20000 & 10000 & 10000 \end{bmatrix}$ = $\begin{bmatrix} 100 & 200 & 120 \\ 400 & 200 & 200 \end{bmatrix}$ Hence, in November Ram receives Rs. 100, Rs. 200 and Rs. 120 as profit in the sale of each variety of rice, respectively, and Shyam receives profit of Rs. 400, Rs. 200 and Rs. 200 in the sale of each variety of rice, respectively.	5