CHAPTER-3
MATRICES
02 MARK TYPE QUESTIONS

<table>
<tr><th>Q. NO</th><th>QUESTION</th><th>MARK</th></tr>
<tr><td>1.</td><td>Gautam buys 5 pens, 3 bags and 1 instrument box and pays a sum of Rs.160. From the shop, Vikram buys 2 pens, 1 bag and 3 instrument boxes and pays a sum of Rs.190. Also Ankur buys 1 pen, 2 bags and 4 instrument boxes and pays a sum of Rs.250.
Represent the above information in matrix equation.</td><td>2</td></tr>
<tr><td>2.</td><td>Consider two families A and B. Suppose there are 4 men, 4 women and 4 children in family A and 2 men, 2 women and 2 children in family B. The recommended daily amount of calories is 2400 for a man, 1900 for a woman 1800 for a children and 45 grams of proteins for a man, 55 grams for a woman and 33 grams for children.
What are requirement of calories of family A is:</td><td>2</td></tr>
<tr><td>3.</td><td>If $A = (a_{ij})_{mxn}\ and\ B = (b_{ij})_{mxn}$ are two matrices , then $A \pm B$ is of order mxn is defined as $(A \pm B)_{ij} = a_{ij} \pm b_{ij}$, where i=1,2,3….m, j = 1,2,3…n. $A = (a_{ij})_{mxn}\ and\ b = (b_{jk})_{nxp}$ are two matrices, then AB is of order mxp and is defined as $(AB)_{ixk} = \sum_{r=1}^{n} a_{ir}b_{rk} =$
$a_{i1}b_{1k} + a_{i2}b_{2k} + \cdots \ldots \ldots . + a_{im}b_{mk}$
Consider A = $\begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$ and B=$\begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix}, C = \begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}, D = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$
Find the matrix D such that AB-CD=0</td><td>2</td></tr>
<tr><td>4.</td><td>Two farmers Shyam and Balwan singh cultivated only three varieties of pulses namely Urad, Masoor and Mung. The sales of these varieties of pulses by both the farmers in the month of September and October are given by the following matrices A and B.
September sales in Rupees:
$A = \begin{bmatrix} 10000 & 20000 & 30000 \\ 50000 & 30000 & 10000 \end{bmatrix}$
October sales in rupees
$B = \begin{bmatrix} 5000 & 10000 & 6000 \\ 20000 & 10000 & 10000 \end{bmatrix}$
1 What is the combined sales of Masoor in September and October for Balwar Singh.</td><td>2</td></tr>
<tr><td>5.</td><td>A bolt manufacturing company produces three types of bolts x, y and z which he sell in two markets. Annual sales are indicated in the following table:
<table>
<tr><td rowspan="2">Market</td><td colspan="3">Products (in numbers)</td></tr>
<tr><td>X</td><td>Y</td><td>z</td></tr>
<tr><td>I</td><td>5000</td><td>1000</td><td>9000</td></tr>
<tr><td>II</td><td>3000</td><td>10000</td><td>4000</td></tr>
</table>
If unit sales price x, y and z are Rs.2.50, Rs.1.50 and Rs.1 respectively, then answer the following.
Total revenue collected from market I and II.</td><td>2</td></tr>
<tr><td>6.</td><td>If A = $\begin{bmatrix} ab & b^2 \\ -a^2 & -ab \end{bmatrix}$ and A^n= 0 then find minimum value of n?

i)2 ii) 3 iii) 4 iv)5</td><td>2</td></tr>
<tr><td>7.</td><td>If A =$\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ and I is the identity matrix of order 2 then (A-2I) (A-3I) =

i)1 ii) zero matrix iii) Identity matrix iv) 0</td><td>2</td></tr>
</table>

8.	For what value of p, $A^2 = 0$, where A= $\begin{bmatrix} p & 1 \\ -1 & -p \end{bmatrix}$ i)0 ii) ∓ 1 iii) -1 iv) 1	2
9.	If A = $\begin{bmatrix} 1 & tan\frac{\theta}{2} \\ -tan\frac{\theta}{2} & 1 \end{bmatrix}$ and AB = I then B= i)$\cos^2\frac{\theta}{2}$ A ii) $\cos^2\frac{\theta}{2}$ I iii) $\cos^2\frac{\theta}{2} A^T$ iv) none	2
10.	If α and β are the roots of the equation $1+x+x^2=0$, then $\begin{bmatrix} 1 & \beta \\ \alpha & \alpha \end{bmatrix}\begin{bmatrix} \alpha & \beta \\ 1 & \beta \end{bmatrix}$= i)$\begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix}$ ii)$\begin{bmatrix} -1 & -1 \\ -1 & 2 \end{bmatrix}$ iii)$\begin{bmatrix} 1 & -1 \\ -1 & 2 \end{bmatrix}$ iv)$\begin{bmatrix} -1 & -1 \\ -1 & -2 \end{bmatrix}$	2
11.	If A is a square matrix such that $A^2 = I$, then find the simplified value of $(A – I)^3 + (A + I)^3 – 7A$.	2
12.	Write the number of all possible matrices of order 2 × 2 with each entry 1, 2 or 3.	2
13.	$If\,2\begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix}+\begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix}=\begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$ then, find the value if x+ y.	2
14.	If $A=\begin{bmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{bmatrix}$ then find value of $A^2 – 3A + 2I$.	2
15.	If $A=\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & x \\ -2 & 2 & -1 \end{bmatrix}$ is a matric satisfying $AA^T = 9I_3$, find x.	2
16.	Two schools A and B want to award their selected students on the values of Honesty, Hard work and Punctuality. The school A wants to award Rs. x each, Rs. y each and Rs. z each for the three respective values to its 3, 2 and 1 students respectively with a total award money of Rs.2200. School B wants to spend Rs.3100 to award its 4, 1 and 3 students on the respective values. The total amount of award for one prize on each value is Rs.1200. Convert this problem in matrix form.	2
17.	If A = (a_{ij}) = $\begin{bmatrix} 2 & 3 & -5 \\ 1 & 4 & 9 \\ 0 & 7 & -2 \end{bmatrix}$ and B = (b_{ij}) = $\begin{bmatrix} 2 & 1 & -1 \\ -3 & 4 & 4 \\ 1 & 5 & 2 \end{bmatrix}$, then (find co factor of a_{22}) + (co factor of b_{21})	2
18.	If A and B are symmetric matrices of the same order, prove that AB + BA is symmetric.	2
19.	If A is a square matrix such that $A^2 = A$, then write the value of $7A-(I + A)^3$, where I is the identity matrix	2

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<tr><td></td><td></td><td></td></tr>
<tr><td>20.</td><td>If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, Write A^{-1}in terms of A</td><td>2</td></tr>
<tr><td>21.</td><td>If A and B are symmetric matrices, show that AB is symmetric ,if AB=BA.</td><td>2
MARKS</td></tr>
<tr><td>22.</td><td>If A=$\begin{pmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{pmatrix}$ write a_{33}+a_{12}=</td><td>2</td></tr>
<tr><td>23.</td><td>Show that A=$\begin{bmatrix} 0 & -1 & 2 \\ 1 & 0 & 3 \\ -2 & -3 & 0 \end{bmatrix}$is a skew symmetric matrix.</td><td>2</td></tr>
<tr><td>24.</td><td>If the matrix A=$\begin{bmatrix} 0 & a & -3 \\ 2 & 0 & -1 \\ b & 1 & 0 \end{bmatrix}$ is skew symmetric matrix. Find the values of a and b.</td><td>2
MARKS</td></tr>
<tr><td>25.</td><td>If $\begin{pmatrix} 2 & 3 \\ 5 & 7 \end{pmatrix}\begin{pmatrix} 1 & -3 \\ -2 & 4 \end{pmatrix} = \begin{pmatrix} -4 & 6 \\ -9 & x \end{pmatrix}, find\ the\ value\ of\ x.$</td><td>2</td></tr>
<tr><td>26.</td><td>Let A =$\begin{bmatrix} 1 & -1 & 0 \\ 2 & 1 & 3 \\ 1 & 2 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 3 \\ 0 & 1 & 1 \end{bmatrix}$. Find A ′ , B ′ and verify that(2A)′=2A ‘</td><td>2</td></tr>
<tr><td>27.</td><td>Let A =$\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$, B = $\begin{bmatrix} 4 & 0 \\ 1 & 5 \end{bmatrix}$, C = $\begin{bmatrix} 2 & 0 \\ 1 & -2 \end{bmatrix}$ Show thatA (BC) = (AB) C</td><td>2</td></tr>
<tr><td>28.</td><td>For what values 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.</td><td>2</td></tr>
<tr><td>29.</td><td>Let A =$\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$, B = $\begin{bmatrix} 4 & 0 \\ 1 & 5 \end{bmatrix}$, C = $\begin{bmatrix} 2 & 0 \\ 1 & -2 \end{bmatrix}$ Show that (AB) ′ = B ′ A ′</td><td>2</td></tr>
<tr><td>30.</td><td>There are 3 families A, B and C. The number of men, women and children in these families are as under:
<table>
<tr><th></th><th>Men</th><th>Women</th><th>Children</th></tr>
<tr><td>Family A</td><td>2</td><td>3</td><td>1</td></tr>
<tr><td>Family B</td><td>2</td><td>1</td><td>3</td></tr>
<tr><td>Family C</td><td>4</td><td>2</td><td>6</td></tr>
</table>
Daily expenses of men, women and children are₹ 200, ₹ 150 and ₹ 200 respectively. Only men and women earn and children do not. Using matrix multiplication, calculate the daily expenses of each family. What impact does more children in the family create on the society ?</td><td>2</td></tr>
<tr><td>31.</td><td>Find k if A = $\begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$, and I = $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ satisfy the relation A^2 = k A – 2I.</td><td>2</td></tr>
<tr><td>32.</td><td>If A = $\begin{bmatrix} sin\alpha & cos\alpha \\ -cos\alpha & sin\alpha \end{bmatrix}$, then verify that A'A = I.</td><td>2</td></tr>
<tr><td>33.</td><td>If A' = $\begin{bmatrix} -2 & 3 \\ 1 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} -1 & 0 \\ 1 & 2 \end{bmatrix}$, then find (A + 2B)'.</td><td>2</td></tr>
<tr><td>34.</td><td>If $\begin{bmatrix} 3x - 2y & 5 \\ x & -2 \end{bmatrix}$ = $\begin{bmatrix} 3 & 5 \\ -3 & -2 \end{bmatrix}$, find the value of y .</td><td>2</td></tr>
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<tr><td></td><td></td><td></td></tr>
<tr><td>35.</td><td>If $\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 0 \\ 1 \end{bmatrix}$, find x,y,z.</td><td>2</td></tr>
<tr><td>36.</td><td>Consider the following information regarding the number of men and women worker in three factories I, II and III
Men wokers Women wokers
I 20 25
II 15 30
III 40 50
Represent the above information in the form of a 3 x 2 matrix. What does the entry in the second row and second column represent?</td><td>2</td></tr>
<tr><td>37.</td><td>If A = $[a_{ij}]$ is a square matrix of order 2 such that $a_{ij} = \begin{cases} 1, when\ i \neq j \\ 0, when\ i = j \end{cases}$ then find A^2.</td><td>2</td></tr>
<tr><td>38.</td><td>Explain why in general (i) $(A - B)(A + B) \neq A^2 - B^2$
(ii) $(A + B)^2 \neq A^2 + 2AB + B^2$, where A and B are matrices of same order.</td><td>2</td></tr>
<tr><td>39.</td><td>There are 3 families A, B and C. The number of men, women and children in these families are as under:
<table><tr><td></td><td>Men</td><td>Women</td><td>Children</td></tr><tr><td>Family A</td><td>2</td><td>3</td><td>1</td></tr><tr><td>Family B</td><td>2</td><td>1</td><td>3</td></tr><tr><td>Family C</td><td>4</td><td>2</td><td>6</td></tr></table>Daily expenses of men, women and children are Rs. 200, Rs. 150 and Rs. 200 respectively. Using matrix, calculate the daily expenses of each family.</td><td>2</td></tr>
<tr><td>40.</td><td>In a legislative assembly election, a political group hired a public relations firm to promote its candidate in three ways: telephone, house calls and letters. The cost per contact (in paise) is given in matrix A as
$$\begin{array}{c} \textit{Cost per contact} \\ A = \begin{bmatrix} 40 \\ 100 \\ 50 \end{bmatrix} \begin{array}{l} Telrphone \\ Housecall \\ Letter \end{array} \end{array}$$
The number of contacts of each type made in two cities X and Y is given by
$$\begin{array}{cc} & \begin{array}{ccc} Telephone & Housecall & Letter \end{array} \\ B = & \begin{bmatrix} 1000 & 500 & 5000 \\ 3000 & 1000 & 10000 \end{bmatrix} \begin{array}{l} X \\ Y \end{array} \end{array}$$
Find the total amount spent by the group in two cities X and Y.</td><td>2</td></tr>
</table>

ANSWERS:

Q. NO	ANSWER	MARKS
1.	Let $A = \begin{bmatrix} 5 & 3 & 1 \\ 2 & 1 & 3 \\ 1 & 2 & 4 \end{bmatrix}$ and B = $\begin{bmatrix} 160 \\ 190 \\ 250 \end{bmatrix}$ and X = $\begin{bmatrix} x \\ y \\ z \end{bmatrix}$ AX = B	2
2.	24,400	2
3.	AB-CD=0 $D = C^{-1}AB$ Here $C^{-1} = \frac{1}{9}\begin{bmatrix} 4 & -2 \\ -7 & 5 \end{bmatrix}$ $and\ A.B = \begin{bmatrix} 3 & 0 \\ 43 & 22 \end{bmatrix}$ D = $C^{-1}AB = \frac{1}{9}\begin{bmatrix} -74 & -44 \\ 194 & 110 \end{bmatrix}$	2
4.	$A = \begin{bmatrix} 10000 & 20000 & 30000 \\ 50000 & 30000 & 10000 \end{bmatrix}$ and $B = \begin{bmatrix} 5000 & 10000 & 6000 \\ 20000 & 10000 & 10000 \end{bmatrix}$ A+B = $\begin{bmatrix} 15000 & 30000 & 36000 \\ 70000 & 40000 & 20000 \end{bmatrix}$	2
5.	Rs.23000 and Rs.26500	2
6.	i)2 ANS:- we can find that $A^2=0$ (0 here is zero matrix) $A^3=A^2A=0\cdot A=0$ $A^n=0$ for all $n\geq 2$	2
7.	ii)zero matrix ans- (A-2I)(A-3I) = $\begin{bmatrix} 2 & 2 \\ -1 & -1 \end{bmatrix}\begin{bmatrix} 1 & 2 \\ -1 & -2 \end{bmatrix}$ = 0	2
8.	ii)∓ 1 ANS:- $A^2=0$ $P^2-1=0$ $P=\mp 1$	2
9.	iii)$\cos^2\frac{\theta}{2}A^T$ ans:- $\|A\|=1+\tan^2\frac{\theta}{2}$ AB=I ie $B=A^{-1}$ B=(adjA)\\$|A|$ B=$\begin{bmatrix} 1 & -tan\frac{\theta}{2} \\ tan\frac{\theta}{2} & 1 \end{bmatrix}/\sec^2\frac{\theta}{2}$ $=\cos^2\frac{\theta}{2}\cdot A^T$	2
10.	ii)$\begin{bmatrix} -1 & -1 \\ -1 & 2 \end{bmatrix}$ as $\alpha\ and\ \beta$ are roots of $1+x+x^2=0$ $\alpha + \beta = -1$ and $\alpha\beta=1$ Also $1 + \alpha + \alpha^2 = 0$ and $1+\beta + \beta^2 = 0$	2
11.	$A^2 = I$ ……. (i) Now, $(A – I)^3 + (A + I)^3 – 7A$ $= (A^3 – 3A^2I + 3AI^2 – I) + (A^3 + 3A^2I + 3AI^2 + I^3) – 7A$ $= A^3 – 3A^2 + 3AI – I + A^3 + 3A^2 + 3AI + I – 7A$ $[\because A^2I = A^2$ and $I^3 = I^3 = I]$ $= 2A^3 + 6AI – 7A = 2A^2 A + 6A – 7A$ $[\because AI = A]$ $= 2IA – A$ [from Eq. (1)]	2

	$= 2A - A = A$ [$\because IA = A$]	
12.	A matrix of order 2 × 2 has 4 entries. Since, each entry has 3 choices, 1, 2 or 3, therefore number of required matrices $3^4 = 3 \times 3 \times 3 \times 3 = 81$.	2
13.	X=3 , Y = 3 hence X+Y = 6	2
14.	$\begin{bmatrix} 1 & -1 & -1 \\ 3 & -3 & -4 \\ -3 & 2 & 0 \end{bmatrix}$	2
15.	$AA^T = 9I$, $\begin{bmatrix} 9 & 4+2x & 0 \\ 4+2x & 5+x^2 & -2-x \\ 0 & -2-x & 9 \end{bmatrix} = \begin{bmatrix} 9 & 0 & 0 \\ 0 & 9 & 0 \\ 0 & 0 & 9 \end{bmatrix}$ X=-2	2
16.	Let, Award money for value 1 = Rs. X Award money for value 2 = Rs. Y Award money for value 3 = Rs. Z A/Q, For school A: 3X + 2Y + Z = 2200 For school B: 4X + Y + 3Z = 3100 And X + Y + Z = 1200 In matrix form: $\begin{bmatrix} 3 & 2 & 1 \\ 4 & 1 & 3 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} X \\ Y \\ Z \end{bmatrix} = \begin{bmatrix} 2200 \\ 3100 \\ 1200 \end{bmatrix}$	2
17.	Co factor of a22+ co factor of b21 $= \begin{bmatrix} 2 & -5 \\ 0 & -2 \end{bmatrix} + \begin{bmatrix} 1 & -1 \\ 5 & 2 \end{bmatrix}$ $= \begin{bmatrix} 3 & -6 \\ 5 & 0 \end{bmatrix}$	2
18.	$A^T = A, B^T = B$ $(AB + BA)^T = B^T A^T + A^T B^T$. =BA+AB =AB+BA (Commutativity) Therefore AB+ BA is symmetric.	2
19.	$A^2=A$ $7A-(I+A)^3$ $= 7A-(I^3+A^3+3I^2A+3IA^2)$ $=7A-I-7A$ (Using $I^3=I^2=I$, $A^2=A$) $=-I$	2
20.	A=$\begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ Det A= -19 (≠ 0)	2

	Adj A= $\begin{bmatrix} -2 & -3 \\ -5 & 2 \end{bmatrix}$ A^{-1}=Adj A/Det A = 1/19$\begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ =$\frac{1}{19}$A	
21.	Given A^T=A, B^T=B and if AB is symmetric then $(AB)^T$=AB ALSO $(AB)^T = B^T A^T = BA, therefore\ AB = BA$	2
22.	Here a_{33}=9 and a_{12}=4 therefore $a_{33} + a_{12} = 13$	2
23.	Here A^t=$\begin{pmatrix} 0 & 1 & -2 \\ -1 & 0 & -3 \\ 2 & 3 & 0 \end{pmatrix}$=- $\begin{pmatrix} 0 & -1 & 2 \\ 1 & 0 & 3 \\ -2 & -3 & 0 \end{pmatrix}$=-A Therefore the matrix A is skew symmetric matrix.	2
24.	For skew symmetric matrix, $a_{ij} = -a_{ji}$ this gives $\begin{pmatrix} 0 & a & -3 \\ 2 & 0 & -1 \\ b & 1 & 0 \end{pmatrix} = -\begin{pmatrix} 0 & 2 & b \\ a & 0 & 1 \\ -3 & -1 & 0 \end{pmatrix}$ or a=-2 and b=3.	2
25.	We have $\begin{pmatrix} 2 & 3 \\ 5 & 7 \end{pmatrix}\begin{pmatrix} 1 & -3 \\ -2 & 4 \end{pmatrix} = \begin{pmatrix} -4 & 6 \\ -9 & x \end{pmatrix}$ This gives $\begin{pmatrix} -4 & 6 \\ -9 & 13 \end{pmatrix} = \begin{pmatrix} -4 & 6 \\ -9 & x \end{pmatrix}$ or x=13	2
26.	2 A = 2 $\begin{bmatrix} 1 & -1 & 0 \\ 2 & 1 & 3 \\ 1 & 2 & 1 \end{bmatrix}$ = $\begin{bmatrix} 2 & -2 & 0 \\ 4 & 2 & 6 \\ 2 & 4 & 2 \end{bmatrix}$ (2 A)' = $\begin{bmatrix} 2 & 4 & 2 \\ -2 & 2 & 4 \\ 0 & 6 & 2 \end{bmatrix}$ 2 A' = 2 $\begin{bmatrix} 1 & 2 & 1 \\ -1 & 1 & 2 \\ 0 & 3 & 1 \end{bmatrix}$ = $\begin{bmatrix} 2 & 4 & 2 \\ -2 & 2 & 4 \\ 0 & 6 & 2 \end{bmatrix}$ Hence verified	2
27.	BC = $\begin{bmatrix} 8 & 0 \\ 7 & -10 \end{bmatrix}$ A(BC) = $\begin{bmatrix} 22 & -20 \\ 13 & -30 \end{bmatrix}$ AB = $\begin{bmatrix} 6 & 10 \\ -1 & 15 \end{bmatrix}$ (AB)C = $\begin{bmatrix} 22 & -20 \\ 13 & -30 \end{bmatrix}$ Hence verified	2
28.	$\begin{bmatrix} 1 & 2 & 1 \end{bmatrix}\begin{bmatrix} 1 & 2 & 0 \\ 2 & 0 & 1 \\ 1 & 0 & 2 \end{bmatrix}\begin{bmatrix} 0 \\ 2 \\ x \end{bmatrix}$ = 0. Or, [1+4+1 2+0+0 0+2+2] $\begin{bmatrix} 0 \\ 2 \\ x \end{bmatrix}$ = 0	2

	Or, $[\,6\ 2\ 2\,]\begin{bmatrix}0\\2\\x\end{bmatrix} = 0$ Or, $[\,4 + 4x] = 0$ Or, $4 + 4x = 0$ Or, $x = -1$	
29.	$AB = \begin{bmatrix}6 & 10\\-1 & 15\end{bmatrix}$ $(AB)' = \begin{bmatrix}6 & -1\\10 & 15\end{bmatrix}$ $B'A' = \begin{bmatrix}4 & 1\\5 & 0\end{bmatrix}\begin{bmatrix}1 & -1\\2 & 3\end{bmatrix} = \begin{bmatrix}6 & -1\\10 & 15\end{bmatrix}$ Hence verified	2
30.	The members of three families can be represented by a 3x3 matrix F given below $F = \begin{bmatrix}2 & 3 & 1\\2 & 1 & 3\\4 & 2 & 6\end{bmatrix}$ And the daily expenses of men, women and children can be represented by 3x1 matrix R as given below $R = \begin{bmatrix}200\\150\\200\end{bmatrix}$ The total expense for each of the three families by matrix multiplication FR as given below $FR = \begin{bmatrix}2 & 3 & 1\\2 & 1 & 3\\4 & 2 & 6\end{bmatrix}\begin{bmatrix}200\\150\\200\end{bmatrix} = \begin{bmatrix}1050\\1150\\2300\end{bmatrix}$ Hence, families A, B and C have a daily expense of Rs. 1050, Rs. 1150 and Rs. 2300.	2
31.	**K = 1**	2
32.	Verification	2
33.	$\begin{bmatrix}\mathbf{-4} & \mathbf{5}\\\mathbf{1} & \mathbf{6}\end{bmatrix}$	2
34.	Since corresponding elements of equal matrices are equal. $\therefore$ x= -3 and 3x - 2 y = 3 ⇒ y = - 6	2
35.	$\begin{bmatrix}1 & 0 & 0\\0 & -1 & 0\\0 & 0 & 1\end{bmatrix}\begin{bmatrix}x\\y\\z\end{bmatrix} = \begin{bmatrix}1\\0\\1\end{bmatrix} \Rightarrow \begin{bmatrix}x+0+0\\0-y+0\\0+0+z\end{bmatrix} = \begin{bmatrix}1\\0\\1\end{bmatrix}$ ⇒ x = 1, y = 0, z = 1.	1 1
36.	$\begin{bmatrix}20 & 25\\15 & 30\\40 & 50\end{bmatrix}$ The entry in the second row and second column represent the number of women worker in factory II.	2
37.	$A = \begin{bmatrix}0 & 1\\1 & 0\end{bmatrix}$ $A^2 = \begin{bmatrix}1 & 0\\0 & 1\end{bmatrix}$	2
38.	(A – B)(A + B) = AA + AB – BA – BB	2

	$= A^2 + AB - BA - B^2$ In general $AB \neq BA$ So $(A - B)(A + B) \neq A^2 - B^2$ Similarly, $(A + B)^2 \neq A^2 + 2AB + B^2$	
39.	Let X = $\begin{bmatrix} 2 & 3 & 1 \\ 2 & 1 & 3 \\ 4 & 2 & 6 \end{bmatrix}$ and Y = $\begin{bmatrix} 200 \\ 150 \\ 200 \end{bmatrix}$ XY = $\begin{bmatrix} 400 + 450 + 200 \\ 400 + 150 + 600 \\ 800 + 300 + 1200 \end{bmatrix}$ $= \begin{bmatrix} 1050 \\ 1150 \\ 2300 \end{bmatrix}$ Hence, families A, B and C expense Rs. 1050, Rs. 1150 and Rs. 2300 respectively	2
40.	Here BA = $\begin{bmatrix} 1000 & 500 & 5000 \\ 3000 & 1000 & 10000 \end{bmatrix} \begin{bmatrix} 40 \\ 100 \\ 50 \end{bmatrix}$ $= \begin{bmatrix} 40000 + 50000 + 250000 \\ 120000 + 100000 + 500000 \end{bmatrix}$ $= \begin{bmatrix} 340000 \\ 720000 \end{bmatrix}$ So the total amount spent by the group in cities X and Y are 340000 paise and 720000 paise i.e Rs. 3400 and Rs. 7200 respectively.	2