Matrices

Multiple Choice Questions :-

Q1. If a matrix has 8 elements then the total number of different orders of writing the matrices.

A) 1 B)2 C)3 D)4

Q2. Let A and B are two matrices and A+B and AB both exist, then

A) A and B are square matrices B) A and B are mXn matrices.

C) A and B are square matrices of same order. D)None

Q3. The number of all possible matrices of order 3x3 with each entry 1 or 2 is

A) 27 B)18 C)81 D)512

Q4. From the following, Identify the wrong statement.

A) Matrix multiplication satisfies associative property.

B) Matrix multiplication is distributive over addition.

C) Matrix multiplication satisfies commutative property.

D) For every non-singular square matrix, inverse exists.

Q5. If A and B are symmetric matrices of same order, then AB - BA is a

A) Skew Symmetric matrix B) Zero matrix

C) Identity matrix D) Symmetric matrix

Q6. The principal diagonal elements of a skew symmetric matrix are

A) 1 B) 0 C) 0 or 1 D) None of these

Q7. The number of all possible matrices of order 3 × 3 with each entry 0 or 1 or 2 is:

A) 3^3 B)3^5 C) 3^8 D) 3^9

Q8. If A and B are symmetric matrices of same order, then

A) Skew symmetric matrix B) Null matrix

C) Symmetric matrix D) None of these

Q9. If A and B are matrices of same order, then (AB'–BA') is a

A) skew symmetric matrix B) null matrix

C) symmetric matrix D) unit matrix

Q10. If A is a 2 × 3 matrix and AB is a 2 × 5 matrix, then B must be a

A) 3 × 5 matrix B) 5 × 3 matrix

C) 3 × 2 matrix D) 5 × 2 matrix

ANSWERS

1.D 2.C 3.D 4.C 5.A 6.B 7.D 8.A 9.A 10.A

Case Study Based Questions :-

Case Study Question – 1

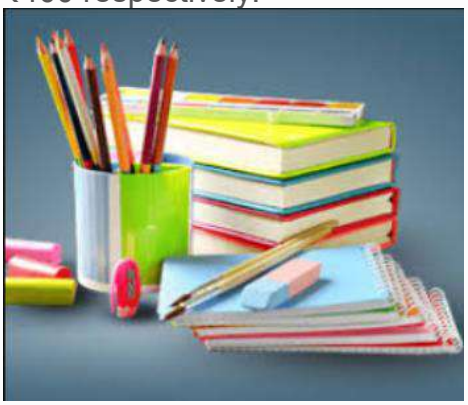
Two schools P and Q want to award their selected students on the values of Tolerance, Kindness, and Leadership. The school P wants to award Rs x each, Rs y each and Rs z each for the three respective values to 3, 2 and 1 students respectively with total award money of Rs. 2200. School Q wants to spend Rs 3100 to award its 4, 1 and 3 students on the respective values (by giving the same award money to the three values as school P). If the total amount of award for one prize on each value is Rs1200, using matrices, find the following:

1. What is award money for Tolerance?
    1. 350
    2. 300
    3. 500
    4. 400
2. What is the award money for Leadership?
    1. 300
    2. 280
    3. 450
    4. 500
3. What is the award money for Kindness?
    1. 500
    2. 400
    3. 300
    4. 550
4. If a matrix A is both symmetric and skew-symmetric, then
    1. A is a diagonal matrix
    2. A is a scalar matrix
    3. A is a zero matrix
    4. A is a square matrix
5. If A and B are two matrices such that AB = B and BA = A, then B^2 is equal to
    1. B
    2. A
    3. 1
    4. 0

Case Study Question - 2

Read the case study carefully and answer any four out of the following questions:

Three friends Ravi, Raju and Rohit were buying and selling stationery items in a market. The price of per dozen 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?
    1. ₹ 100
    2. ₹ 200
    3. ₹ 300
    4. ₹ 400
2. What is the total price of one dozen of pens and one dozen of notebooks?
    1. ₹ 100
    2. ₹ 200
    3. ₹ 300
    4. ₹ 400
3. What is the sale amount of Ravi?
    1. ₹ 1000
    2. ₹ 1100
    3. ₹ 1300
    4. ₹ 1200
4. What is the amount of purchases made by all three friends?
    1. ₹ 1200
    2. ₹ 1500
    3. ₹ 1300
    4. ₹ 1400
5. What is the price of sales made by all three friends?
    1. ₹ 3000
    2. ₹ 2500
    3. ₹ 2700
    4. ₹ 2400

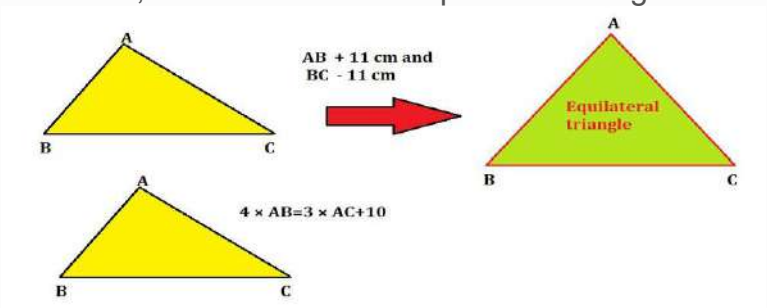
Answer Key:

1. (a) ₹ 100
2. (c) ₹ 300
3. (d) ₹ 1200
4. (b) ₹ 1500
5. (c) ₹ 2700

Case Study Questions – 3

Read the case study carefully and answer any four out of the following questions:

Once a mathematics teacher drew a triangle ABC on the blackboard. Now he asked Jose," If I increase AB by 11 cm and decrease the side BC by 11 cm, then what type of triangle it would be?" Jose said, "It will become an equilateral triangle."



Again teacher asked Suraj," If I multiply the side AB by 4 then what will be the relation of this with side AC?"

Suraj said it will be 10 cm more than the three times AC.

Find the sides of the triangle using the matrix method and answer the following questions:

1. What is the length of the smallest side?
    1. 54 cm
    2. 43 cm
    3. 30 cm
    4. 35 cm
2. What is the length of the largest side?
    1. 54 cm
    2. 43 cm
    3. 65 cm
    4. 35 cm
3. What is the perimeter of the triangle?
    1. 150 cm
    2. 160 cm
    3. 165 cm
    4. 162cm
4. What is the side of the equilateral triangle formed?
    1. 54 cm
    2. 43 cm
    3. 30 cm
    4. 35 cm
1. What is the order of the matrix formed?
    1. 3 × 3
    2. 2 × 3
    3. 3 × 2
    4. 2 × 2

Answer

1. (b) 43 cm 2. (c) 65 cm 3. (d) 162 cm 4. (a) 54 cm 5. (a) 3 × 3

ASSERTION AND REASONING TYPE QUESTIONS

1.	**Assertion (A)**	The value of x for which $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$ is $\pm 2\sqrt{2}$
	Reason(R)	The determinant of a matrix A order 2x2, A= $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is = ad – bc
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

2.	**Assertion (A)**	The value of x for which $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$ is $\pm$ 6
	Reason(R)	The determinant of a matrix A order 2 x 2 , A= $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ is = ab– dc
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

3.	**Assertion (A)**	If A= $\begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 0 & 0 & 4 \end{bmatrix}$ then $\lvert 3A \rvert$ =9$\lvert A \rvert$
	Reason(R)	If A is a square matrix of order n then $\lvert kA \rvert$ =k$^n\lvert A \rvert$
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

4.	**Assertion (A)**	If A is a non singular square matrix of order 3x3 and$\lvert A \rvert$ =5 then $\lvert adjA \rvert$ is equal to 125
	Reason(R)	$\lvert adjA \rvert$ =($\lvert A \rvert$)$^{n-1}$where n is order of A.
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	

C	A is true but R is false
D	A is false but R is true
E	Both A and R are false

5.	**Assertion (A)**	Let $A^{-1}=\begin{bmatrix}5 & -7\\ -2 & 3\end{bmatrix}$ and $B^{-1}=\begin{bmatrix}7 & 6\\ 8 & 7\end{bmatrix}$ then $(AB)^{-1}=\begin{bmatrix}23 & 31\\ 26 & 35\end{bmatrix}$
	Reason(R)	$(AB)^{-1} = A^{-1}B^{-1}$
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

6.	**Assertion (A)**	Value of x for which the matrix $\begin{bmatrix}1 & 2 & 0\\ 0 & 1 & 2\\ -1 & 2 & x\end{bmatrix}$ is singular is 5
	Reason(R)	A square matrix is singular if $\lvert A\rvert = 0$
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

7.	**Assertion (A)**	The minor of the element 3 in the matrix $\begin{bmatrix}2 & 3 & 1\\ 0 & -2 & 4\\ 2 & 1 & 5\end{bmatrix}$ is 8.
	Reason(R)	: Minor of an element $\mathbf{a_{ij}}$ of a matrix is the determinant obtained by deleting its j^{th} row and i^{th} column
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

8.	**Assertion (A)**	For two matrices A and B of order 3, $\|A\|=2\|B\|$ = -3 then if$\|2AB\|$ is -48.
	Reason(R)	For a square matrix A, A(adj A)=(adj A)A=$\|A\|$ I
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

9.	**Assertion (A)**	Values of k for which area of the triangle with vertices (2, -6), (5,4) and (k,4) is 35 sq units are 12, 2.
	Reason(R)	Area of a triangle with vertices A (x_1, y_1),B (x_2, y_2) and C (x3, y3) is $\frac{1}{2}\begin{vmatrix} x1 & y1 & 1 \\ x2 & y2 & 1 \\ x3 & y3 & 1 \end{vmatrix}$
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

10.	**Assertion (A)**	The points A(a, b+c), B(b, c+a) and C(c, a+b) are collinear.
	Reason(R)	Three points A (x_1, y_1) , B(x_2, y_2) and C(x3, y_3) are collinear if area of a triangle ABC is zero.
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

11.	**Assertion (A)**	Inverse of the matrix $\begin{bmatrix} 1 & -1 & 2 \\ 0 & 2 & -3 \\ 3 & -2 & 4 \end{bmatrix}$ is the matrix $\begin{bmatrix} -2 & 0 & 1 \\ 9 & 2 & -3 \\ 6 & 1 & -2 \end{bmatrix}$
	Reason(R)	: Inverse of a square matrix A, if it exits is given by $A^{-1} = \frac{1}{\|A\|}$ adjA

A	Both A and R are true and R is the correct explanation of A
B	Both A and R are true but R is NOT the correct explanation of A.
C	A is true but R is false
D	A is false but R is true
E	Both A and R are false

12.	**Assertion (A)**	For a matrix A=$\begin{bmatrix} 2 & -1 \\ -3 & 4 \end{bmatrix}$, A. adj A =$\begin{bmatrix} 4 & 0 \\ 0 & 4 \end{bmatrix}$
	Reason(R)	For a square matrix A , A(adj A) = (adj A)A=$\lvert A \rvert$ I

A	Both A and R are true and R is the correct explanation of A
B	Both A and R are true but R is NOT the correct explanation of A.
C	A is true but R is false
D	A is false but R is true
E	Both A and R are false

13.	**Assertion (A)**	In a square matrix of order 3 the minor of an element a_{22} is 6 then cofactor of $a_{22}$is -6.
	Reason(R)	Cofactor an element a_{ij} = A_{IJ}= (-1)$^{i+j}$$M_{ij}$

A	Both A and R are true and R is the correct explanation of A
B	Both A and R are true but R is NOT the correct explanation of A.
C	A is true but R is false
D	A is false but R is true
E	Both A and R are false

14.	**Assertion (A)**	Inverse of a matrix A =$\begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ is the matrix A^{-1} =$\begin{bmatrix} 2 & -3 \\ -1 & 2 \end{bmatrix}$
	Reason(R)	: Inverse of a square matrix $\begin{pmatrix} a & b \\ c & d \end{pmatrix}$is $\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$.

A	Both A and R are true and R is the correct explanation of A
B	Both A and R are true but R is NOT the correct explanation of A.
C	A is true but R is false
D	A is false but R is true
E	Both A and R are false

15.	**Assertion (A)**	If A is an invertible matrix of order 2, and det A= 3 then det(A^{-1})is equal to $\frac{1}{3}$

	Reason(R)	If A is an invertible matrix of order 2 then det (A^{-1}) = $\det A$
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

16.	**Assertion (A)**	The equation of the line joining (1,2) and (3,6) using determinants is y= 3x.
	Reason(R)	The area of ΔPAB is zero if P(x, y) is a point on the line joining a A and B.
A	Both A and R are true and R is the correct explanation of A	
B	Both A and R are true but R is NOT the correct explanation of A.	
C	A is true but R is false	
D	A is false but R is true	
E	Both A and R are false	

Answers

1	A	2	C	3	D	4	D	5	E
6	D	7	E	8	B	9	D	10	A
11	A	12	D	13	D	14	C	15	C
16	D								