CLASS 12

MATHS

## MATRICES

## **OPERATION ON MATRICES**

## EXERCISE

Q.1 Find the values of a, b, c, x, y, z if 
$$\begin{bmatrix} x+3 & z+4 & 2y-7 \\ -6 & a-1 & 0 \\ b-3 & -21 & 0 \end{bmatrix} = \begin{bmatrix} 0 & 6 & 3y-2 \\ -6 & -3 & 2c+2 \\ 2b+4 & -21 & 0 \end{bmatrix}$$

**Q.2** Suppose 
$$A = \begin{bmatrix} 1 & -3 & 2 \\ 2 & 1 & -3 \\ 4 & -3 & -1 \end{bmatrix}, B = \begin{bmatrix} 1 & 4 & 1 & 0 \\ 2 & 1 & 1 & 1 \\ 1 & -2 & 1 & 2 \end{bmatrix} \& C = \begin{bmatrix} 1 & 1 & -1 & -2 \\ 3 & -2 & -1 & -1 \\ 2 & -5 & -1 & 0 \end{bmatrix}$$
 are matrices

then, Prove that the cancellation law does not hold in matrix multiplication.

**Q.3** Given matrices A and B such that  $A + B = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ ,  $A - B = \begin{bmatrix} 3 & 2 \\ -2 & 0 \end{bmatrix}$  find the product AB.

**Q.4** If  $f(x) = x^2 - 3x + 3$  and  $A = \begin{bmatrix} 2 & 1 \\ -1 & 1 \end{bmatrix}$  is a square matrix then demonstrate that

f(A) = 0. Consequently determine  $A^4$ .

**Q.5** The expression 
$$\begin{bmatrix} 1 & -\tan\frac{\theta}{2} \\ \tan\frac{\theta}{2} & 1 \end{bmatrix} \begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}^{-1}$$
 is equal to What?

**Q.6** If 
$$A = \begin{bmatrix} 8 & 0 \\ 4 & -2 \\ 3 & 6 \end{bmatrix}$$
 is a matrix such that  $2A + 3X = 5B$  where  $B = \begin{bmatrix} 2 & -2 \\ 4 & 2 \\ -5 & 1 \end{bmatrix}$  is

another matrix, find the matrix X.

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**Q.7** Given A = 
$$\begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$$
, demonstrate that A<sup>3</sup> - 23A - 40 I = 0

**Q.8** For matrices A and B, where A is of order m × n and B is of order n × n =, determine which of the following matrix products are defined:

(A) AB, BA (B) AB, 
$$A^2$$
 (C)  $A^2$ ,  $B^2$  (D) AB,  $B^2$ 

**Q.9** Given 
$$A = \begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$$
 and  $A^2 + kI = 8A$ , determine the value of k.

(A) 4 (B) 8 (C) 
$$\frac{1}{4}$$
 (D)  $\frac{1}{16}$ 

**Q.10** If matrices A,B,C have dimensions 1 × 3, 3 × 3 and 3 × 1 respectively, what will be the dimensions of the matrix product ABC ?

(A)  $3 \times 3$  (B)  $1 \times 3$  (C)  $1 \times 1$  (D)  $3 \times 1$ 

## **ANSWER KEY**

1. 
$$a = -2, b = -7, c = -1, x = -3, y = -5, z = 2$$

- **3.**  $AB = \begin{bmatrix} 2 & 2 \\ 0 & 2 \end{bmatrix} \begin{bmatrix} -1 & 0 \\ 2 & 2 \end{bmatrix} = \begin{bmatrix} 2 & 4 \\ 4 & 4 \end{bmatrix}$
- **5.**  $\begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$

$$6. \qquad \begin{bmatrix} -2 & \frac{-10}{3} \\ 4 & \frac{14}{3} \\ \frac{-31}{3} & \frac{-7}{3} \end{bmatrix}$$

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8.	(D)	АВ, В <sup>2</sup>						
9.	(B)	8						
10	(C)	$1 \times 1$						