

Class: XII
Subject: Maths
Topic: Matrices
No. of Questions: 26

Q1. If A is a diagonal matrix, what is the value of A^T ?

1. I
2. A
3. A^{-1}
4. A^2

Q2. If $a_{ij} = 0$ for all value of i and j , then it is a

1. null matrix
2. row matrix
3. identity matrix
4. none of these

Q3. If the rank of matrix is 3, then its order could be

1. 3×3
2. 3×2
3. 2×2
4. 2×1

Q4. The inverse of a symmetric matrix is:

1. Symmetric
2. Skew symmetric
3. Diagonal matrix
4. None of these

Q5. If a matrix is of order 2×7 , the number of elements in it is

1. 14
2. 7
3. 2
4. 9

Q6. If $A = \begin{bmatrix} 1 & 2 \\ 0 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -2 & 0 \\ 1 & 0 \end{bmatrix}$, then

1. $AB = BA = 0$
2. $AB = 0, BA \neq 0$
3. $BA = 0, AB \neq 0$
4. none of the above

Q7. If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$, then for all natural numbers n , A^n is equal to

1. $\begin{bmatrix} n & 0 \\ 1 & 1 \end{bmatrix}$
2. $\begin{bmatrix} 1 & 0 \\ n & 1 \end{bmatrix}$
3. $\begin{bmatrix} 1 & 0 \\ 1 & n \end{bmatrix}$
4. None of these

Q8. If $f(x) = x^2 + 4x - 5$ and $A = \begin{bmatrix} 1 & 2 \\ 4 & -3 \end{bmatrix}$, then $f(A) =$

1. $\begin{bmatrix} 0 & -4 \\ 8 & 8 \end{bmatrix}$
2. $\begin{bmatrix} 2 & 1 \\ 2 & 0 \end{bmatrix}$
3. $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$
4. $\begin{bmatrix} 8 & 4 \\ 8 & 0 \end{bmatrix}$

Q9. Let A be $\begin{bmatrix} 5 & 5\alpha & \alpha \\ 0 & \alpha & 5\alpha \\ 0 & 0 & 5 \end{bmatrix}$. If $|A^2| = 25$, then $|\alpha|$ is equal to

1. 5^2
2. 1
3. $\frac{1}{5}$
4. 5

Q10. Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}$, $a, b \in \mathbb{N}$, then

1. there exist more than one but finite number of B's such that $AB = BA$
2. there exists exactly one B such that $AB = BA$
3. there exists infinitely many B's such that $AB = BA$
4. there cannot exist any B such that $AB = BA$

Q11. If A and B are square matrices of size $n \times n$ such that $A^2 - B^2 = (A - B)(A + B)$, then which of the following will be always true?

1. $AB = BA$
2. either A or B is a zero matrix
3. either A or B is an identity matrix
4. $A = B$

Q12. If $A = \begin{bmatrix} 3 & 5 \\ 2 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 17 \\ 0 & -10 \end{bmatrix}$, then $|AB|$ is equal to

1. 80
2. 100
3. -110
4. 92

Q13. If $\begin{bmatrix} 1 & -\tan \theta \\ \tan \theta & 1 \end{bmatrix} \begin{bmatrix} 1 & \tan \theta \\ -\tan \theta & 1 \end{bmatrix} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$, then

1. $a = 1, b = 1$
2. $a = \sin 2\theta, b = \cos 2\theta$
3. $a = \cos 2\theta, b = \sin 2\theta$
4. none of these

Q14. The matrix $\begin{bmatrix} 0 & -3 & 4 \\ 3 & 0 & -5 \\ -4 & 5 & 0 \end{bmatrix}$ is:

1. symmetric
2. skew-symmetric
3. non-singular
4. singular

Q15. Find the inverse of a matrix $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$.

1. $\begin{bmatrix} -2 & 1 \\ \frac{-3}{2} & \frac{-1}{2} \end{bmatrix}$
2. $\begin{bmatrix} 2 & -1 \\ \frac{-3}{2} & \frac{1}{2} \end{bmatrix}$
3. $\begin{bmatrix} 2 & 1 \\ \frac{3}{2} & \frac{1}{2} \end{bmatrix}$
4. $\begin{bmatrix} -2 & 1 \\ \frac{3}{2} & \frac{-1}{2} \end{bmatrix}$

Q16. If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ satisfies the relation $A^n = kA + mI$, the values of k and m are

1. $(k, m) = (n, n - 1)$
2. $(k, m) = (n, n)$
3. $(k, m) = (n, n + 1)$
4. $(k, m) = (n, 1 - n)$

Q17. For any two 3×3 matrices P and Q, if $PQ = P$ and $QP = Q$, find the value of $P^2 + Q^2$.

1. PQ
2. QP
3. P - Q
4. P + Q

Q18. In trigonometry,

$$\sin(A+B) = \sin A \cos B + \cos A \sin B, \cos(A+B) = \cos A \cos B - \sin A \sin B$$

If $A = \begin{bmatrix} \cos A & -\sin A \\ \sin A & \cos A \end{bmatrix}$ and $B = \begin{bmatrix} \cos B & -\sin B \\ \sin B & \cos B \end{bmatrix}$, find the value of $A^n + B^n$.

1. $\begin{bmatrix} \cos nA - \cos nB & -(\sin nA + \sin nB) \\ \sin nA + \sin nB & \cos nA - \cos nB \end{bmatrix}$
2. $\begin{bmatrix} \cos nA + \cos nB & -(\sin nA + \sin nB) \\ \sin nA + \sin nB & \cos nA + \cos nB \end{bmatrix}$
3. $\begin{bmatrix} \cos nA + \cos nB & \sin nA + \sin nB \\ \sin nA + \sin nB & \cos nA + \cos nB \end{bmatrix}$
4. $\begin{bmatrix} \cos nA + \cos nB & -(\sin nA - \sin nB) \\ \sin nA - \sin nB & \cos nA + \cos nB \end{bmatrix}$

Q19. In trigonometry, $\sin(A+B) = \sin A \cos B + \cos A \sin B$, $\cos(A+B) = \cos A \cos B - \sin A \sin B$

If $A = \begin{bmatrix} \cos A & -\sin A \\ \sin A & \cos A \end{bmatrix}$ and $B = \begin{bmatrix} \cos B & -\sin B \\ \sin B & \cos B \end{bmatrix}$, what is the value of $A^n \times B^n$?

1. $\begin{bmatrix} \cos n(A-B) & -\sin n(A+B) \\ \sin n(A+B) & \cos n(A-B) \end{bmatrix}$
2. $\begin{bmatrix} \cos n(A+B) & -\sin n(A-B) \\ \sin n(A-B) & \cos n(A+B) \end{bmatrix}$
3. $\begin{bmatrix} \cos n(A+B) & -\sin n(A+B) \\ \sin n(A+B) & \cos n(A+B) \end{bmatrix}$
4. $\begin{bmatrix} \cos n(A+B) & \sin n(A+B) \\ \sin n(A+B) & \cos n(A+B) \end{bmatrix}$

Q20. The matrix product $\begin{bmatrix} 1 \\ -2 \\ 3 \end{bmatrix} [4 \ 5 \ 2] \begin{bmatrix} 2 \\ -3 \\ 5 \end{bmatrix}$ equals

1. $\begin{bmatrix} 3 \\ -6 \\ 9 \end{bmatrix}$
2. $\begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix}$
3. $\begin{bmatrix} 3 \\ 6 \\ -9 \end{bmatrix}$
4. none of these

Q21. 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 of $(x + y)$, [Delhi 2013C; All India 2012]

Q22. If $\begin{bmatrix} y + 2x & 5 \\ -x & 3 \end{bmatrix} = \begin{bmatrix} 7 & 5 \\ -2 & 3 \end{bmatrix}$, then find the value of y .
[Foreign 2009]

Q23. If $A = \begin{pmatrix} 2 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & -1 & 0 \end{pmatrix}$, then find value of
 $A^2 - 3A + 2I$. [All India 2010]

Q24. For the following matrices A and B, verify that

$$[AB]' = B'A'; \quad A = \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix},$$

$$B = [-1 \ 2 \ 1]$$

[All India 2010]

Q25. Express the following matrix as a sum of a symmetric and a skew-symmetric matrix and

Verify your result $\begin{bmatrix} 3 & -2 & -4 \\ 3 & -2 & -5 \\ -1 & 1 & 2 \end{bmatrix}$.

[Hots; All India 2010]

Q26. Using elementary row transformation, find inverse of following matrices

$$\begin{bmatrix} -1 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$$

[Delhi 2012]