

MATRICES

ONE MARKS QUESTIONS

1. Show by means of an example that the product of two non- zero matrices can be a zero matrix.
2. Construct a 3×2 matrix whose elements are given by $a_{ij} = e^{ix} \sin jx$. (Exemplar)
3. Solve for x and y for $x \begin{bmatrix} 2 \\ 1 \end{bmatrix} + y \begin{bmatrix} 3 \\ 5 \end{bmatrix} + \begin{bmatrix} -8 \\ -11 \end{bmatrix} = 0$ (Exemplar).
4. Give an example of matrices A,B and C such that $AB = AC$, Where A is non-zero matrix, but $B \neq C$.
5. Show that $A^T A$ and AA^T are both symmetric matrices for any matrix A. (Exemplar).

FOUR MARKS QUESTIONS

6. If $A = \begin{pmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{pmatrix}$ prove that $A^2 - 4A - 5I = 0$. Hence find A^{-1}
7. Given $A = \begin{pmatrix} 3 & -4 \\ 1 & -1 \end{pmatrix}$ show by induction that $A^n = \begin{pmatrix} 1+2n & -4n \\ n & 1-2n \end{pmatrix}$
8. If $X = \begin{bmatrix} 3 & 1 & -1 \\ 5 & -2 & -3 \end{bmatrix}$ and $Y = \begin{bmatrix} 2 & 1 & -1 \\ 7 & 2 & 4 \end{bmatrix}$, Find a matrix Z such that $X+Y+Z$ is a zero matrix. (Exemplar).
9. Find the matrix A satisfying the matrix equation :
 $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix} A \begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$. (Exemplar).
10. Prove by mathematical induction that
 $(A^T)^n = (A^n)^T$, where $n \in N$ for any square matrix A. (Exemplar).
11. If $F(\theta) = \begin{pmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{pmatrix}$ show that $F(\theta)F(\varphi) = F(\theta + \varphi)$.
12. Find the inverse by elementary Operations $\begin{bmatrix} 2 & -1 & 3 \\ 1 & 3 & -1 \\ 3 & 2 & 1 \end{bmatrix}$.
13. Express the matrix $\begin{bmatrix} 2 & 3 & 1 \\ 1 & -1 & 2 \\ 4 & 1 & 2 \end{bmatrix}$ as the sum of a symmetric and skew symmetric matrix.
 (Exemplar).
14. Find the value of x , if
 $\begin{bmatrix} 1 & x & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = 0$.