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 $a_{ij} = e^{ix} sinjx$.(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≠C.

5. Show that $A^T A \text{ and } AA^T$ 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 $A^2 - 4A - 5I$ = 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
$[1 \quad x \quad 1]\begin{bmatrix}1 & 3 & 2\\2 & 5 & 1\\15 & 3 & 2\end{bmatrix}\begin{bmatrix}1\\2\\x\end{bmatrix} = O.$