

## ASSIGNMENT 2

Solve the following Questions

1) If  $I_3 \times \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} = \begin{bmatrix} -1 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$ , then find Matrix  $X$

2) Find  $x$  if  $\begin{bmatrix} x & 1 \\ -2 & 0 \end{bmatrix} = O$

3) Find value of  $x$  if  $\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix} \begin{bmatrix} -1 & -3 \\ -2 & 4 \end{bmatrix} = \begin{bmatrix} -4 & 6 \\ -9 & x \end{bmatrix}$

4) If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ ,  $B = \begin{bmatrix} a & 0 \\ 0 & b \end{bmatrix}$  and  $AB = BA$ , then show that  $B$  is a scalar matrix

5) If  $A = \begin{bmatrix} x & y \\ y & -x \end{bmatrix}$  and  $A^2 = I$ , then find  $x^2 + y^2$

6) If  $M_\theta = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$ , show that  $M(x) \cdot M(y) = M(x+y)$

7) If  $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ , then find  $K$  so that  $A^2 = KA - 2I$

8) If  $A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$ , and  $f(x) = x^2 - 4x + 7$ , show that  $f(A) = O$   
Use this to find  $A^3$  and  $A^5$ .

9) Proof by Mathematical induction:  $A^n = \begin{bmatrix} 2^{n-1} & 2^{n-1} \\ 2^{n-1} & 2^{n-1} \end{bmatrix}$ ,  
 $\forall n \in \mathbb{I}$ , if  $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$

10) If  $A = \begin{bmatrix} 2 & -1 & 5 \\ 4 & 0 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} -2 & 3 & 1 \\ -1 & 2 & -3 \end{bmatrix}$ , find  $A' + B'$

11) If  $A = \begin{bmatrix} \cos x & -\sin x \\ \sin x & \cos x \end{bmatrix}$ ,  $0 < x < \frac{\pi}{2}$ , and  $A + A' = I$ , find  $x$

12) If  $A = \begin{bmatrix} 2 & 4 \\ 3 & 5 \end{bmatrix}$ , show that  $A + A'$  is symmetric matrix.

13) If  $A$  is a square matrix, prove that  $A'A$  is symmetric

14)  $A$ ,  $B$  and  $AB$  all are symmetric matrices, then show that  $AB = BA$

15)  $A$ ,  $B$  are skew-symmetric matrices and  $AB = BA$ , then  $AB$  is symmetric

16)  $A = \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 2 & 1 \end{bmatrix}$ , verify that  $(AB)' = B'A'$

17)  $A = \begin{bmatrix} 2 & 4 & 0 \\ 3 & 9 & 6 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 4 \\ 1 & 3 \end{bmatrix}$ , verify that  $(AB)' = B'A'$

18)  $A = \begin{bmatrix} \sin x & \cos x \\ -\cos x & \sin x \end{bmatrix}$ , show that  $A'A = I$

19) Find value of  $x$ , if  $\begin{bmatrix} x & 4 & -1 \\ 2 & 2 & 4 \end{bmatrix} \begin{bmatrix} 2 & 1 & -1 \\ 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} x & 4 & -1 \end{bmatrix}' = O$

