UNIT-IV

CHEPTER – (Matrices and its application)

Section 'A' **1 Mark each**

1. If the order of a matrix A is m x n and that of a matrix B is n x p. Then what is the order of the matrix AB.
2. If A is a square matrix of order 3x3 and $|A| = 2$ *find* $|adj\ A|$
3. If $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}$ Find A+I where I is the identity matrix of order 2.
4. Construct a 2x2 matrix whose elements are given by $Rij = i+j\ \forall$ I = 1,2 $j = 1, 2$
5. If order of a matrix AB is 2x3 and order of the matrix A is 2x2, then what is the order of the matrix B.
6. If $A = \begin{bmatrix} 1 & 0 \\ 2 & -1 \end{bmatrix}, B = \begin{bmatrix} 1 & -5 \\ -3 & 2 \end{bmatrix}$ Find A-B.
7. What is the number of all possible matrices of order 3x3 with each entry 0 or 1. (zero of one)
8. Construct a 2x3 matrix whose elements are $\frac{i+j}{2}$,
9. If a matrix has 6 elements, what are the possible orders it can have.
10. If $\begin{bmatrix} 3x+2 & 5 \\ 2 & x+1 \end{bmatrix} = \begin{bmatrix} 5 & 5 \\ 2 & 2 \end{bmatrix}$ Find the value of x.
11. If $A = diag\,[2, -2, 7]\ and\ B = diag\,[-1, 2, 4]$ then find $A+B$.
12. If matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 6 & 1 & 2 \\ 0 & -4 & 5 \end{bmatrix}$ Find the $(1,\ 3)^{th}$ element of A.
13. What is the order of the matrix [1 5 7].
14. If $X + Y = \begin{bmatrix} 1 & -5 \\ 6 & 2 \end{bmatrix}\ and\ X = \begin{bmatrix} 1 & -2 \\ -3 & 4 \end{bmatrix}\ find\ Y.$
15. Write the following equations in the form of a single matrix equation $\begin{matrix} 3x+10y=7 \\ 5x+15y=11 \end{matrix}$
16. If $A = \begin{pmatrix} a & h & g \\ h & b & f \\ g & f & c \end{pmatrix}$ find A^{-1}
17. Give an example of a symmetric matrix.
18. If $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then find A^{2}.

19. If $A=\begin{bmatrix}2 & 5\\ 3 & -4\end{bmatrix}$ Find adj A.

20. If A and B are two invertible square matrix then $(AB)^{-1}$ is equal to ……

Section 'B' **4 Mark each**

1. If $A=\begin{bmatrix}3 & 4\\ 2 & 5\end{bmatrix} and\ B=\begin{bmatrix}1 & 3 & 4\\ 0 & -2 & 2\end{bmatrix}$

   Find AB or BA which ever exist.

2. If $2X+3Y=\begin{bmatrix}1 & 0\\ 2 & 5\end{bmatrix} and\ 3X+2Y=\begin{bmatrix}3 & 0\\ 0 & 3\end{bmatrix}$ Find X and Y.

3. If $A=\begin{bmatrix}8 & 0\\ 4 & -2\\ 3 & 6\end{bmatrix}$ and $B=\begin{bmatrix}2 & -2\\ 4 & 2\\ -5 & 1\end{bmatrix}$ then find the matrix X such that 2A+3X=5B.

4. For the matrix $A=\begin{bmatrix}1 & -1 & 5\\ -1 & 2 & 1\\ 5 & 1 & 3\end{bmatrix}$ show that A+A^{-} is symmetric.

5. Simplify $sin\theta\begin{bmatrix}sin\theta & -Cos\theta\\ Cos\theta & Sin\theta\end{bmatrix}+Cos\theta\begin{bmatrix}Cos\theta & sin\theta\\ -sin\theta & Cos\theta\end{bmatrix}$.

6. Show that the matrix $A=\begin{bmatrix}2 & 3\\ 1 & 2\end{bmatrix}$ satisfies the equation $A^3-4A^2+A=0$.

7. If $A=\begin{bmatrix}3 & 4\\ -4 & -3\end{bmatrix}$ Find +(A) when $f(x)=x^2-5x+7$

8. If $A=\begin{bmatrix}3 & 1\\ -1 & 2\end{bmatrix}$ and $A^2-5A+7I=0$ Hence find A^{-1}

9. If *A* and *B* are symmetric matrices prove that *AB-BA* is s skew symmetric matrix.

10. Solve for *x* and *y*

    $\begin{bmatrix}x & y\\ 3y & x\end{bmatrix}\begin{bmatrix}1\\ 2\end{bmatrix}=\begin{bmatrix}3\\ 5\end{bmatrix}$

11. If $A=\begin{bmatrix}cos\alpha & sin\alpha\\ -sin\alpha & cos\alpha\end{bmatrix}$ show that A^1 A= I

12. If $A=\begin{bmatrix}3 & 5\\ 1 & 2\end{bmatrix} and\ B=\begin{bmatrix}2 & -5\\ -1 & 3\end{bmatrix}$ then show that *B* is inverse of *A*.

13. Using elementary has formations find A^{-1} of $A=\begin{bmatrix}1 & -1\\ 2 & 3\end{bmatrix}$

14. Show by elementary row operation A^{-1} do Show by elementary such that doesn't exist if $A=\begin{bmatrix} 6 & -3 \\ -2 & 1 \end{bmatrix}$.

15. Find a matrix X such that $2A+B+X=0$ *where* $A=\begin{bmatrix} -1 & 2 \\ 3 & 4 \end{bmatrix}$ *and* $B=\begin{bmatrix} 3 & -2 \\ 1 & 5 \end{bmatrix}$.

Section 'C' **6 Mark each**

1. If $A=\begin{bmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{bmatrix}$ then prove that $A^n=\begin{bmatrix} cos\, n\theta & sin\, n\theta \\ -sin\, n\theta & cos\, n\theta \end{bmatrix}, n \in N.$

2. Express the matrix $\begin{bmatrix} 2 & -2 & -4 \\ -1 & 3 & 4 \\ 1 & -2 & -3 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.

3. By using elementary row operation find the inverse of the matrix $A=\begin{bmatrix} 3 & -1 & -2 \\ 2 & 0 & -1 \\ 3 & -5 & 0 \end{bmatrix}$.

4. Find the matrix X so that $X=\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}=\begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$

5. If $A=\begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}, B=\begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix}, \mathrm{C}=\begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}$ Find a matrix *D* such that *CD-AB =0.*

6. Find the value of *x* if $\begin{bmatrix} 1 & x & 1 \end{bmatrix}\begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix}\begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix}=\begin{bmatrix} 0 \end{bmatrix}$

7. Express the matrix $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ as the sum of a symmetric and skew symmetric matrix.

8. If $A=\begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$ *and* $B=\begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$ Find AB and use this result in solving the following system of equations:-

$$x-y+z=4$$
$$x-2y-2z=9$$
$$2x+y+3z=1$$