

**SELF ASSESSMENT TEST -2****CLASS 10+2****MATRICES**

1.If a matrix has 24 elements , what are the possible orders it can have ? what, if it has 13 elements ?

2.Construct matrix whose order  $3 \times 4$   $a_{ij} = \frac{i+2j}{2}$  .

3. Construct matrix whose order  $3 \times 3$ ,  $a_{ij} = \begin{cases} -1 & (i+j) \text{ is even} \\ 1 & (i+j) \text{ is odd} \end{cases}$

4.Find the number of all possible matrices of order  $3 \times 3$  with each entry 0 & 1

5.Find the value of x & y if  $\begin{bmatrix} x^2 & 2 & 2y \\ 5 & -1 & 5 \end{bmatrix} = \begin{bmatrix} 2x+15 & 2 & y^2+1 \\ 5 & -1 & 5y \end{bmatrix}$

6.Given that order of matrix X is  $2 \times n$  and that of matrix Y is  $p \times 3$ .Find the order of matrix  $7X - 5Y$  .

7.Find the additive inverse of a matrix  $A = \begin{bmatrix} -1 & 2 & -5 \\ 2 & 4 & 0 \end{bmatrix}$  .

8.If  $A = \begin{bmatrix} -1 & 2 \\ 3 & 4 \end{bmatrix}$  ,  $B = \begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix}$  , find matrix X so that X is additive inverse of  $A + 2B$ .

9.If  $2X+3Y = \begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$  and  $3X+2Y = \begin{bmatrix} -2 & 2 \\ 1 & -5 \end{bmatrix}$  , find X and Y.

10. Given that order of matrix X is  $3 \times p$  and that of matrix Y is  $2 \times q$ .XY and YX are defined find the value of p and q.

11.Find a  $2 \times 2$  order matrix B such that  $\begin{bmatrix} 3 & -2 \\ 1 & 4 \end{bmatrix} B = \begin{bmatrix} 4 & 0 \\ 0 & 4 \end{bmatrix}$

12.If  $A = \begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix}$  and  $A^2 - xA + yI = O$  , find the value of x and y .

13. If  $A = \begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$ , prove that  $A^3 - 6A^2 + 7A + 2I = O$ .

14. If  $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$  then prove that  $A^n = \begin{bmatrix} 1+2n & -4n \\ n & 1-2n \end{bmatrix}$ , where  $n \in \mathbb{N}$ .

15. If  $A = \begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$  then show that  $A^2 - 4A + 7I = O$ . Hence evaluate  $A^5$ .

16. If  $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ ,  $B = \begin{bmatrix} 1 & 4 \\ -1 & 1 \end{bmatrix}$ , does  $(A+B)^2 = A^2 + 2AB + B^2$  hold?

17. If  $\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 1 & 0 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix} = O$ , find the value of  $x$ .

18. If  $A^2 = I$ , then matrix  $A$  is called Involutory.

Prove that  $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$  is a Involutory matrix.

19. If  $A^m = O$  then matrix  $A$  is called Nilpotent matrix of degree  $m$ .

Prove that  $A = \begin{bmatrix} 0 & 5 & 7 \\ 0 & 0 & 6 \\ 0 & 0 & 0 \end{bmatrix}$  is a Nilpotent matrix.

20. If  $A^2 = A$ , then matrix  $A$  is called Idempotent.

Prove that  $A = \begin{bmatrix} -1 & 3 & 5 \\ 1 & -3 & -5 \\ -1 & 3 & 5 \end{bmatrix}$  is a Idempotent matrix

21. If  $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$  find  $A^{16}$ .

22. If A is a square matrix s.t.  $A^2 = A$ , prove that  $(I + A)^3 - 7A = I$ .

23. If A and B are square matrices of the same order s.t.  $AB = BA$ , then prove by induction that  $AB^n = B^n A$ .

24. Show that  $A = \begin{bmatrix} 0 & -2 & 4 \\ 2 & 0 & 3 \\ -4 & -3 & 0 \end{bmatrix}$  is skew symmetric.

25. If A is any square matrix, then  $\frac{1}{2}(A + A')$  is symmetric and  $\frac{1}{2}(A - A')$  is skew symmetric.

26. If A is a symmetric matrix and P is a square matrix of the same order as of A. Show that  $P'AP$  is symmetric.

27. If A and B are two symmetric matrices, prove that  $AB = BA$  iff AB is symmetric.

28. Show that a matrix which is both symmetric and skew symmetric is a zero matrix.

29. If  $A = \begin{bmatrix} 3 & 2x-7 \\ 5x-1 & 1 \end{bmatrix}$  is a symmetric matrix, find the value of x.

30. If  $A = \begin{bmatrix} 3 \\ 5 \\ 2 \end{bmatrix}$ ,  $B = [1 \ 0 \ 4]$ , verify  $(AB)' = B'A'$ .

31. Express the  $\begin{bmatrix} 3 & 4 & 2 \\ 1 & -5 & 2 \\ 2 & 5 & 1 \end{bmatrix}$  as the sum of a symmetric and skew symmetric matrix.

32. Using elementary row transformations, find the inverse of matrix  $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$

33. Using column transformations, find the inverse of matrix  $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$