

HOLIDAY HOMEWORK
MATRIX AND DETERMINANTS

CLASS-XII

1. If A is a square matrix such that $A^2 = I$, then find the simplest value of $(A - I)^3 + (A + I)^3 - 7A$.

2. Write the number of all possible matrices of order 2×2 with each entry 1, 2 or 3.

3. If $\begin{bmatrix} 2 & 1 & 3 \\ -1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix} = A$, then write the order of matrix A.

4. If $2 \begin{bmatrix} 3 & 4 \\ 5 & x \end{bmatrix} + \begin{bmatrix} 1 & y \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 7 & 0 \\ 10 & 5 \end{bmatrix}$, then find (x-y).

5. Solve the following matrix equation for x. $(x - 1) \begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} = O$.

6. If matrix $A = \begin{bmatrix} 1 & -1 \\ -1 & 1 \end{bmatrix}$ and $A^2 = kA$, then write the value of k.

7. In the interval $\frac{\pi}{2} < x < \pi$, find the value of x for which the matrix $\begin{bmatrix} 2 \sin x & 3 \\ 1 & 2 \sin x \end{bmatrix}$ is singular matrix.

8. For what value of x, $A = \begin{bmatrix} 2(x+1) & 2x \\ x & x-2 \end{bmatrix}$ is a singular matrix?

9. For what value of k, the system of linear equations $x + y + z = 2$; $2x + y - z = 3$; $3x + 2y + kz = 4$ has a unique solution?

10. If A is a square matrix of order 3 such that $|adj A| = 64$, find the $|A|$.

Short Answer (2 marks)

11. If $\begin{vmatrix} x & \sin \theta & \cos \theta \\ -\sin \theta & -x & 1 \\ \cos \theta & 1 & x \end{vmatrix} = 8$, then write the value of x.

12. If $A = \begin{bmatrix} 3 & 5 \\ 7 & 3 \end{bmatrix}$, $B = \begin{bmatrix} 7 & 3 \end{bmatrix}$ then find matrix C such that $AC = BC$.

13. If $A = \begin{bmatrix} 0 & 0 \\ 5 & 0 \end{bmatrix}$ find A^{16} .

14. If $A = \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix}$, find α satisfying $0 < \alpha < \frac{\pi}{2}$ when $A + A^T = \sqrt{2}I_2$; where A^T is transpose of A.

15. Show that $\begin{bmatrix} 2 & -1 & 3 \\ -5 & 3 & 1 \\ -3 & 2 & 3 \end{bmatrix}$ is inverse of the matrix $\begin{bmatrix} -7 & -9 & 10 \\ -12 & -15 & 17 \\ 1 & 1 & -1 \end{bmatrix}$.

16. Find the matrix A such that $\begin{bmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{bmatrix} A = \begin{bmatrix} -1 & -8 & -10 \\ 1 & -2 & -5 \\ 9 & 22 & 15 \end{bmatrix}$.

17. The co-operative store of a particular school has 10 dozen physics books, 8 dozen chemistry books and 5 dozen mathematics books. Their selling prices are Rs. 45, 40 and 30 each respectively. Find the total amount the store will receive by selling all books.

18. Let $f(t) = \begin{vmatrix} \cos t & t & 1 \\ 2 \sin t & t & 2t \\ \sin t & t & t \end{vmatrix}$ then find $\lim_{t \rightarrow 0} \frac{f(t)}{t^2}$

19. A total amount of Rs. 7000 is deposited in three different saving bank accounts with annual interest rates 5%, 8% and $8\frac{1}{2}\%$ respectively. The total annual interest from these three accounts is Rs. 550. Equal amounts have been deposited in the 5% and 8% savings accounts. Find the amount deposited in each of the three accounts, with the helps of matrices.

20. Given that $A = \begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$ find AB. Use this result to solve the following system of linear equations : $x - 2y + z = 4$; $x - 2y - 2z = 9$; $2x + y + 3z = 1$.

21. Find A^{-1} if $A = \begin{bmatrix} -1 & 2 & 5 \\ 2 & -3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$ and hence, solve the system of linear equations :
 $-x + 2y + 5z = 2$; $2x - 3y + z = 15$; $-x + y + z = -3$.