

Class:12

Unit Test-1

Max Marks:50

Applications Of Matrices and Determinants

Time:45 Minutes

Part-I

Answer all the Questions:

5X1=5

1. If  $A = \begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$ , then  $9I_2 - A =$

- (1)  $A^{-1}$                       (2)  $\frac{A^{-1}}{2}$                       (3)  $3A^{-1}$                       (4)  $2A^{-1}$

2. If  $A^T A^{-1}$  is symmetric then  $A^2 =$

- (1)  $A^{-1}$                       (2)  $(A^T)^2$                       (3)  $A^T$                       (4)  $(A^{-1})^2$

3. If  $A = \begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$  and  $A(\text{adj}A) = \begin{bmatrix} k & 0 \\ 0 & k \end{bmatrix}$ , then  $k =$

- (1) 0                      (2)  $\sin \theta$                       (3)  $\cos \theta$                       (4) 1

4. Let  $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$  and  $4B = \begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & x \\ -1 & 1 & 3 \end{bmatrix}$ . If B is the inverse of A, then the value of x is

- (1) 2                      (2) 4                      (3) 3                      (4) 1

5. Cramer's rule is applicable only when

- (1)  $\Delta = 0$                       (2)  $\Delta \neq 0$                       (3)  $\Delta_x = \Delta_y = \Delta_z = 0$                       (4)  $\Delta = 0, \Delta_x = 0$

Part-II

Answer any all the Questions:

5X2=10

6. Prove that  $\begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$  is orthogonal.

7. Find the rank of  $\begin{bmatrix} -1 & 3 \\ 4 & -7 \\ 3 & -4 \end{bmatrix}$

8. If  $\text{adj}(A) = \begin{bmatrix} 2 & -4 & 2 \\ -3 & 12 & -7 \\ -2 & 0 & 2 \end{bmatrix}$ , find A.

9. If  $\text{adj} A = \begin{bmatrix} -1 & 2 & 2 \\ 1 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ , then find  $A^{-1}$

10. If  $\text{adj}A = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$  and  $\text{adj} B = \begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ , find  $\text{adj}(AB)$ .

### Part-III

Answer any all the Questions:

5X3=15

11. If  $A = \begin{bmatrix} 8 & -4 \\ -5 & 3 \end{bmatrix}$ , verify that  $A(adjA) = (adjA)A = |A|I$ .

12. Solve the following system of linear equations, using matrix inversion method:

$$5x + 2y = 3, 3x + 2y = 5.$$

13. Find the inverse of  $A = \begin{bmatrix} 2 & 1 & 1 \\ 3 & 2 & 1 \\ 2 & 1 & 2 \end{bmatrix}$  by Gauss-Jordan method.

14. Test for consistency and if possible, solve the following systems of equations by rank method.  $2x + 2y + z = 5, x - y + z = 1, 3x + y + 2z = 4$

15. If  $A = \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ , verify that  $(AB)^{-1} = B^{-1}A^{-1}$ .

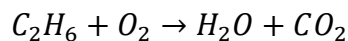
### Part-IV

Answer any all the Questions:

4X5=20

16. Find the value of  $k$  for which the equations  $kx - 2y + z = 1, x - 2ky + z = -2, x - 2y + kz = 1$  have (i)no solution (ii)unique solution (iii)infinitely many solution

17. By using Gaussian elimination method, balance the chemical reaction equations:



18. Solve, by Cramer's rule, the system of equations

$$\frac{3}{x} - \frac{4}{y} - \frac{2}{z} - 1 = 0, \frac{1}{x} + \frac{2}{y} + \frac{1}{z} - 2 = 0, \frac{2}{x} - \frac{5}{y} - \frac{4}{z} + 1 = 0$$

19. If  $ax^2 + bx + c$  is divided by  $x + 3, x - 5$ , and  $x - 1$ , the remainders are 21,61 and 9 respectively. Find  $a, b$  and  $c$ . (Use Gaussian elimination method.)