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^TA^{-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 $A(adjA)=\begin{bmatrix}k & 0\\ 0 & k\end{bmatrix}$, 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 adj$(A)=\begin{bmatrix}2 & -4 & 2\\ -3 & 12 & -7\\ -2 & 0 & 2\end{bmatrix}$, find A.

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

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

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:
$C_2H_6 + O_2 \rightarrow H_2O + CO_2$

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.)