XII-MATHEMATICS

UNIT-1 - Applications of Matrices and Determinants

Important 2 and 3 Marks:

1. **If A is a non-singular matrix of odd order, Prove that adj A is positive .**
2. **Find a matrix A of adj(A) =**

   7

   7

   -7

3. Verify the property $(A^T)^{-1} = (A^{-1})^T$ with A=

2

9

1 7

4. **Verify $(AB)^{-1} = B^{-1} A^{-1}$**

-3 12 -7 , find A.
-2 0 2

5. **Prove that cosΘ -sinΘ is orthogonal.**
   sinΘ cosΘ
6. **Find the inverse of the following:**
   i) -2 4
   1 -3
   ii) 5 1 1
   1 5 1
   1 1 5
   iii) 2 3 1
   3 4 1
   3 7 2
7. **If adj(A) = 2 -4 2**

8. If adj(A

)
=

0

-
2

0
6

2

-
6
-
3

0

6

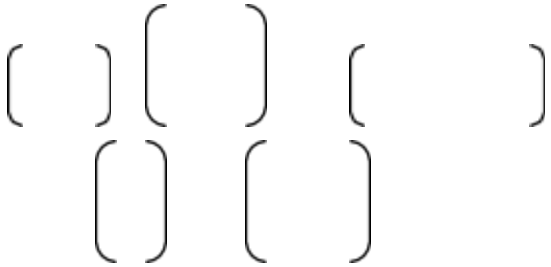
9. If adj(adj(A)) if adjA = 1

0

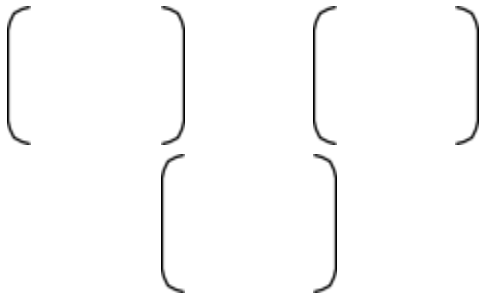
1

0 2
0
-1
0
1

10. Find the rank of the following matrices by minor method.



11.



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

i) 5x+2y=3, 3x+2y=5 **ii) 2x+5y=2 , x+2y = -3** **iii) 2y-y = 8, 3x+2y = -2**

13. Cramer's rule:

i) 5x-2y+16 = 0 , x+3y-7 = 0 **ii)** $\frac{3}{x}$ **+ 2y = 12,** $\frac{2}{x}$ **+3y = 13.**

iii) $x_1 - x_2 = 3,\ 2x_1 + 3x_2 + 4x_3 = 17,\ x_2 + 2x_3 = 7$ **,**

14. Guassian Elimination method.

i) 2x-2y+3z = 2, x+2y-z = 3, 3x – y- 2z =1,

ii)2x+4y+6z = 22 , 3x+8y+5z = 27, -x +y+2z=2,

iii) 4x+3y+6z = 25, x+5y+7z = 13, 2x+9y+z = 1.

15. Find the rank of the following matrices,

i) $\begin{bmatrix} 3 & 2 & 5 \\ 1 & 1 & 2 \\ 3 & 3 & 6 \end{bmatrix}$ **ii)** $\begin{bmatrix} 4 & 3 & 1 & -2 \\ -3 & -1 & -2 & 4 \\ 6 & 7 & -1 & 2 \end{bmatrix}$

5 MARKS

16. If ax^2+by+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 Guassian elimination method).**

17. A boy is walking alone path $y= ax^2+by+c$ **through the points (-6, 8), (-2,-12) and (3,8). He wants to meet his friend at p(7,60). Will he, meet his friend? (Guassian Elimination method).**

18. If $A = \begin{bmatrix} -4 & 4 & 4 \\ -7 & 1 & 3 \\ 5 & -3 & -1 \end{bmatrix}$ **and** $B = \begin{bmatrix} 1 & -1 & 1 \\ 1 & -2 & -2 \\ 2 & 1 & 3 \end{bmatrix}$ **, Find the products AB and BA**

And hence system of equations x – y + z = 4 , x – 2y -2z = 9, 2x + y + 3z =1.

19. If $A = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$ **, show that** $A^{-1} = 1\ (A^2 - 3I)$.

20. Find the matrix A for which $A \begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix} = \begin{bmatrix} 14 & 7 \\ 7 & 7 \end{bmatrix}$

21. $A = \begin{matrix} 1 & \tan x \\ -\tan x & 1 \end{matrix}$, Show that $A^T A^{-1} = \begin{matrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{matrix}$

22. $A = \frac{1}{9}\begin{matrix} -8 & 1 & 4 \\ 4 & 4 & 7 \\ 1 & -8 & 4 \end{matrix}$. Prove that $A^{-1} = A^T$

23. If $F(\alpha) = \begin{matrix} \cos\alpha & 0 & \sin\alpha \\ 0 & 1 & 0 \\ -\sin\alpha & 0 & \cos\alpha \end{matrix}$, show that $[F(\alpha)]^{-1} = F(-\alpha)$.

A^{-1}.

25. Find the inverse of the matrix $\begin{matrix} 2 & -1 & 3 \\ -5 & 3 & 1 \\ -3 & 2 & 3 \end{matrix}$.

26. Solve the equations $x+y+z-2=0$, $6x-4y+5z-31=0$, $5x+2y+2z=13$. By using matrix inversion method.

27. If $\begin{matrix} x & y & z \\ \frac{3}{x} & -\frac{4}{y} & -\frac{2}{z} \\ -1 & 1 & 1 \end{matrix} = 0$, $\begin{matrix} x & y & z \\ \frac{1}{x} & +\frac{2}{y} & +\frac{1}{z} \\ 2 & -1 & 1 \end{matrix} = 0$, $\begin{matrix} x & y & z \\ \frac{2}{x} & -\frac{5}{y} & -\frac{4}{z} \\ 1 & 1 & 1 \end{matrix} = 0$ by using Cramer's rule.