DALMIA HIGHER SECONDARY SCHOOL
DALMIAPURAM – 621651
Std : 12 MATHEMATICS TIME: 1.50HRS
CHAPTER – 1 TEST -1 MARKS : 50

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2 MARKS : ANSWERS ANY 15 Q **15 X 2 = 30**

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

2. Verify the property $(A^T)^{-1} = (A^{-1})^T$ with A = $\begin{bmatrix} 2 & 9 \\ 1 & 7 \end{bmatrix}$

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

4. Reduce the matrix $\begin{bmatrix} 3 & -1 & 2 \\ -6 & 2 & 4 \\ -3 & 1 & 2 \end{bmatrix}$ to a row-echelon form

5. Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 3 & 0 & 5 \end{bmatrix}$ by reducing it to a row-echelon form.

6. Find the adjoint of the following $\begin{bmatrix} -3 & 4 \\ 6 & 2 \end{bmatrix}$

7. Find the inverse (if it exists) of the following: $\begin{bmatrix} -2 & 4 \\ 1 & -3 \end{bmatrix}$

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

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

10.. Find the rank of the following matrices by minor method:
$\begin{bmatrix} 1 & -2 & -1 & 0 \\ 3 & -6 & -3 & 1 \end{bmatrix}$

11. Find the rank of the following matrices by minor method:
$\begin{bmatrix} 1 & -2 & 3 \\ 2 & 4 & -6 \\ 5 & 1 & -1 \end{bmatrix}$

12. Find the rank of the following matrices by row reduction method: $\begin{bmatrix} 1 & 1 & 1 & 3 \\ 2 & -1 & 3 & 4 \\ 5 & -1 & 7 & 11 \end{bmatrix}$

13. Find the inverse of each of the following by Gauss-Jordan method: $\begin{bmatrix} 2 & -1 \\ 5 & -2 \end{bmatrix}$

14. Solve the following system of linear equations by matrix inversion method: $2x + 5y = -2$, $x + 2y = -3$,

15. Solve the following systems of linear equations by Cramer's rule:
$5x - 5y + 16 = 0$, $x + 3y - 7 = 0$

16. 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.)

3 MARKS : ANSWERS ANY 5 Q **5 X 3 = 15**

17. If A is symmetric, prove that adj A is also symmetric.

18.. Verify $(AB)^{-1} = B^{-1}A^{-1}$ with A = $\begin{bmatrix} 0 & -3 \\ 1 & 4 \end{bmatrix}$, B = $\begin{bmatrix} -2 & -3 \\ 0 & -1 \end{bmatrix}$

19.. Solve the following system of linear equations, using matrix inversion method: $5x + 2y = 3$, $3x + 2y = 5$

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

21. If A = $\begin{bmatrix} 5 & 3 \\ -1 & -2 \end{bmatrix}$, show that $A^2 - 3A - 7I_2 = O_2$, Hence find A^{-1}.

22. If A = $\begin{bmatrix} 8 & -4 \\ -5 & 3 \end{bmatrix}$ verify that A(adjA) = (adjA)A = $|A|I_2$.

5 MARKS : ANSWERS ANY 1 Q **1 X 5 = 5**

23. Solve, by Cramer's rule, the system of equations)
$\frac{3}{x} - \frac{4}{y} - \frac{2}{z} - 1 = 0$, $\frac{1}{x} + \frac{2}{y} + \frac{1}{z} - 2 = 0$, $\frac{2}{x} - \frac{5}{y} - \frac{4}{z} + 1 = 0$

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CHAPTER – 1 TEST -2 MARKS : 50

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3 MARKS : ANSWERS ANY 10 Q **10 X 3 = 30**

1. If adj (A) = $\begin{bmatrix} 0 & -2 & 0 \\ 6 & 2 & -6 \\ -3 & 0 & 6 \end{bmatrix}$, find A^{-1}

2. Given A = $\begin{bmatrix} 1 & -1 \\ 2 & 0 \end{bmatrix}$, B = $\begin{bmatrix} 3 & -2 \\ 1 & 1 \end{bmatrix}$ and C = $\begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$, find a matrix X such that AXB = C.

3. Find the rank of the following matrices by row reduction method: $\begin{bmatrix} 1 & 2 & -1 \\ 3 & -1 & 2 \\ 1 & -2 & 3 \\ 1 & -1 & 1 \end{bmatrix}$

4. Find the rank of the following matrices by row reduction method: $\begin{bmatrix} 3 & -8 & 5 & 2 \\ 2 & -5 & 1 & 4 \\ -1 & 2 & 3 & -2 \end{bmatrix}$

5. Find the inverse of each of the following by Gauss-Jordan method: $\begin{bmatrix} 1 & -1 & 0 \\ 1 & 0 & -1 \\ 6 & -2 & -3 \end{bmatrix}$

6. Find the inverse of each of the following by Gauss-Jordan method: $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$

7. Solve the following system of linear equations by matrix inversion method: $2x - y = 8$, $3x + 2y = -2$

8.. Four men and 4 women can finish a piece of work jointly in 3 days while 2 men and 5 women can finish the same work jointly in 4 days. Find the time taken by one man alone and that of one woman alone to finish. the same work by using matrix inversion method

9. In a competitive examination, one mark is awarded for every correct answer while $\frac{1}{4}$ mark is deducted for every wrong answer. A student answered 100 questions and got 80 marks. How many questions did he answer correctly ? (Use Cramer's rule to solve the problem).

10. Solve the following system of linear equations, using matrix inversion method:
$5x + 2y = 3$, $3x + 2y = 5$

11. Find the adjoint of $\frac{1}{3}\begin{bmatrix} 2 & 2 & 1 \\ -2 & 1 & 2 \\ 1 & -2 & 2 \end{bmatrix}$

12. A = $\begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$, show that $A^T A^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$

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

5 MARKS : ANSWERS ANY 1 Q **4 X 5 = 20**

14. An amount of ₹ 65,000 is invested in three bonds at the rates of 68%, 8 % and 9% per annum respectively. The total annual income is ₹ 4,800. The income from the third bond is ₹ 600 more than that from the second bond. Determine the price of each bond. (Use Gaussian elimination method.)

15. . If A = $\begin{bmatrix} -5 & -1 & 3 \\ 7 & 1 & -5 \\ 1 & -1 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 1 & 2 \\ 3 & 2 & 1 \\ 2 & 1 & 3 \end{bmatrix}$, find the products AB and BA and hence solve the system of equations $x + y + 2z = 13$, $3x + 2y + z = 7$, $2x + y + 3z = 2$

16. If the system of equations $px + by + cz = 0$, $ax + qy + cz = 0$, $ax + by + rz = 0$ has a non-trivial solution and $b \neq a$, $q \neq b$, $r \neq c$, prove that $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c} = 2$

17. Investigate for what values of λ and μ the system of linear equations $x + 2y + z = 7$, $x + y + \lambda z = \mu$, $x + 3y - 5z = 5$, has (i) no solution (ii) a unique solution (iii) an infinite number of solutions.

18. Investigate the values of λ and μthe system of linear equations $2x + 3y + 5z = 9$, $7x + 3y - 5z = 8$, $2x + 3y + \lambda z = \mu$, have (i) no solution (ii) a unique solution (iii) an infinite number of solutions.