



N K MATHS ACADEMY

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TIRUPUR-98434 34491

UNIT TEST-2022-23

MATHEMATICS

UNIT TEST -1

MARKS: 40

TIME: 1.00 HR

I. CHOOSE THE BEST ANSWER:

8X1=8

1. If $|adj(adjA)| = |A|^9$, then the order of the square matrix A is
 (1)3 (2)4 (3)2 (4)5
2. If $p = \begin{bmatrix} 1 & x & 0 \\ 1 & 3 & 0 \\ 2 & 4 & -2 \end{bmatrix}$ is the adjoint of 3×3 matrix A and $|A| = 4$, then x is
 (1)15 (2)12 (3)14 (4)11
3. If $A^T A^{-1}$ is symmetric, then $A^2 =$
 (1) A^{-1} (2) $(A^T)^2$ (3) A^T (4) $(A^{-1})^2$
4. 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
5. The rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ -1 & -2 & -3 & -4 \end{bmatrix}$ is
 (1)1 (2)2 (3)4 (4)3
6. If $\rho(A) = \rho([A|B])$, then the system $AX = B$ of linear equations is
 (1) Consistent and has unique solution (2) consistent
 (3) Consistent and has infinitely many solution (4) inconsistent.
7. If $A = (2 \ 0 \ 1)$, then the rank of AA^T is,
 (1) 1 (2) 2 (3) 3 (4) 0
8. If A is a square matrix of order n then $|adj A|$ is
 (1) $|A|^2$ (2) $|A|^n$ (3) $|A|^{n-1}$ (4) $|A|$

II. ANSWER ANY 4 QUESTIONS:

4X2=8

9. Find the rank of the matrix $\begin{bmatrix} 1 & -2 & 3 \\ -2 & 4 & -6 \\ 5 & 1 & -1 \end{bmatrix}$

10. If A is non-Singular, prove that $(A^{-1})^T = (A^T)^{-1}$
11. Prove that $\begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$ is orthogonal
12. Solve $5x - 2y + 16 = 0, x + 3y - 7 = 0$ by Cramer's rule.

13. Find the adjoint of $\begin{bmatrix} 2 & 3 & 1 \\ 3 & 4 & 1 \\ 3 & 7 & 2 \end{bmatrix}$

III. ANSWER ANY 3 QUESTIONS:**3X3=9**

14. Show that the adjoint of $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & 3 \end{bmatrix}$ is A itself.

15. If $A = \begin{bmatrix} -1 & 2 \\ 1 & -4 \end{bmatrix}$, verify the result $A(\text{adj } A) = (\text{adj } A)A = |A|I_2$

16. Solve the system of linear equation $5x + 2y = 3, 3x + 2y = 5$ using matrix inversion methods.
17. Solve $x + 2y + 3z = 0, 3x + 4y + 4z = 0, 7x + 10y + 12z = 0$

IV. ANSWER ANY 3 QUESTIONS:**3X5=15**

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 solve

$$x - y + z = 4, x - 2y - 2z = 9, 2x + y + 3z = 1$$

19. A family of 3 people went out for dinner in a restaurant. The cost of two dosai, three idlies and two vadai is Rs150. The cost of two dosai, two idlies and four vadais is Rs 200. The cost of five dosais, four idlies and two vadais is Rs 250. The family has Rs 350 in hand and they ate 3 dosai and six idlies and 6 vadais. Will they be able to manage to pay the bill within the amount they had?
20. Test for consistency and if possible solve $x - y + 2z = 2, 2x + y + 4z = 7, 4x - y + z = 4$ by rank method.
21. Investigate the value of λ and μ , $2x + 3y + 5z = 9, 7x + 3y - 5z = 8, 2x + 3y + \lambda z = \mu$
- (i) No solution (ii) a unique solution. (iii) infinitely many solutions.