CUET Mathematics Test

Chapter: Unit II: Algebra (Matrices and Determinants)

General Instructions

1. Total Questions: **20**
2. Duration: **60 Minutes**
3. All questions are compulsory.
4. Each question carries **5 marks**.
5. For each correct answer: **+5 marks**.
6. For each incorrect answer: **-1 mark**.
7. No negative marking for unanswered questions.
8. Use of calculator or electronic devices is strictly prohibited.
9. Choose the most appropriate answer from the given options.

1. If A is a square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is equal to:
   (A) A
   (B) $I - A$
   (C) I
   (D) $3A$

2. If the order of matrix A is 2×3 and the order of matrix B is 3×2, then the order of matrix $(AB)^T$ is:
   (A) 3×3
   (B) 2×2
   (C) 2×3
   (D) 3×2

3. For what value of k is the matrix $A = \begin{bmatrix} 2 & k \\ 3 & 5 \end{bmatrix}$ singular?
   (A) 10/3
   (B) 6/5
   (C) 15/2
   (D) 1

4. If A is a 3×3 non-singular matrix such that $|A| = 5$, then $|adj(A)|$ is:
   (A) 5
   (B) 25
   (C) 125
   (D) 1/5

5. The system of equations $x + y + z = 2$, $2x + y - z = 3$, $3x + 2y + kz = 4$ has a unique solution if:
   (A) $k \neq 0$
   (B) $k \neq -1$
   (C) $k = 0$
   (D) $k = 1$

6. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then $A^T A$ is equal to:
   (A) O
   (B) I
   (C) A
   (D) $2I$

7. If A and B are symmetric matrices of the same order, then $AB - BA$ is a:
   (A) Symmetric matrix
   (B) Skew-symmetric matrix
   (C) Null matrix
   (D) Identity matrix

8. Let A be a square matrix of order 3 such that $|A| = 2$. The value of $|2A|$ is:
   (A) 4
   (B) 8
   (C) 16
   (D) 6

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

(A) $\begin{bmatrix} -2 & 1 \\ 1.5 & -0.5 \end{bmatrix}$

(B) $\begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix}$

(C) $\begin{bmatrix} -4 & 2 \\ 3 & -1 \end{bmatrix}$

(D) $\begin{bmatrix} 2 & -1 \\ -1.5 & 0.5 \end{bmatrix}$

10. The area of a triangle with vertices $(2, 7)$, $(1, 1)$ and $(10, 8)$ using determinants is:
    (A) 25
    (B) 23.5
    (C) 47
    (D) 50

11. If A is an invertible matrix of order 2, then $det(A^{-1})$ is equal to:
    (A) $det(A)$
    (B) $1/det(A)$
    (C) 1
    (D) 0

12. If $\begin{bmatrix} x+y & 2 \\ 5+z & xy \end{bmatrix} = \begin{bmatrix} 6 & 2 \\ 5 & 8 \end{bmatrix}$, then the values of x, y, z respectively are:
    (A) 4, 2, 0
    (B) 2, 4, 0
    (C) Both (A) and (B)
    (D) 3, 3, 1

13. If $A = \begin{bmatrix} 0 & 2 \\ 0 & 0 \end{bmatrix}$ and $f(x) = 1 + x + x^2 + \cdots + x^{10}$, then $f(A)$ is:
    (A) $\begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$
    (B) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
    (C) $\begin{bmatrix} 0 & 2 \\ 0 & 0 \end{bmatrix}$
    (D) $\begin{bmatrix} 1 & 2 \\ 0 & 0 \end{bmatrix}$

14. If A is a skew-symmetric matrix of order 3, then $|A|$ is:
    (A) 1
    (B) -1
    (C) 0
    (D) 3

15. In a system of linear equations $AX = B$, if $|A| = 0$ and $(adjA)B \neq O$, then the system has:
    (A) Unique solution
    (B) Infinitely many solutions
    (C) No solution
    (D) Trivial solution

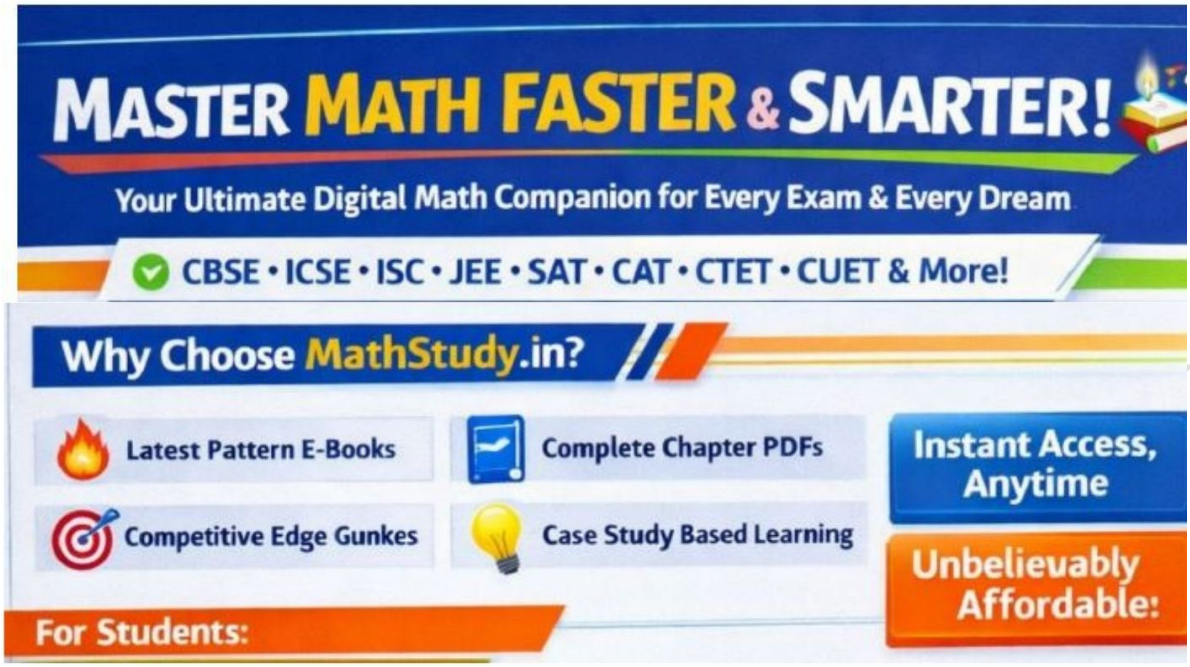
16. If $A = [a_{ij}]_{3\times 3}$ where $a_{ij} = i - j$, then A is a:
    (A) Symmetric matrix
    (B) Skew-symmetric matrix
    (C) Diagonal matrix
    (D) Scalar matrix

17. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ such that $ad - bc \neq 0$, then $adj(A)$ is:
    (A) $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$
    (B) $\begin{bmatrix} d & c \\ b & a \end{bmatrix}$
    (C) $\begin{bmatrix} a & c \\ b & d \end{bmatrix}$
    (D) $\begin{bmatrix} -d & b \\ c & -a \end{bmatrix}$

18. If A and B are square matrices of order n such that $A^2 - B^2 = (A - B)(A + B)$, then:
    (A) $AB = BA$
    (B) $A = B$
    (C) $A = O$ or $B = O$
    (D) $A^2 = B^2$

19. The trace of a matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ is:
    (A) 15
    (B) 45
    (C) 1
    (D) 0

20. If $A = \begin{bmatrix} 3 & -4 \\ 1 & -1 \end{bmatrix}$, then the value of A^k is given by:
    (A) $\begin{bmatrix} 1 + 2k & -4k \\ k & 1 - 2k \end{bmatrix}$
    (B) $\begin{bmatrix} 3k & -4k \\ k & -k \end{bmatrix}$
    (C) $\begin{bmatrix} 1 + 3k & -4k \\ k & 1 - k \end{bmatrix}$
    (D) $\begin{bmatrix} 3^k & (-4)^k \\ 1^k & (-1)^k \end{bmatrix}$



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