

CUET (UG) – MATHEMATICS

Chapter Test - Section B2: Applied Mathematics - Unit II: Algebra

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.

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1. If A is a square matrix of order 3 such that $|A| = 5$, then the value of $|\text{adj}(A)|$ is:
 (A) 5
 (B) 25
 (C) 125
 (D) $1/5$
2. If $A = \begin{bmatrix} 2 & \lambda \\ -3 & 4 \end{bmatrix}$ is a non-invertible matrix, then the value of λ is:
 (A) $8/3$
 (B) $-8/3$
 (C) 6
 (D) -6
3. For a system of linear equations $AX = B$, if $|A| = 0$ and $(\text{adj}A)B \neq O$, then the system has:
 (A) A unique solution
 (B) Infinitely many solutions
 (C) No solution
 (D) Exactly two solutions
4. If A and B are invertible matrices of the same order, then $(AB)^{-1}$ is equal to:
 (A) $A^{-1}B^{-1}$
 (B) $B^{-1}A^{-1}$
 (C) AB^{-1}
 (D) BA^{-1}
5. The value of the determinant $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$ is:
 (A) 0
 (B) $a + b + c$
 (C) 1
 (D) $(a - b)(b - c)(c - a)$
6. If A is a 3×3 matrix and $|3A| = k|A|$, then the value of k is:
 (A) 3
 (B) 9
 (C) 27
 (D) 81
7. The area of a triangle with vertices $(2, -6)$, $(5, 4)$ and $(k, 4)$ is 35 sq units. The values of k are:
 (A) 12, -2
 (B) -12 , -2
 (C) 12, 2
 (D) 8, -2
8. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, then $A^2 - 5A$ is equal to:
 (A) $2I$
 (B) $-2I$
 (C) I
 (D) O

9. Let A be a non-singular matrix of order 3. If $A^2 = I$, then $|A|$ is:

- (A) 1 only
- (B) -1 only
- (C) ± 1
- (D) 0

10. If x, y, z are non-zero real numbers, the inverse of matrix $A = \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$ is:

(A) $\begin{bmatrix} x^{-1} & 0 & 0 \\ 0 & y^{-1} & 0 \\ 0 & 0 & z^{-1} \end{bmatrix}$

(B) $\frac{1}{xyz} \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

(D) $\begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$

11. If $A = \begin{bmatrix} \cos \alpha & -\sin \alpha \\ \sin \alpha & \cos \alpha \end{bmatrix}$, then $A + A^T = I$, if the value of α is:

- (A) $\pi/6$
- (B) $\pi/3$
- (C) π
- (D) $3\pi/2$

12. The sum of the products of elements of any row with the cofactors of the same row is:

- (A) 0
- (B) 1
- (C) $|A|$
- (D) $|A|^2$

13. If $A = \begin{bmatrix} 0 & 2 \\ 0 & 0 \end{bmatrix}$, then A^{10} is:

(A) $\begin{bmatrix} 0 & 20 \\ 0 & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & 1024 \\ 0 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

(D) $\begin{bmatrix} 0 & 2 \\ 0 & 0 \end{bmatrix}$

14. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then $\text{adj} A$ is:

(A) $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

- (B) $\begin{bmatrix} d & -c \\ -b & a \end{bmatrix}$
- (C) $\begin{bmatrix} a & -b \\ -c & d \end{bmatrix}$
- (D) $\begin{bmatrix} -d & b \\ c & -a \end{bmatrix}$

15. Consider the system $x + y + z = 6, x + 2y + 3z = 10, x + 2y + \lambda z = \mu$. The system has infinite solutions if:

- (A) $\lambda = 3, \mu = 10$
- (B) $\lambda \neq 3, \mu = 10$
- (C) $\lambda = 3, \mu \neq 10$
- (D) $\lambda \neq 3, \mu \neq 10$

16. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ a & b & -1 \end{bmatrix}$, then A^2 is:

- (A) A
- (B) $-A$
- (C) I
- (D) O

17. If the points $(x, -2), (5, 2), (8, 8)$ are collinear, then x is:

- (A) 3
- (B) -3
- (C) 1
- (D) 4

18. For a square matrix A , $A(\text{adj}A)$ is equal to:

- (A) $|A|I$
- (B) $|A|^2I$
- (C) I
- (D) A^{-1}

19. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ and $A^{-1} = kA$, then k is:

- (A) 19
- (B) $1/19$
- (C) -19
- (D) $-1/19$

20. If A is a square matrix such that $A^2 = A$, then $(I + A)^3 - 7A$ is:

- (A) A
- (B) $I - A$
- (C) I
- (D) $3A$

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