RAVI MATHS TUITION CENTER, NEAR VILLIVAKKAM RLY STATION, CHENNAI – 82.
WHATSAPP - 8056206308

Application of Matrices and Determinants 1 MARKS TEST

12th Standard

Maths

Exam Time : 01:15:00 Hrs | Total Marks : 75

Multiple Choice Question | 75 x 1 = 75

1) If $|\text{adj}(\text{adj } A)| = |A|^9$, then the order of the square matrix A is
(a) 3 (b) 4 (c) 2 (d) 5

2) If A is a 3 × 3 non-singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then BB^T =
(a) A (b) B (c) I (d) B^T

3) If $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, B = adj A and C = 3A, then $\frac{|adjB|}{|C|}$ =
(a) $\frac{1}{3}$ (b) $\frac{1}{9}$ (c) $\frac{1}{4}$ (d) 1

4) If $A\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 6 & 0 \\ 0 & 6 \end{bmatrix}$, then A =
(a) $\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 4 & -1 \\ 2 & 1 \end{bmatrix}$

5) If $A = \begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, then 9I - A =
(a) A^{-1} (b) $\frac{A^{-1}}{2}$ (c) $3A^{-1}$ (d) $2A^{-1}$

6) If $A = \begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then |adj (AB)| =
(a) -40 (b) -80 (c) -60 (d) -20

7) 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
(a) 15 (b) 12 (c) 14 (d) 11

8) If $A = \begin{bmatrix} 3 & 1 & -1 \\ 2 & -2 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ then the value of a_{23} is
(a) 0 (b) -2 (c) -3 (d) -1

9) If A, B and C are invertible matrices of some order, then which one of the following is not true?
(a) adj A = $|A|A^{-1}$ (b) adj(AB) = (adj A)(adj B) (c) det A^{-1} = $(\det A)^{-1}$ (d) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

10) If $(AB)^{-1} = \begin{bmatrix} 12 & -17 \\ -19 & 27 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$, then B^{-1} =
(a) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

11) If A^TA^{-1} is symmetric, then A^2 =
(a) A^{-1} (b) $(A^T)^2$ (c) A^T (d) $(A^{-1})^2$

12) If A is a non-singular matrix such that $A^{-1} = \begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$, then $(A^T)^{-1}$ =

(a) $\begin{bmatrix} -5 & 3 \\ 2 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$ (c) $\begin{bmatrix} -1 & -3 \\ 2 & 5 \end{bmatrix}$ (d) $\begin{bmatrix} 5 & -2 \\ 3 & -1 \end{bmatrix}$

13) If $A = \begin{bmatrix} \frac{3}{5} & \frac{4}{5} \\ x & \frac{3}{5} \end{bmatrix}$ and $A^T = A^{-1}$, then the value of x is

(a) $\frac{-4}{5}$ (b) $\frac{-3}{5}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

14) If $A = \begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}$ and AB = I , then B =

(a) $\left(\cos^2\frac{\theta}{2}\right) A$ (b) $\left(\cos^2\frac{\theta}{2}\right) A^T$ (c) $\left(\cos^2\theta\right) I$ (d) $(\text{Sin}^2\frac{\theta}{2})$A

15) If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ and A(adj A) = $\begin{bmatrix} k & 0 \\ 0 & k \end{bmatrix}$ then adj (AB) is

(a) 0 (b) sin θ (c) cos θ (d) 1

16) If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $\lambda A^{-1} = A$, then λ is

(a) 17 (b) 14 (c) 19 (d) 21

17) If adj A = $\begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and adj B = $\begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ then adj (AB) is

(a) $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$ (b) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$ (c) $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$ (d) $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

18) The rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ -1 & -2 & -3 & -4 \end{bmatrix}$ is

(a) 1 (b) 2 (c) 4 (d) 3

19) If $x^a y^b = e^m$, $x^c y^d = e^n$, $\Delta_1 = \begin{vmatrix} m & b \\ n & d \end{vmatrix}$, $\Delta_2 = \begin{vmatrix} a & m \\ c & n \end{vmatrix}$, $\Delta_3 = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$, then the values of x and y are respectively,

(a) $e^{(\Delta_2/\Delta_1)}, e^{(\Delta_3/\Delta_1)}$ (b) $\log(\Delta_1/\Delta_3), \log(\Delta_2/\Delta_3)$ (c) $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$ (d) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

20) Which of the following is/are correct?

(i) Adjoint of a symmetric matrix is also a symmetric matrix.

(ii) Adjoint of a diagonal matrix is also a diagonal matrix.

(iii) If A is a square matrix of order n and λ is a scalar, then $\text{adj}(\lambda A) = \lambda^n \text{adj}(A)$.

(iv) A(adjA) = (adjA)A = |A| I

(a) Only (i) (b) (ii) and (iii) (c) (iii) and (iv) (d) (i), (ii) and (iv)

21) If $\rho(A) = \rho([A \mid B])$, then the system AX = B of linear equations is

(a) consistent and has a unique solution (b) consistent (c) consistent and has infinitely many solution (d) inconsistent

22) If 0 ≤ θ ≤ π and the system of equations x + (sinθ)y - (cosθ)z = 0, (cosθ)x - y +z = 0, (sinθ)x + y - z = 0 has a non-trivial solution then θ is

(a) $\frac{2\pi}{3}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{4}$

23) The augmented matrix of a system of linear equations is $\begin{bmatrix} 1 & 2 & 7 & 3 \\ 0 & 1 & 4 & 6 \\ 0 & 0 & \lambda - 7 & \mu + 5 \end{bmatrix}$. The system has infinitely many solutions if

(a) λ = 7, μ ≠ -5 (b) λ = 7, μ = 5 (c) λ ≠ 7, μ ≠ -5 (d) λ = 7, μ = -5

24) Let A = $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and 4B = $\begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & x \\ -1 & 1 & 3 \end{bmatrix}$. If B is the inverse of A, then the value of x is

(a) 2 (b) 4 (c) 3 (d) 1

25) If A = $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, then adj(adj A) is

(a) $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 6 & -6 & 8 \\ 4 & -6 & 8 \\ 0 & -2 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} -3 & 3 & -4 \\ -2 & 3 & -4 \\ 0 & 1 & -1 \end{bmatrix}$ (d) $\begin{bmatrix} 3 & -3 & 4 \\ 0 & -1 & 1 \\ 2 & -3 & 4 \end{bmatrix}$

26) The system of linear equations x + y + z = 6, x + 2y + 3z =14 and 2x + 5y + λz =μ (λ, μ $\in$ R) is consistent with unique solution if

(a) λ = 8 (b) λ = 8, μ ≠ 36 (c) λ ≠ 8 (d) none

27) If the system of equations x = cy + bz, y = az + cx and z = bx + ay has a non - trivial solution then

(a) $a^2 + b^2 + c^2 = 1$ (b) abc ≠ 1 (c) a + b + c =0 (d) $a^2 + b^2 + c^2 + 2abc = 1$

28) Let A be a 3 x 3 matrix and B its adjoint matrix If |B|=64, then |A|=

(a) ±2 (b) ±4 (c) ±8 (d) ±12

29) If A^T is the transpose of a square matrix A, then

(a) $|A| \neq |A^T|$ (b) $|A| = |A^T|$ (c) $|A| + |A^T| = 0$ (d) $|A| = |A^T|$ only

30) The number of solutions of the system of equations 2x+y = 4, x - 2y = 2, 3x + 5y = 6 is

(a) 0 (b) 1 (c) 2 (d) infinitely many

31) If A is a square matrix that IAI = 2, than for any positive integer n, $|A^n|$ =

(a) 0 (b) 2n (c) 2^n (d) n^2

32) The system of linear equations x + y + z = 2, 2x + y - z = 3, 3x + 2y + kz = has a unique solution if

(a) k ≠ 0 (b) -1 < k < 1 (c) -2 < k < 2 (d) k=0

33) If A is a square matrix of order n, then |adj A| =

(a) $|A|^{n-1}$ (b) $|A|^{n-2}$ (c) $|A|^n$ (d) None

34) If the system of equations x + 2y - 3x = 2, (k + 3) z = 3, (2k + 1) y + z = 2. is inconsistent then k is

(a) -3, -$\frac{1}{2}$ (b) -$\frac{1}{2}$ (c) 1 (d) 2

35) If A = $\begin{pmatrix} cosx & sinx \\ -sinx & cosx \end{pmatrix}$ and A(adj A) =λ $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ then λ is

(a) sinx cosx (b) 1 (c) 2 (d) none

36) If A is a matrix of order m x n, then ρ(A) is

(a) m (b) n (c) ≤ min (m,n) (d) ≥ min (m,n)

37) The system of equations x + 2y + 3z = 1, x - y + 4z = 0, 2x + y + 7z = 1 has

(a) One solution (b) Two solution (c) No solution (d) Infinitely many solution

38) If ρ(A) = ρ([A/B]) = number of unknowns, then the system is

(a) consistent and has infinitely many solutions (b) consistent (c) inconsistent (d) consistent and has unique solution

39) Which of the following is not an elementary transformation?

(a) $R_i \leftrightarrow R_j$ (b) $R_i \longrightarrow 2R_i + R_j$ (c) $C_j \longrightarrow C_j + C_i$ (d) $R_i \longrightarrow R_i + C_j$

40) If ρ(A) = r then which of the following is correct?

(a) all the minors of order n which do not vanish (b) 'A' has at least one minor "of order r which does not vanish and all higher order minors vanish (c) 'A' has at least one (r + 1) order minor which vanish (d) all (r + 1) and higher order minors should not vanish

41) Every homogeneous system ______

(a) Is always consistent (b) Has only trivial solution (c) Has infinitely many solution (d) Need not be consistent

42) If ρ(A) ≠ ρ([AIB]), then the system is

(a) consistent and has infinitely many solutions (b) consistent and has a unique solution (c) consistent (d) inconsistent

43) In the non - homogeneous system of equations with 3 unknowns if ρ(A) = ρ([AIB]) = 2, then the system has _______

(a) unique solution (b) one parameter family of solution (c) two parameter family of solutions (d) in consistent

44) Cramer's rule is applicable only when ______

(a) $\Delta \neq 0$ (b) $\Delta = 0$ (c) $\Delta = 0, \Delta_x = 0$ (d) $\Delta_x = \Delta_y = \Delta_z = 0$

45) In a homogeneous system if ρ (A) =ρ([A|0]) < the number of unknouns then the system has ________

(a) trivial solution (b) only non - trivial solution (c) no solution (d) trivial solution and infinitely many non - trivial solutions

46) In the system of equations with 3 unknowns, if $\Delta = 0$, and one of Δ_x, Δ_y of Δ_z is non zero then the system is ______

(a) Consistent (b) inconsistent (c) consistent with one parameter family of solutions (d) consistent with two parameter family of solutions

47) In the system of liner equations with 3 unknowns If ρ(A) = ρ([A|B]) =1, the system has ________

(a) unique solution (b) inconsistent (c) consistent with 2 parameter -family of solution (d) consistent with one parameter family of solution.

48) If A = [2 0 1] then the rank of AA^T is ______

(a) 1 (b) 2 (c) 3 (d) 0

49) If A is a non-singular matrix then $|A^{-1}|$= ______

(a) $\left|\frac{1}{A^2}\right|$ (b) $\frac{1}{|A^2|}$ (c) $\left|\frac{1}{A}\right|$ (d) $\frac{1}{|A|}$

50) In a square matrix the minor M_{ij} and the' co-factor A_{ij} of and element a_{ij} are related by ______

(a) $A_{ij} = -M_{ij}$ (b) $A_{ij} = M_{ij}$ (c) $A_{ij} = (-1)^{i+j} M_{ij}$ (d) $A_{ij} = (-1)^{i-j} M_{ij}$

Match the following

51) Trivial solution of AX=0	(1) $adj(A^{-1})$
52) Non - Trivial solution of AX=0	(2) $|A| = 0$
53) ρ(A) = ρ[(A/0)] < n	(3) Consistent with one parameter family of solution
54) ρ(A) = ρ[(A/0)] = n	(4) $B^{-1}A^{-1}$

55) ρ (A) = ρ [(A|B]) =3 = number of unknowns — (5) In consistent and has no solution

56) ρ (A) = ρ [(A|B]) =2 < number of unknowns — (6) $|A|^{n-1}$

57) ρ (A) = ρ [(A|B]) = 1 < number of unknowns — (7) adj (A^T)

58) ρ (A) ≠ ρ [(A|B]) — (8) λ^{n-1} adj(A)

59) [adj A] — (9) A

60) $(\text{adj } A)^T$ — (10) Non - trivial solution

61) adj (adj A) — (11) $|A|. I_n$

62) |adj (adj A)| — (12) Unique solution

63) $(\text{adj } A)^{-1}$ — (13) $\frac{1}{\lambda} A^{-1}$

64) $(\lambda A)^{-1}$ — (14) IAI ≠ 0

65) adj (AB) — (15) $|A|^{n-2}$. A

66) $(A^T)^{-1}$ — (16) Trivial solution

67) A(adj A) — (17) $|A|^{n-2}$.A

68) $(AB)^{-1}$ — (18)

Consistent with two parameter family of solution

69) $(A^{-1})^{-1}$ — (19) (adj B) (adj A)

70) adj (λA) — (20) $(A^{-1})^T$

Odd one out

71) The rank of any 3 x 4 matrix is
(1) May be 1
(2) May be 2
(3) May be 3
(4) Maybe 4

72) If A is symmetric then
(1) A^T= A
(2) adj A is symmetric
(3) adj (A^T)= $(\text{adj } A)^T$
(4) A is orthogonal

73) If A is a non-singular matrix of odd order them
1) Order of A is 2m + 1
(2) Order of A is 2m + 2
(3) |adj AI is positive
(4) IAI ≠ 0

74) If A is a orthogonal matrix, then
(1) AA^T= A^TA=I
(2) A is non-singular
(3) IAI= 0
(4) $A^{-1} = A^T$

75) A matrix which is obtained from an identity matrix by applying only one elementary transformation is
(1) Identity matrix
(2) Elementary matrix
(3) Square matrix
(4) Equivalent to identify matrix

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