QB365 Question Bank Software Study Materials

Applications of Matrices and Determinants 50 Important 1Marks Questions With Answers (Book Back and Creative)

12th Standard

Maths

Total Marks : 50

50 x 1 = 50

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_3** (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 $9I_2 - A$ =

(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 $|\text{adj } (AB)|$ =

(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_2, 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) $(\sin^2\frac{\theta}{2})$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 k =

(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)** $\mathbf{e^{(\Delta_1 / \Delta_3)}, e^{(\Delta_2 / \Delta_3)}}$

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 ρ (A) = ρ([A| 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) $\lambda = 7, \mu \neq -5$ (b) $\lambda = -7, \mu = 5$ (c) $\lambda \neq 7, \mu \neq -5$ **(d)** $\lambda = 7, \mu = -5$

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) 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) $a^2 + b^2 + c^2 + 2abc = 1$**

27) 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

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

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

29) If A is a matrix of order m × n, then ρ (A) is _____

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

30) 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

31) 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) $R_i \longrightarrow R_i + C_j$**

32) Every homogeneous system _____

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

33) 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

34) Cramer's rule is applicable only when _____

(a) Δ ≠ 0 (b) Δ = 0 (c) Δ =0, Δ_x =0 (d) $\Delta_x = \Delta_y = \Delta_z = 0$

35) 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

36) In the system of equations with 3 unknowns, if Δ = 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

37) 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.

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

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

39) 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) $A_{ij} = (-1)^{i-j} M_{ij}$

40) The two lines are Parallel (non-coincident) then the solution is _____

(a) Consistent and Only two solutions (b) Consistent and infinite number of solutions (c) no solution

(d) consistent and unique solution

41) Let $\mathbf{A} = \begin{bmatrix} 4 & 4k & k \\ 0 & k & 4k \\ 0 & 0 & 4 \end{bmatrix}$ If $\det(A^2) = 16$ then $|k|$ is _____

(a) 1 **(b)** $\frac{1}{4}$ (c) 4 (d) 4^2

42) If $P = \begin{bmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ -\frac{1}{2} & \frac{\sqrt{3}}{2} \end{bmatrix}, A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$ and $Q = PAP^T$, then $P^T, Q^{2013} P$ = _____

(a) $\begin{bmatrix} 1 & 2013 \\ 0 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 4+2013\sqrt{3} & 6039 \\ 2012 & 4-2013\sqrt{3} \end{bmatrix}$ (c) $\frac{1}{4}\begin{bmatrix} 2+\sqrt{3} & 1 \\ -1 & 2-\sqrt{3} \end{bmatrix}$ (d) $\frac{1}{4}\begin{bmatrix} 2012 & 2-\sqrt{3} \\ 2+\sqrt{3} & 2012 \end{bmatrix}$

43) If $\mathbf{A} = \begin{bmatrix} i & 0 & 0 \\ 0 & i & 0 \\ 0 & 0 & i \end{bmatrix}, \mathbf{i} = \sqrt{-1}$, then $A^n = I$ where I is unit matrix when n = _____

(a) 4p + 1 (b) 4p + 3 **(c) 4p** (d) 4p + 2

44) If $A = \begin{bmatrix} k & 3 \\ 3 & k \end{bmatrix}$ and $|A^3| = 343$, then find the value of k _____

(a) ± 1 (b) ± 2 (c) ± 3 **(d)** ± 4

45) If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$, then $A^n + (n - 1) I$ = _____

(a) $2^{n-1}A$ (b) - nA **(c) nA** (d) (n + 1)A

46) $X \begin{bmatrix} \tan^2 x & -\sec^2 x & 1 \\ -\sec^2 x & \tan^2 x & 1 \\ -10 & 12 & -2 \end{bmatrix} =$ _____

(a) 12 $\tan^2$ x - 10 $\sec^2$ x (b) 12 $\sec^2$ x - 10 $\tan^2$ x + 2 **(c) 0** (d) $\tan^2$ x. $\sec^2$ x

47) If the inverse of the matrix $\begin{vmatrix} 1 & 2 \\ 3 & -5 \end{vmatrix}$ is $\frac{1}{11}\begin{vmatrix} a & b \\ c & d \end{vmatrix}$ then the ascending order of a, b, c, d is _____

(a) a, b, c, d **(b) d, b, c, a** (c) c, a, b, d (d) b, d, c, d

48) If A is a 3×3 matrix such that | 3adj A | = 3 then |A| is equal to _____

(a) $\frac{1}{3}$ (b) $-\frac{1}{3}$ **(c)** $\pm\frac{1}{3}$ (d) ± 3

49) The inverse of $\begin{bmatrix} 3 & 1 \\ 5 & 2 \end{bmatrix}$ is

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

50) copmlex number

(a) abc (b) def