

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 $AA^T = A^T A$ and $B = A^{-1}A^T$, then $BB^T =$
(a) A (b) B (c) **I_3** (d) B^T
- 3) If $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, $B = \text{adj } A$ and $C = 3A$, then $\frac{|\text{adj } B|}{|C|} =$
(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) $\text{adj } A = |A|A^{-1}$ (b) **$\text{adj}(AB) = (\text{adj } A)(\text{adj } B)$** (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 $A^T A^{-1}$ 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 $A^{-1} = \begin{bmatrix} 5 & 3 \\ \circ & 1 \end{bmatrix}$, 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) $(\cos^2 \frac{\theta}{2}) A$ (b) $(\cos^2 \frac{\theta}{2}) A^T$ (c) $(\cos^2 \theta) I$ (d) $(\sin^2 \frac{\theta}{2}) A$

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

(a) 0 (b) $\sin \theta$ (c) $\cos \theta$ (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 $\text{adj } A = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and $\text{adj } B = \begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ then $\text{adj } (AB)$ 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) $A(\text{adj } A) = (\text{adj } A)A = |A| I$

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

21) If $\rho(A) = \rho([A | B])$, 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 $0 \leq \theta \leq \pi$ and the system of equations $x + (\sin \theta)y - (\cos \theta)z = 0$, $(\cos \theta)x - y + z = 0$, $(\sin \theta)x + y - z = 0$ 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 $\text{adj}(\text{adj } A)$ 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) $abc \neq 1$ (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) $k \neq 0$** (b) $-1 < k < 1$ (c) $-2 < k < 2$ (d) $k = 0$

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

- (a) $\sin x \cos x$ **(b) 1** (c) 2 (d) none

29) If A is a matrix of order $m \times n$, then $\rho(A)$ is _____

- (a) m (b) n **(c) $\leq \min(m, n)$** (d) $\geq \min(m, n)$

30) If $\rho(A) = \rho([A/B]) =$ 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) $R_i \rightarrow 2R_i + R_j$ (c) $C_j \rightarrow C_j + C_i$ **(d) $R_i \rightarrow R_i + C_j$**

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 $\rho(A) \neq \rho([A/B])$, 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) $\Delta \neq 0$** (b) $\Delta = 0$ (c) $\Delta = 0, \Delta_x = 0$ (d) $\Delta_x = \Delta_y = \Delta_z = 0$

35) In a homogeneous system if $\rho(A) = \rho([A|0]) <$ the number of unknowns 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 $\Delta = 0$, and one of Δ_x, Δ_y or 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 linear equations with 3 unknowns If $\rho(A) = \rho([A/B]) = 1$, 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 $\mathbf{A} = \begin{bmatrix} i & 0 & 0 \\ 0 & i & 0 \\ 0 & 0 & i \end{bmatrix}$, $i = \sqrt{-1}$, 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) $\tan^2 x \cdot \sec^2 x$

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 $|3 \text{adj } A| = 3$ 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) complex number

- (a) **abc** (b) def