TEST - 02

By O.P. GUPTA

MULTIPLE CHOICE TYPE QUESTIONS

For CBSE 2025 Exams - Mathematics (041) - Class 12

Topics : Determinants **Max. Marks : 50**

☑ ***Select the correct option in the followings. Each question carries 1 mark.***

Q01. For the matrix $A=\begin{bmatrix}0 & -2023 & 2022\\ 2023 & 0 & -2024\\ -2022 & 2024 & 0\end{bmatrix}$, the value of $\text{Det.}(A)$ is given by

(a) 0 (b) –2023 (c) –1 (d) 1

Q02. Let A be a square matrix of order 3 such that its det. value is '–2'. Then $|3A|=$

(a) 54 (b) –54 (c) –6 (d) 6

Q03. Let $A=\left[a_{ij}\right]_{3\times3}$ such that $A.(\text{adj}.A)=5\,I$. Then $|\text{adj}.(2A)|=$

(a) 16 (b) 25 (c) 1600 (d) 50

Q04. The cofactor of element 3 in $\begin{vmatrix}1 & 3\\ 6 & 0\end{vmatrix}$ is

(a) 6 (b) –1 (c) 1 (d) –6

Q05. Let $\begin{vmatrix}x & -\sin\theta & \cos\theta\\ \sin\theta & -x & 1\\ \cos\theta & 1 & x\end{vmatrix}=k\,x^m$. Then $m-k$ equals

(a) –1 (b) 3 (c) 2 (d) 4

Q06. If $\begin{vmatrix}1 & 3 & 1\\ 1 & 9 & 3\\ 1 & x & y\end{vmatrix}=0$ gives an equation of line $x=\lambda y$, then $\lambda=$

(a) 0 (b) –3 (c) 1 (d) 3

Q07. If A and B are matrices of order 3×3 such that $|A|=5,\ |B|=2,$ then the value of $|2AB|$ is

(a) 10 (b) 80 (c) 20 (d) 40

Q08. Let $A=\begin{bmatrix}-4 & 3\\ -1 & 0\end{bmatrix}$. Then inverse of matrix A is

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

Q09. Let $A=\begin{bmatrix}\cos 30^\circ & -\sin 60^\circ \\ \sin 60^\circ & \cos 30^\circ\end{bmatrix}$. Then $|A|=$

(a) $\frac{3}{2}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $\frac{1}{4}$

Q10. The determinant value of a square matrix of order 3 is known to be 4. Then the determinant value of the matrix formed by replacing each element by its cofactor will be

(a) 4 (b) 16 (c) 64 (d) 0

Q11. If $A=\begin{bmatrix}\frac{x}{6} & 2 \\ 1 & 3\end{bmatrix}$ is a singular matrix, then

(a) $x=\pm 4$ (b) $x=-4$ (c) $x=4$ (d) $x\in R-\{4\}$

Q12. If A' represents the transpose of matrix $A=\begin{pmatrix}\cos\omega & -\sin\omega \\ \sin\omega & \cos\omega\end{pmatrix}$, then $|A'|=$

(a) -1 (b) 0 (c) ± 1 (d) 1

Q13. For $\text{diag.}\begin{pmatrix}1 & 2 & 3\end{pmatrix}$, the determinant value is

(a) 6 (b) 0 (c) 36 (d) 216

Q14. If $\Delta=\begin{vmatrix}1 & a & a^2 \\ a & a^2 & 1 \\ a^2 & 1 & a\end{vmatrix}=-4$, then the value of $\begin{vmatrix}a^3-1 & 0 & a-a^4 \\ 0 & a-a^4 & a^3-1 \\ a-a^4 & a^3-1 & 0\end{vmatrix}$ is

(a) -4 (b) 16 (c) -64 (d) 0

Q15. If [.] represents the greatest integer function, and $-1\le x<0,\ 0\le y<1,\ 1\le z<2$ then, the value of the determinant $\begin{vmatrix}[x]+1 & [y] & [z] \\ [x] & [y]+1 & [z] \\ [x] & [y] & [z]+1\end{vmatrix}$ is given by

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

Q16. For the matrix $A=\begin{bmatrix}1 & -1 & 2 \\ 3 & 0 & -2 \\ 1 & 0 & 3\end{bmatrix}$, the value of $|A^{-1}|$ will be

(a) 11 (b) $-\frac{1}{11}$ (c) -11 (d) $\frac{1}{11}$

Q17. Let $A=\begin{bmatrix}5 & 0 & 4 \\ 2 & 3 & 2 \\ 1 & 2 & 1\end{bmatrix}$. Then the value of $|A|+|\text{adj.}A|$ is

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

Q18. If $\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix} A \begin{bmatrix} -3 & 2 \\ 5 & -3 \end{bmatrix} = \begin{bmatrix} -2 & 4 \\ 3 & -1 \end{bmatrix}$, then the matrix A is

(a) $\begin{bmatrix} -24 & 13 \\ -34 & -18 \end{bmatrix}$ (b) $\begin{bmatrix} 24 & 13 \\ -34 & -18 \end{bmatrix}$ (c) $\begin{bmatrix} 24 & 13 \\ -34 & 18 \end{bmatrix}$ (d) $\begin{bmatrix} 24 & 13 \\ 34 & -18 \end{bmatrix}$

Q19. Let $(A^{-1})' = (A')^{-k}$. Then 'k' equals

(a) 0 (b) −1

(c) 1, when A is a non-singular matrix (d) 1, when A can be any square matrix

Q20. For the matrix $A = \begin{pmatrix} 7 & 2 \\ 6 & 3 \end{pmatrix}$, $A.(adj.A) =$

(a) 9 (b) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (c) ±9 (d) $\begin{pmatrix} 9 & 0 \\ 0 & 9 \end{pmatrix}$

Q21. The value of $\begin{vmatrix} 1 & 1 & 1 \\ \alpha+\beta & \beta+\gamma & \gamma+\alpha \\ \gamma & \alpha & \beta \end{vmatrix}$ is

(a) 0 (b) $\alpha+\beta+\gamma$ (c) $1+\alpha+\beta+\gamma$ (d) $(\alpha-\beta)(\beta-\gamma)(\gamma-\alpha)$

Q22. For the matrix $A = \begin{pmatrix} 3 & 4 & 5 \\ 2 & -1 & 8 \\ 5 & -2 & 7 \end{pmatrix}$, $|-A| =$

(a) 136 (b) −136 (c) 1 (d) 0

Q23. Let $A = \begin{pmatrix} 1 & -\sin\theta & -1 \\ \sin\theta & 1 & -\sin\theta \\ 1 & \sin\theta & 1 \end{pmatrix}$, where $\theta \in [0, 2\pi]$ such that $|A| \in [m, n]$. Then $n^m =$

(a) [2, 4] (b) 4 (c) 16 (d) 2

Q24. If x, y, z are all non-zero real numbers then, $\begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}^{-1}$ equals

(a) $\begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$ (b) $\begin{bmatrix} z & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & x \end{bmatrix}$ (c) $\begin{bmatrix} z^{-1} & 0 & 0 \\ 0 & y^{-1} & 0 \\ 0 & 0 & x^{-1} \end{bmatrix}$ (d) $\begin{bmatrix} x^{-1} & 0 & 0 \\ 0 & y^{-1} & 0 \\ 0 & 0 & z^{-1} \end{bmatrix}$

Q25. If $A_m = \begin{bmatrix} m & m-1 \\ m-1 & m \end{bmatrix}$ and $|A_1| + |A_2| + |A_3| + ... + |A_{2024}| = k^2$, $(k > 0)$. Then $k =$

(a) 2024 (b) 2024^2 (c) 2023 (d) 2023^2

Q26. If $A=\begin{pmatrix}1 & 2\\ 3 & 5\end{pmatrix}$, then the value of $\left|A^{2023}\right|$ is

(a) 1 (b) -1 (c) 2023 (d) -2023

Q27. $\begin{bmatrix}1 & -\tan\frac{\theta}{2}\\ \tan\frac{\theta}{2} & 1\end{bmatrix}\begin{bmatrix}1 & \tan\frac{\theta}{2}\\ -\tan\frac{\theta}{2} & 1\end{bmatrix}^{-1}=$

(a) $\begin{bmatrix}\cos\theta & \sin\theta\\ -\sin\theta & \cos\theta\end{bmatrix}$ (b) $\begin{bmatrix}\cos\theta & \sin\theta\\ \sin\theta & -\cos\theta\end{bmatrix}$ (c) $\begin{bmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{bmatrix}$ (d) $\begin{bmatrix}-\cos\theta & \sin\theta\\ \sin\theta & \cos\theta\end{bmatrix}$

Q28. For the matrix $A=\begin{pmatrix}3 & -1 & 1\\ -15 & 6 & -5\\ 5 & -2 & 2\end{pmatrix}$, $A^{-1}.\,A=$

(a) $\begin{bmatrix}-1 & 0 & 0\\ 0 & -1 & 0\\ 0 & 0 & -1\end{bmatrix}$ (b) $\begin{bmatrix}0 & 0 & 1\\ 0 & 1 & 0\\ 1 & 0 & 0\end{bmatrix}$ (c) $\begin{bmatrix}0 & 0 & -1\\ 0 & -1 & 0\\ -1 & 0 & 0\end{bmatrix}$ (d) $\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}$

Q29. If the system of linear equations $x+y+z=2,\ 2x+y-z=3,\ 3x+2y+kz=4$ has a unique solution, then

(a) $k\neq 0$ (b) $k=0$ (c) $k\in R$ (d) None of these

Q30. The given system of equations $x+2y+z=7,\ x+3z=11,\ 2x-3y=1$ can be expressed as

(a) $\begin{bmatrix}x\\ y\\ z\end{bmatrix}\begin{bmatrix}1 & 2 & 1\\ 1 & 0 & 3\\ 2 & -3 & 0\end{bmatrix}=\begin{bmatrix}7\\ 11\\ 1\end{bmatrix}$ (b) $\begin{bmatrix}1 & 2 & 1\\ 1 & 0 & 3\\ 2 & -3 & 0\end{bmatrix}\begin{bmatrix}x\\ y\\ z\end{bmatrix}=\begin{bmatrix}7\\ 11\\ 1\end{bmatrix}$

(c) $\begin{bmatrix}1 & 2 & 1\\ 1 & 0 & 3\\ 2 & -3 & 0\end{bmatrix}\begin{bmatrix}7\\ 11\\ 1\end{bmatrix}=\begin{bmatrix}x\\ y\\ z\end{bmatrix}$ (d) $\begin{bmatrix}x\\ y\\ z\end{bmatrix}\begin{bmatrix}7\\ 11\\ 1\end{bmatrix}=\begin{bmatrix}1 & 2 & 1\\ 1 & 0 & 3\\ 2 & -3 & 0\end{bmatrix}$

Q31. For matrix $A=\begin{pmatrix}2 & 3 & 10\\ 4 & -6 & 5\\ 6 & 9 & -20\end{pmatrix}$, the value of $\dfrac{|adj.A|}{|A|}$ is

(a) 1440000 (b) $\dfrac{1}{1200}$ (c) 1200 (d) $\dfrac{1}{1440000}$

Q32. $\begin{vmatrix}1 & 1 & 1\\ 1 & 0 & 2\\ 3 & 1 & 1\end{vmatrix}=$

(a) -4 (b) 2 (c) -2 (d) 4

Q33. Minor of element '2' in $\begin{vmatrix} 0 & -1 & 3 \\ -2 & 0 & 2 \\ 3 & 4 & 5 \end{vmatrix}$ is

(a) 3 (b) −3 (c) 17 (d) −17

Q34. Let $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 0 & 3 \\ 1 & -2 & 1 \end{bmatrix}$. Then adjoint of matrix A is

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

Q35. If A is a square matrix of order 3 such that $A(\text{adj}.A) = \begin{bmatrix} -2 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -2 \end{bmatrix}$, then $|A|$ is

(a) 2 (b) 1 (c) −2 (d) −1

Q36. If $A = \begin{bmatrix} \alpha & 2 \\ 2 & \alpha \end{bmatrix}$ and $|A^3| = 27$, then the value of α is

(a) ± 1 (b) ± 2 (c) $\pm\sqrt{5}$ (d) $\pm\sqrt{7}$

Q37. If $\begin{vmatrix} 5 & 3 & -1 \\ -7 & x & -3 \\ 9 & 6 & -2 \end{vmatrix} = 0$, then the value of x is

(a) 9 (b) 5 (c) 7 (d) 3

Q38. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 59 & 69 & -1 \end{bmatrix}$, then A^{-1}

(a) is $(-A)$ (b) is A (c) is A^2 (d) does not exist

Q39. The determinant $\begin{vmatrix} y+k & y & y \\ y & y+k & y \\ y & y & y+k \end{vmatrix}$ is equal to

(a) $k(3y+k^2)$ (b) $3y+k^3$ (c) $k^2(3y+k)$ (d) $3y+k^2$

Q40. If $A = \begin{bmatrix} 1 & -2 & 4 \\ 2 & -1 & 3 \\ 4 & 2 & 0 \end{bmatrix}$ is the adjoint of a square matrix B, then B^{-1} is equal to

(a) $\pm A$ (b) $\pm\sqrt{2}A$ (c) $\pm\frac{1}{\sqrt{2}}B$ (d) $\pm\frac{1}{\sqrt{2}}A$

Q41. The value of $\begin{vmatrix} \lfloor 1 & \lfloor 2 & \lfloor 3 \\ 2\lfloor 2 & 3\lfloor 3 & 4\lfloor 4 \\ \lfloor 3 & \lfloor 4 & \lfloor 5 \end{vmatrix}$ is

(a) -24 (b) -12 (c) 24 (d) 12

Q42. If $\begin{bmatrix} 1 & -\tan\theta \\ \tan\theta & 1 \end{bmatrix}\begin{bmatrix} 1 & \tan\theta \\ -\tan\theta & 1 \end{bmatrix}^{-1} = \begin{bmatrix} a & -b \\ b & a \end{bmatrix}$, then

(a) $a^2 \times b^2 = 1$ (b) $a^2 + b^2 = 1$ (c) $a^2 - b^2 = 1$ (d) $b^2 - a^2 = 1$

Q43. If $A = [a_{ij}]$ is a 3×3 matrix and A_{ij} denotes the cofactors of the corresponding elements a_{ij}'s then, the value of $a_{21}A_{11} + a_{22}A_{12} + a_{23}A_{13} =$

(a) $|A|$ (b) $-|A|$ (c) 0 (d) $|adj.A|$

Q44. If $\begin{vmatrix} x+1 & x-1 \\ x-3 & x+2 \end{vmatrix} = \begin{vmatrix} 4 & -1 \\ 1 & 3 \end{vmatrix}$, then the value of x will be

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

Q45. If $A = \left[a_{ij}\right]_{3\times 3}$ is a matrix, such that $Det.(A) = -15$ and C_{ij} represents the cofactor of a_{ij}, then the value of $a_{11}C_{11} + a_{12}C_{12} + a_{13}C_{13} =$

(a) -15 (b) 15 (c) 0 (d) 1

Q46. Let $A = \left[a_{ij}\right]$ be a square matrix of order 3, such that $a_{ij} = \begin{cases} 1, \text{ if } i = j \\ 0, \text{ if } i \neq j \end{cases}$.

Then $a_{31}C_{31} + a_{32}C_{32} + a_{33}C_{33} =$

(a) 0 (b) 1 (c) -1 (d) 111

*Question numbers **47** to **50** are Assertion and Reason based questions. Two statements are given, one labelled **Assertion (A)** and the other labelled **Reason (R)**. Select the correct answer from the codes (a), (b), (c) and (d) as given below.*

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(b) Both Assertion (A) and Reason (R) are true and Reason (R) is **not** the correct explanation of Assertion (A).
(c) Assertion (A) is true but Reason (R) is false.
(d) Assertion (A) is false but Reason (R) is true.

Q47. **Assertion (A) :** If $\Delta = \begin{vmatrix} 0 & a-b & a-c \\ b-a & 0 & b-c \\ c-a & c-b & 0 \end{vmatrix}$, then $\Delta = 0$.

Reason (R) : The determinant value of a skew-symmetric matrix is always zero.

Q48. **Assertion (A) :** The matrix given by $M = \begin{bmatrix} -3 & 4 \\ -1 & 1 \end{bmatrix}$ is a non-invertible matrix.

Reason (R) : A singular matrix is always non-invertible.

Q49. **Assertion (A) :** If $X = \begin{bmatrix} 1 & 2 \\ 1 & 4 \end{bmatrix}$, then $adj.X = \begin{bmatrix} 4 & -2 \\ -1 & 1 \end{bmatrix}$.

Reason (R) : For a matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$, adjoint of the matrix will be given by $\begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$.

Q50. **Assertion (A) :** Matrix $M = \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$ will have a determinant value given as ‘ xyz ’.

Reason (R) : For a square matrix P of order n, we always have $|adj.P| = |P|^{n-1}$.

This document contains MCQs for Mathematics (041) of class XII.
✪ Answers / Solutions is available on YouTube channel – Mathematicia By O.P. Gupta
You can share this document with other students!

✍ *With a lot of Blessings!*

O.P. GUPTA
Author & Math Mentor
Indira Award Winner

🕮 The O.P. Gupta Advanced Math Classes
@ **Think Academy**, Near Dhansa Bus Stand
Metro Station Gate No.3, Najafgarh, Delhi

Telegram / WhatsApp : +919650350480

YouTube.com/@theopgupta