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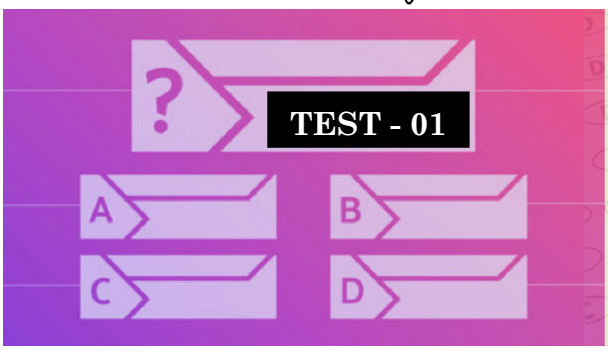

By O.P. GUPTA

MULTIPLE CHOICE TYPE QUESTIONS

For CBSE 2026 Exams - Mathematics (041) - Class 12

Topics : Algebra of Matrices **Max. Marks : 50**

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

Q01. Let $A=[a_{ij}]_2$ be a square matrix whose elements are given by $a_{ij}=|(i)^2-j|$. Then matrix A is

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

Q02. If $\begin{bmatrix}x+y&7\\9&x-y\end{bmatrix}=\begin{bmatrix}2&7\\9&4\end{bmatrix}$, then $x.y=$

(a) 0 (b) 1 (c) –3 (d) 3

Q03. If $a_{12}=k\sin x\cos x\,e^{2x}$ in a marix $A=\left[a_{ij}\right]_{2\times3}$, where $a_{ij}=e^{2ix}\sin jx$, then value of k is

(a) 1 (b) –1 (c) –2 (d) 2

Q04. If A and B are two matrices such that $A+B$ is defined then

(a) A and B can be any matrices
(b) A and B are square matrices not necessarily of same order
(c) Number of columns in A = Number of rows in B
(d) A and B must be of same order

Q05. The matrix $A=\begin{bmatrix}0&0&5\\0&5&0\\5&0&0\end{bmatrix}$ is a

(a) scalar matrix (b) diagonal matrix (c) unit matrix (d) square matrix

Q06. If $A=\begin{bmatrix}\sin^2(x\pi)&\tan\left(\frac{x}{\pi}\right)\\\sin\left(\frac{x}{\pi}\right)&\operatorname{cosec}^2(x\pi)\end{bmatrix}$, $B=\begin{bmatrix}-\cos^2(x\pi)&\tan\left(\frac{x}{\pi}\right)\\\sin\left(\frac{x}{\pi}\right)&\cot^2(x\pi)\end{bmatrix}$, then the value of A – B is

(a) I (b) O (c) $\frac{1}{2}$ I (d) 2 I

Q07. If $A=\begin{pmatrix}1&2\\3&4\end{pmatrix}$, $B=\begin{pmatrix}2&3\\4&5\end{pmatrix}$ and $4A-3B+C=O$, then C is

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

Q08. If a matrix has 13 elements, then the possible dimensions it can have are

(a) $1\times13,\ 13\times1$ (b) $1\times26,\ 26\times1$ (c) $2\times13,\ 13\times2$ (d) 1×13 only

Q09. If a matrix A has 12 elements then, how many different orders it can have?

(a) $1\times12,\ 2\times6,\ 3\times4,\ 4\times3,\ 6\times2,\ 12\times1$ (b) $2\times6,\ 3\times4,\ 4\times3,\ 6\times2$
(c) 6 (d) $1\times12,\ 12\times1$

Q10. How many matrices of order 2×3 are possible with each entry 0 or 1?

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(a) 2^5 (b) 128 (c) 2^6 (d) 2^{12}

Q11. Let $A=\begin{bmatrix}5 & 0 & 0\\ 0 & \frac{25}{x} & 0\\ 0 & 0 & x\end{bmatrix}$. If A is a scalar matrix, then value of x is

(a) ±5 (b) only 5 (c) only -5 (d) x can be any real number

Q12. If $A=\begin{pmatrix}\cos\omega & -\sin\omega\\ \sin\omega & \cos\omega\end{pmatrix}$, then for what value of ω is A an identity matrix?

(a) $\omega=n\pi,\ n\in Z$ (b) $\omega=3n\pi,\ n\in Z$ (c) $\omega=2n\pi,\ n\in Z$ (d) $\omega=\frac{n\pi}{2},\ n\in Z$

Q13. The values of x and y, if $\begin{bmatrix}x^2\\ y^2\end{bmatrix}-3\begin{bmatrix}x\\ 2y\end{bmatrix}=\begin{bmatrix}-2\\ 9\end{bmatrix}$, are

(a) $x=1,\ 2;\ y=3\pm3\sqrt{2}$ (b) $x=1,\ -2;\ y=3\pm3\sqrt{2}$

(c) $x=1,\ 2;\ y=3\sqrt{2}\pm3$ (d) $x=1,\ 2;\ y=3\pm2\sqrt{3}$

Q14. If $A=\begin{pmatrix}0 & 3\\ 2 & -5\end{pmatrix}$ and $kA=\begin{pmatrix}0 & 4a\\ -8 & 5b\end{pmatrix}$, then the value of $(k)^{-a}$ is

(a) 64 (b) -64 (c) ±64 (d) $-\frac{1}{64}$

Q15. The values of x and y, if $\begin{bmatrix}2x+y & 3y\\ 0 & y^2-5y\end{bmatrix}=\begin{bmatrix}x+3 & y^2+2\\ 0 & -6\end{bmatrix}$ are

(a) $x=1,\ y=1,2$ (b) $y=1,\ x=2$ (c) $x=1,\ y=1$ (d) $x=1,\ y=2$

Q16. For what value (s) of x, the matrix $\begin{pmatrix}-1 & 0 & y-x\\ 0 & 0 & 0\\ 0 & x+y-6 & 5\end{pmatrix}$ is a diagonal matrix?

(a) 6 (b) 0 (c) 3 (d) 2

Q17. If $A=\begin{pmatrix}1 & 2 & -1\\ 3 & 4 & 7\\ 5 & 1 & 6\end{pmatrix}$, then the value of X where $A+X$ is a unit matrix, is

(a) $\begin{pmatrix}0 & -2 & 1\\ -3 & -3 & -7\\ -5 & -1 & -5\end{pmatrix}$ (b) $\begin{pmatrix}0 & -3 & 5\\ -2 & -3 & 1\\ -1 & -7 & 6\end{pmatrix}$ (c) $\begin{pmatrix}0 & -1 & -2\\ 3 & 3 & 7\\ 5 & 1 & 6\end{pmatrix}$ (d) $\begin{pmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{pmatrix}$

Q18. If $\begin{pmatrix}4 & 0 & 0\\ 0 & 4 & 0\\ y & 0 & x\end{pmatrix}$ is a scalar matrix, then the value of x^y is

(a) 4 (b) 0 (c) 1 (d) ±4

Q19. For what value of m, the matrix $\begin{pmatrix}5 & 0 & 0\\ 0 & 5 & 0\\ 3 & 0 & m\end{pmatrix}$ is a diagonal matrix?

(a) any real no. (b) 0 (c) 5 (d) no value of m

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Q20. For the matrix $\begin{pmatrix} 1 & 9 & 3 \\ 0 & 4 & -1 \end{pmatrix}$, no. of rows and columns are denoted by 'm' and 'n' respectively. Then value of $(m+n)^m =$

(a) 3 (b) 2 (c) 5 (d) 25

Q21. Let $A = \begin{pmatrix} 4 & 7 & 5 \\ 3 & 6 & -1 \\ 8 & 0 & 2 \end{pmatrix}$ and a_{ij} denote the elements of A. Then $a_{12} - a_{31} + a_{21} =$

(a) 10 (b) 2 (c) 8 (d) 4

Q22. Let $A = \begin{pmatrix} 1 & 0 & 0 \\ x & y & 0 \\ 0 & 0 & 1 \end{pmatrix}$ be a unit matrix of order 3. Then $x - y =$

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

Q23. If $3A + B = \begin{pmatrix} 5 & 1 \\ 3 & 4 \end{pmatrix}$, $A = \begin{pmatrix} -1 & 2 \\ 6 & 0 \end{pmatrix}$, then matrix B is given by

(a) $\begin{pmatrix} 8 & -5 \\ -15 & 4 \end{pmatrix}$ (b) $\begin{pmatrix} 8 & -15 \\ -5 & 4 \end{pmatrix}$ (c) $\begin{pmatrix} 8 & -5 \\ 15 & 4 \end{pmatrix}$ (d) $\begin{pmatrix} -8 & 15 \\ 5 & -4 \end{pmatrix}$

Q24. If $A + B = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ and $A - 2B = \begin{bmatrix} -1 & 1 \\ 0 & -1 \end{bmatrix}$, then $A =$

(a) $\begin{bmatrix} \frac{1}{3} & \frac{1}{3} \\ \frac{2}{3} & \frac{1}{3} \end{bmatrix}$ (b) $\begin{bmatrix} \frac{1}{3} & \frac{2}{3} \\ \frac{2}{3} & \frac{1}{3} \end{bmatrix}$ (c) $\begin{bmatrix} \frac{1}{3} & \frac{2}{3} \\ \frac{1}{3} & \frac{1}{3} \end{bmatrix}$ (d) None of these

Q25. If $A = \text{diag.}(1 \quad 2)$, $B = \text{diag.}(3 \quad -6)$, then $3A + B =$

(a) $\text{diag.}(6 \quad 0)$ (b) $\text{diag.}(0 \quad 6)$ (c) $\text{diag.}(6 \quad -6)$ (d) $\text{diag.}(-6 \quad 6)$

Q26. Which of the following is 'additive identity for matrix addition'?

(a) any matrix (b) any square matrix
(c) any null matrix (d) a null matrix of same order

Q27. A null matrix, whose all elements are zero, is

(a) always a square matrix (b) always a column vector
(c) always a diagonal matrix (d) not necessary to be a square matrix

Q28. For the matrix $P = \begin{bmatrix} 6 & 8 \\ 4 & -10 \\ -2 & 24 \end{bmatrix}$, $-\frac{P}{2}$ is given by

(a) $\begin{bmatrix} 3 & 4 \\ 2 & -5 \\ -1 & 12 \end{bmatrix}$ (b) $\begin{bmatrix} -3 & -4 \\ -2 & 5 \\ 1 & -12 \end{bmatrix}$ (c) $\begin{bmatrix} -3 & -4 \\ -2 & 5 \\ 1 & 12 \end{bmatrix}$ (d) $\begin{bmatrix} 3 & 4 \\ 2 & 5 \\ -1 & 12 \end{bmatrix}$

Q29. Order of the matrix $\begin{bmatrix} m & a & t & h \\ m & i & s & s \\ i & o & n & 12 \end{bmatrix}$ is

(a) 4×3 (b) 3×4 (c) 3/4 (d) 4/3

Q30. How many non-diagonal matrices of order 3 can be formed with each entry 0 or 1?

(a) 512 (b) 1024 (c) 504 (d) 8

Q31. If $\begin{bmatrix} -5 & 6 & 7 \\ 6 & 2 & m^2-6 \\ 7 & 3 & 0 \end{bmatrix}$ is a symmetric matrix, then $m =$

(a) 0 (b) -2 (c) 2 (d) ± 3

Q32. Let $A = (a_{ij})_{m\times m}$. If $A^2 = A$, then $7A - (I + A)^3 =$

(a) $-I$ (b) I (c) 2I (d) O

Q33. If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & x & -1 \end{bmatrix}$ satisfies $AA^T = 9I$, then the value of x will be

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

Q34. Let $A = \begin{pmatrix} 0 & 71 & 29 \end{pmatrix}\begin{pmatrix} 13 \\ 12 \\ 31 \end{pmatrix}$. Then order of matrix $A =$

(a) 3×3 (b) 1×3 (c) 1×1 (d) 3×1

Q35. In the product $\begin{pmatrix} 1 & 0 \\ -5 & 7 \end{pmatrix}\begin{pmatrix} 7 \\ 2 \end{pmatrix}$, the pre-factor matrix is

(a) $\begin{pmatrix} 7 \\ 2 \end{pmatrix}$ (b) $\begin{pmatrix} 7 \\ -21 \end{pmatrix}$ (c) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (d) $\begin{pmatrix} 1 & 0 \\ -5 & 7 \end{pmatrix}$

Q36. Let $A = \begin{pmatrix} 1 & -2 & 3 \\ -4 & 2 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 3 \\ 4 & 5 \\ -9 & 8 \end{pmatrix}$. If $BA = (b_{ij})$, then value of $b_{21} =$

(a) -16 (b) 16 (c) -36 (d) 0

Q37. If $\begin{pmatrix} 2 & -1 \\ 1 & 0 \\ -3 & 4 \end{pmatrix}\begin{pmatrix} m & n \\ x & y \end{pmatrix} = \begin{pmatrix} -1 & -8 \\ 1 & -2 \\ 9 & 22 \end{pmatrix}$, then the value of $(m + n + x + y)$ is

(a) 8 (b) 6 (c) 10 (d) -6

Q38. If $A = \begin{pmatrix} 0 & 2 \\ 2 & 0 \end{pmatrix}$, then $A^4 =$

(a) O (b) 4 I (c) 16 I (d) I

Q39. If order of A^T is 3×5, then order of matrix A is

(a) 3×5 (b) 3×3 (c) 5×5 (d) 5×3

Q40. Let $A = \begin{pmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$; $0 < \theta < \frac{\pi}{2}$. If A satisfies $A + A' = \sqrt{2}\,I$, then $4\theta =$

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

Q41. If $\begin{bmatrix} 16 & 574 & 875 \\ 574 & -97 & 37 \\ 875 & 37 & 709 \end{bmatrix} = P + Q$, where P is symmetric and Q is skew symmetric matrix, then $Q =$

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(a) $\begin{bmatrix} 0 & -574 & -875 \\ -574 & 0 & -37 \\ -875 & -37 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} -16 & -574 & -875 \\ -574 & 97 & -37 \\ -875 & -37 & -709 \end{bmatrix}$ (d) $\begin{bmatrix} 16 & 574 & 875 \\ 574 & -97 & 37 \\ 875 & 37 & 709 \end{bmatrix}$

Q42. Matrix $A = \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$ satisfies $4A - A^2 = kI$. Then $k =$

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

Q43. If $A = \begin{pmatrix} 1 & 3 \\ 0 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -3 \\ 0 & 1 \end{pmatrix}$ such that $AB = 2I$, then inverse of matrix A is

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

Q44. If A and B are invertible matrices of the same order; such that $(BA)^{-1} = A^{-1}B^{-k}$, then k equals

(a) 1 (b) -1 (c) 0 (d) no value of k is possible

Q45. If $A = \begin{pmatrix} 2 & 3 \\ 5 & -2 \end{pmatrix}$ be such that $A^{-1} = mA$, then the value of m is

(a) 19 (b) $\frac{1}{19}$ (c) $-\frac{1}{19}$ (d) -19

Q46. If $A = \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$ and $A^2 - \lambda A + \mu I = O$, then the value of $\lambda + \mu =$

(a) -7 (b) -1 (c) 1 (d) 7

*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 $P = \begin{bmatrix} 1 & 7 & 4 \\ -1 & 2 & 6 \end{bmatrix}$, then $P' = \begin{bmatrix} 1 & -1 \\ 7 & 2 \\ 4 & 6 \end{bmatrix}$.

Reason (R) : If P and Q are matrices of order $m \times n$ and $n \times y$ respectively, then the order of matrix PQ is $m \times y$.

Q48. **Assertion (A) :** The matrix given by $M = \begin{bmatrix} 0 & -1 & 1 \\ 1 & 0 & -5 \\ -1 & 5 & 0 \end{bmatrix}$ is a symmetric matrix.

Reason (R) : If P and Q are square matrices of same order such that $PQ = QP = I$, then we always have $P^{-1} = Q$ and $Q^{-1} = P$.

Q49. **Assertion (A) :** If $X = \begin{bmatrix} -1 & -3 & 4 \\ 0 & 2 & 5 \end{bmatrix}$, then $-X = \begin{bmatrix} 1 & 3 & -4 \\ 0 & -2 & -5 \end{bmatrix}$.

Reason (R) : An element present in the i^{th} row and j^{th} column in the matrix $B = [b_{ij}]_{m\times n}$ is given by b_{ij}.

Q50. **Assertion (A) :** Matrix $M = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ is a diagonal matrix.

Reason (R) : The diagonal matrix is a square matrix, in which all the non-diagonal elements are zero.

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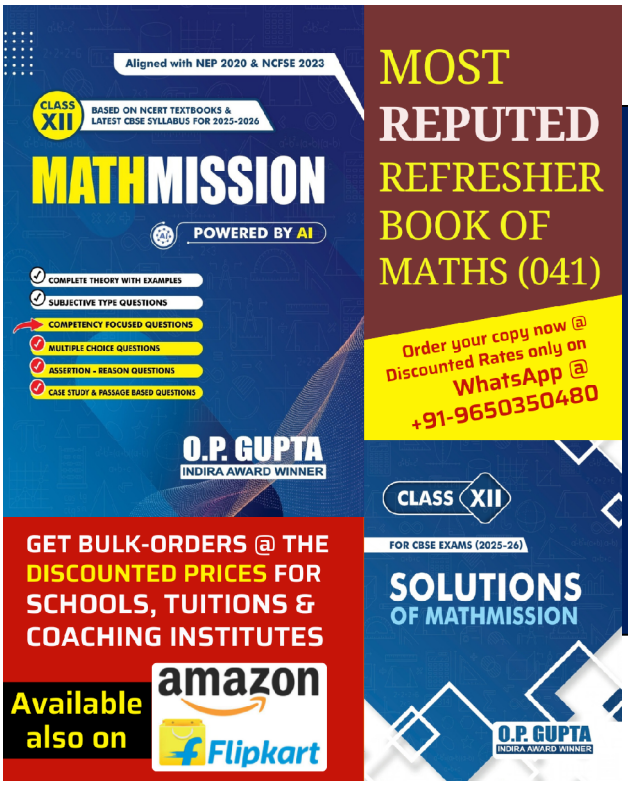

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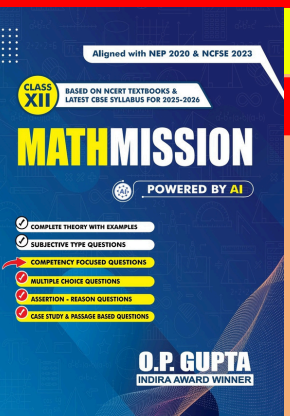

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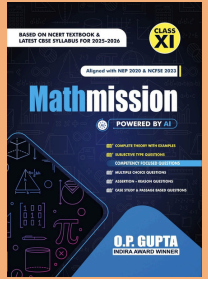

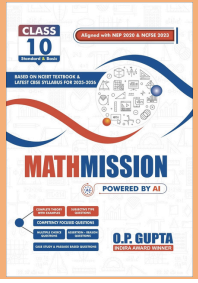

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