CLASS XII – MATHEMATICS – CHAPTER 03
MATRIX

Name: Date:

Q01. If a matrix has 8 elements, what are the possible orders it can have.

Q02. Identity matrix of orders n denoted by.

Q03. Define square matrix.

Q04. The no. of all possible metrics of order 3 x 3 with each entry 0 or 1 is _____

Q05. A = $\begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$. Write (a). a_{33}, a_{12} (b). What is order?

Q06. Two matrices A = $[a_{ij}]$ and B = $[b_{ij}]$ are said to be equal if _____

Q07. Define scalar matrix.

Q08. Every diagonal element of a skew symmetric matrix is _____

Q09. If A = $\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$, then A + A' = I. Find α.

Q10. A = $\begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$. Find A + A'.

Q11. If A = $\begin{bmatrix} \alpha & \beta \\ \beta & -\alpha \end{bmatrix}$ and A^2 = I. Find relation.

Q12. If the matrix A is both symmetric and skews symmetric, then A will be.

Q13. Matrices A and B will be inverse of each other only if _____ .

Q14. If A, B are symmetric matrices of same order, them AB – BA is a _____ .

Q15. Diagonal of skew symmetric matrix are _____.

Q16. If A and B are symmetric matrices of the same order, prove that AB + BA is symmetric

Q17. If A = $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$. Prove that A – A' is a skew – symmetric matrix.

Q18. If A is any square matrix, prove that AA' is symmetric.

Q19. Solve for x and y given that $\begin{bmatrix} 2 & -3 \\ 1 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 3 \end{bmatrix}$.

Q20. Give example of matrices such that AB = 0, BA = 0, A ≠ 0, B ≠ 0

Q21. Show that A = $\begin{bmatrix} 0 & 1 & -1 \\ -1 & 0 & 1 \\ 1 & -1 & 0 \end{bmatrix}$, is skew symmetric matrix.

Q22. If A = $\begin{bmatrix} -1 & 5 \\ 3 & 2 \end{bmatrix}$. Show that (3A)' = 3A'.

Q23. Solve for x and y, given that $\begin{bmatrix} x & y \\ 3y & x \end{bmatrix}\begin{bmatrix} 1 \\ 2 \end{bmatrix} = \begin{bmatrix} 3 \\ 5 \end{bmatrix}$

Q24. Given example of matrix A and B such that AB = 0 but A ≠ 0, B ≠ 0.

Q25. Find x and y if x + y = $\begin{bmatrix} 5 & 2 \\ 0 & 9 \end{bmatrix}$ and x – y = $\begin{bmatrix} 3 & 6 \\ 0 & -1 \end{bmatrix}$

Q26. F(x) = $\begin{bmatrix} \cos x & -\sin x & 0 \\ \sin x & \cos x & 0 \\ 0 & 0 & 1 \end{bmatrix}$. Show that f(x).f(y) = f(x+y)

Q27. If A = $\begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ I = $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$. Find K. So that A^2 = KA – 2I

Q28. A = $\begin{bmatrix} -2 \\ 4 \\ 5 \end{bmatrix}$ B = $\begin{bmatrix} 1 & 3 & -6 \end{bmatrix}$. Prove (AB)' = B'A'

Q29. Construct a 3 x 4 matrix, whose element are given by aij = $\frac{1}{2}|-3i + j|$.

Q30. Obtain the inverse of the following matrix using elementary operations A = $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$.

Q31. Let A= $\begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$, B = $\begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix}$ and C = $\begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}$. Find a matrix D, such that CD – AB = 0.

Q32. If A = $\begin{bmatrix} 3 & -4 \\ 1 & 1 \end{bmatrix}$, then prove that A′ = $\begin{bmatrix} 1+2n & -4n \\ n & 1-2n \end{bmatrix}$ where n is any positive integer.

Q33. For what values of = $\begin{bmatrix} 1 & 2 & 1 \end{bmatrix}\begin{bmatrix} 1 & 2 & 0 \\ 2 & 0 & 1 \\ 1 & 0 & 2 \end{bmatrix}\begin{bmatrix} 0 \\ 2 \\ x \end{bmatrix}$.

Q34. Find the matrix X so that X $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$ = $\begin{bmatrix} -7 & -8 & -9 \\ 2 & 4 & 6 \end{bmatrix}$.

Q35. A = $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$, Show that $(aI + bA)^n = a^n I + na^{n-1}bA$, Where I is the identify matrix of order 2 and n ∈ N.

Q36. Find the values of x, y, z if the matrix A = $\begin{bmatrix} 0 & 2y & z \\ x & y & -z \\ x & -y & z \end{bmatrix}$ Satisfy the equation A'A = I_3.

Q37. If A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$. Show that A^2 - 5A = 7I = 0.

Q38. If A is a square matrix such that A^2 = A, then $(I + A)^3 - 7A$ is equal to

Q39. Construct 2x3 matrix whose element aij are given by a_{ij} = $\begin{bmatrix} 2i + j & \text{when} & i < j \\ 4i.j & \text{when} & i = j \\ i + 2j & \text{when} & i > j \end{bmatrix}$.

Q40. If A = $\begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$, then show that $A^3 - 23A - 40I = 0$.

Q41. Express the matrix B = $\begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$ as the sum of a symmetric and a skew symmetric matrix.

Q42. If A = $\begin{bmatrix} 8 & 0 \\ 4 & -2 \\ 3 & 6 \end{bmatrix}$ B = $\begin{bmatrix} 2 & -2 \\ 4 & 2 \\ -5 & 1 \end{bmatrix}$ then find the matrix X such that 2A + 3X = 5B.

Q43. If A = $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then prove that $A^n = \begin{bmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{bmatrix}$ where n is any positive integer.

Q44. Find X and Y, if 2x + 3y = $\begin{bmatrix} 2 & 3 \\ 4 & 0 \end{bmatrix}$ and 3x + 2y = $\begin{bmatrix} 2 & -2 \\ -1 & 5 \end{bmatrix}$

Q45. If A = $\begin{bmatrix} \cos^2\alpha & \cos\alpha \sin\alpha \\ \cos\alpha \sin\alpha & \sin^2\alpha \end{bmatrix}$, B = $\begin{bmatrix} \cos^2\beta & \cos\beta \sin\beta \\ \cos\beta \sin\beta & \sin^2\beta \end{bmatrix}$ where n is any positive Integer. Show that AB is a zero matrix if a and b differ by an odd multiple of $\frac{\pi}{2}$.

Q46. If $f(x) = x^2 - 5x + 7$ and A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ find f(A).

Q47. A= $\begin{bmatrix} 4 & 3 \\ 2 & 5 \end{bmatrix}$, find x and y such that $A^2 - xA + yI = 0$.

Q48. A = $\begin{bmatrix} 0 & -\tan\alpha/2 \\ \tan\alpha/2 & 0 \end{bmatrix}$, Prove I + A = (I - A) $\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$