QUESTIONS BANK (MATH. 2)

ANSWER THE FOLLOWING QUESTIONS

MATRICES

Multiple Choice

1) The element a_{ij} of any matrix A is present in

(a) i^{th} row and j^{th} column

(b) i^{th} column and j^{th} row

(c) $(i+j)^{th}$ row and column

(d) $(i-j)^{th}$ row and column

2) We can add two matrices having real numbers A and B if their

(a) order is same

(b) rows are same

(c) columns are same

(d) Otherwise

3) An $n \times n$ matrix $A = [a_{ij}]$ is called diagonal if $a_{ij} = 0$ whenever:

(a) $i \neq j$

(b) $i = j$

(c) $i = -j$

(d) Otherwise

4) A matrix having m rows and n columns with $m \neq n$ is said to be a

(a) rectangular matrix

(b) square matrix

(c) identity matrix

(d) scalar matrix

5) If $\begin{bmatrix} 2a+b & a-2b \\ 5c-d & 4c+3d \end{bmatrix} = \begin{bmatrix} 4 & -3 \\ 11 & 24 \end{bmatrix}$, than $a+b-c+2d = \cdots$

(a) 6

(b) 10

(c) -8

(d) 8

6) If $A = \begin{bmatrix} 0 & 3 \\ 3 & -4 \end{bmatrix}$ $and\ \ kA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$, then values a, b, k respectively are

(a) 12, 18, 6

(b) -12, -18, -6

(c) 4, 9, -6

(d) -6, -9, -6

7) A square matrix in which all elements except at least one element in diagonal are non-zeros is said to be a

(a) identical matrix

(b) zero matrix

(c) column matrix

(d) diagonal matrix

8) If $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 1 & 0 \\ 1 & 0 & -1 \end{bmatrix}$, then $tr(A) = \cdots$

(a) 4

(b) 3

(c) 0

(d) 1

9) Two matrices A and B are multiplied to get AB if

(a) both are rectangular

(b) both have same order

(c) no of columns of A is equal to no of rows of B

(d) no of rows of A is equal to no of columns of B

10) If the order of matrix A is m $\times$ p and the order of B is p $\times$ n.Then the order of matrix AB is

(a) m $\times$ n

(b) n $\times$ m

(c) n $\times$ p

(d) m $\times$ p

11) If A and B are matrices, then which from the following is true

(a) $A + B \neq B + A$

(b) $(A^t)^t \neq A$

(c) $AB \neq BA$

(d) all are true

12) If $\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{bmatrix} A = \begin{bmatrix} b_{11} & b_{12} & b_{13} \\ b_{21} & b_{22} & b_{23} \\ b_{31} & b_{32} & b_{33} \end{bmatrix}$, then order of matrix $A =$

(a) 2 x 2

(b) 2 x 3

(c) 3 x 2

(d) 3 x 3.

13) If $A_{m\times n}B_{p\times q} = B_{p\times q}A_{m\times n}$, then

a) $n = p$

b) $n = p,\ m = q$

c) $m = q$

d) $m = n = p = q$

14) If $A_{n\times n}B_{n\times n} = A_{n\times n}C_{n\times n}$, then $B_{n\times n} = C_{n\times n}$

a) True

b) False

15) If $A(BC) = (AB)C$, then with respect to multiplication this law is called

(a) inverse law

(b) associative law

(c) Cramer's law

(d) additive law

16) If $A = [a_{ij}]$ is a square matrix of size 2×2 such that $a_{ij} = 1$ if $i \neq j$ and $a_{ij} = 0$ if $i = j$, then $A^2 = \cdots$

(a) $\begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}$

(d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

17) With

$$B = \begin{bmatrix} -1 & 2 \\ 2 & 1 \\ -1 & 2 \end{bmatrix}, \quad C = \begin{bmatrix} 0 & -2 \\ 3 & 1 \\ 2 & -3 \end{bmatrix}, \quad D = \begin{bmatrix} -1 & 4 & 2 \\ 2 & 0 & 1 \end{bmatrix}, \quad E = \begin{bmatrix} 2 & 3 & 1 \\ 2 & 0 & 0 \end{bmatrix}$$

We have $(2B - C)(3D - E) =$

(a) $\begin{bmatrix} 34 & -8 & 8 \\ -1 & 9 & 8 \\ 48 & -36 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 34 & -18 & 8 \\ -1 & 9 & 8 \\ 48 & -36 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 34 & -18 & 8 \\ -1 & 9 & 8 \\ 48 & -6 & 1 \end{bmatrix}$

(d) none of these.

18) If $A = \begin{bmatrix} -1 & 2 \\ 2 & 1 \\ 0 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 6 & 3 & 7 \\ -9 & 0 & 4 \end{bmatrix}$, **then** $tr(AB) = \cdots$

(a) 2

(b) 4

(c) 8

(d) 12

19) Matrices obtained by changing rows and columns is called

(a) rectangular matrix

(b) transpose

(c) symmetric

(d) None of Above

20) Transpose of a rectangular matrix is a

(a) rectangular matrix

(b) diagonal matrix

(c) square matrix
(d) scalar matrix

21) Transpose of a row matrix is
(a) zero matrix
(b) diagonal matrix
(c) column matrix
(d) row matrix

22) In matrices $(A + B)^t$ equals to
(a) A^t
(b) B^t
(c) $A^t + B^t$
(d) $B^t A^t$

23) Find the first row at the matrix A, such that $\left[2A^t + \begin{bmatrix} 1 & 0 \\ 1 & 2 \end{bmatrix}\right]^t = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$

a) $(2, -1)$
b) $(0, 0)$
c) $\left(\frac{1}{2}, -\frac{1}{2}\right)$
d) $\left(0, \frac{1}{2}\right)$

24) If A be an $n \times n$ matrix, then A is symmetric if:
(a) $A^t = -A$
(b) $A^{-1} = A$
(c) $A^t = A$
(d) Otherwise

25) If $A = \begin{bmatrix} -1 & 3x + 1 \\ x + 3 & 5 - x \end{bmatrix}$ is a symmetric matrix, then $x = \cdots$
(a) 1
(b) 2
(c) 3
(d) 4

26) If A and B are symmetric matrices of the same order, then $(AB^t - BA^t)$ is a

(a) Skew symmetric matrix

(b) Null matrix

(c) Symmetric matrix

(d) None of these

27) If A is a skew-symmetric matrix, then A^2 is a

(a) Skew symmetric matrix

(b) Symmetric matrix

(c) Null matrix

(d) Cannot be determined

28) If A is any square matrix, then which of the following is skew-symmetric?

(a) $A - A^t$

(b) $A + A^t$

(c) AA^t

(d) A^tA

29) If A is a symmetric matrix, then $A^t = \cdots$

(a) 0

(b) A

(c) $|A|$

(d) diagonal matrix

30) If a matrix A is both symmetric and skew-symmetric, then

(a) A is a diagonal matrix

(b) A is a zero matrix

(c) A is a scalar matrix

(d) A is a square matrix

31) If A is a square matrix such that $A^2 = I$, then $(I - A)^3 + (I + A)^3 - 7A = \cdots$

(a) A

(b) $I - A$

(c) $I + A$

(d) 3A

32) If determinant of a matrix is equal to zero, then it is said to be

(a) square matrix

(b) singular matrix

(c) non-singular matrix

(d) identical matrix

33) If determinant of a matrix is not equal to zero, then it is said to be

(a) non-singular matrix

(b) square matrix

(c) singular matrix

(d) identical matrix

34) What is 'a', if $B = \begin{bmatrix} 1 & 4 \\ 2 & a \end{bmatrix}$ is a singular matrix ?

(a) 5

(b) 6

(c) 7

(d) 8.

35) The inverse of a matrix exists if and only if it is a non-singular matrix.

(a) True (b) False

36) Non square matrices do not have inverse.

a) True b) False

37) Matrix which does not have an inverse by solving it, is classified as which of the following?

(a) unidentified matrix

(b) linear matrix

(c) non-singular matrix

(d) singular matrix

38) Multiplicative inverse matrix generalized form to solve is which of the following?

a) $AA^{-1} = A^{-1}A = I$

b) $AA^{-2} = A^{-3}A = I$

c) $3AA^{4} = A^{-1}A = I$

d) $AA^{-1} = 2A^{-5}A = I$

39) If A be an $n \times n$ matrix, then :

(a) $(A^{-1})^{-1} = A^{-1}$

(b) $(A^{-1})^{-1} = A$

(c) $A^{-1} = A$

(d) Otherwise

40) If A be an $n \times n$ matrix, then :

(a) $(AB)^{-1} = A^{-1}\,B^{-1}$

(b) $(AB)^{-1} = B^{-1}\,A^{-1}$

(c) $(AB)^{-1} = AB$

(d) Otherwise

41) If A be an invertible matrix and $A^2 - 3A + I = 0$, then:

(a) $A^{-1} = (3A - I)$

(b) $A^{-1} = (3I - A)$

(c) $A^{-1} = (I - 3A)$

(d) $A^{-1} = (3A - 3I)$

42) If A is a square matrix such that $A^2 = A$, then $(I - A)^2 + A = \cdots$, where I is the identity matrix.

(a) I

(b) 0

(c) $I - A$

(d) $I + A$

43) If A is a square matrix such that $A^2 = A$, then $(I + A)^2 - 7A = \cdots$, where I is the identity matrix.

(a) I

(b) 0

(c) $I - A$

(d) $I + A$

44) Decide whether or not the matrices are inverses of each other:

$$\begin{bmatrix} -2 & 4 \\ 4 & -4 \end{bmatrix} \; and \; \begin{bmatrix} \frac{1}{2} & \frac{1}{4} \\ \frac{1}{2} & \frac{1}{4} \end{bmatrix}$$

(a) Yes (b) No

45) Determine whether the matrix is invertible: $\begin{bmatrix} 6 & 1 \\ 3 & 4 \end{bmatrix}$

(a) Yes (b) No

46) Determine whether the matrix is invertible: $\begin{bmatrix} 8 & 5 & -8 \\ 7 & 2 & -7 \\ -4 & 0 & 4 \end{bmatrix}$

(a) Yes (b) No

47) A multiplicative inverse of a matrix A is

(a) $\frac{adj\,(A)}{|A|}$

(b) $|A|$

(c) A^2

(d) A

48) If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, then $\mathrm{A}^{-1} =$

(a) $\frac{1}{19}\,A$

(b) A

(c) $-A$

(d) $-\frac{1}{19}\,A$

49) If $A = \begin{bmatrix} -1 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$, then $adj\,(A) =$

(a) $\begin{bmatrix} -1 & 8 & -5 \\ 1 & -7 & 4 \\ -1 & 5 & -3 \end{bmatrix}$

(b) $\begin{bmatrix} -1 & 1 & -1 \\ 8 & -7 & 5 \\ -5 & 4 & -3 \end{bmatrix}$

(c) $\begin{bmatrix} -1 & 8 & -5 \\ 8 & -7 & 4 \\ -5 & 4 & -3 \end{bmatrix}$

(d) $\begin{bmatrix} -1 & 1 & -1 \\ 1 & -7 & 5 \\ -1 & 5 & -3 \end{bmatrix}$

50) Find the inverse of the matrix, if it exists: $A = \begin{bmatrix} -5 & 4 \\ 0 & 4 \end{bmatrix}$ **,**

(a) $\begin{bmatrix} -\frac{1}{5} & -\frac{1}{5} \\ 0 & \frac{1}{4} \end{bmatrix}$

(b) $\begin{bmatrix} -\frac{1}{5} & \frac{1}{5} \\ 0 & \frac{1}{4} \end{bmatrix}$

(c) $\begin{bmatrix} \frac{1}{4} & \frac{1}{5} \\ 0 & -\frac{1}{4} \end{bmatrix}$

(d) $\begin{bmatrix} 0 & \frac{1}{4} \\ -\frac{1}{5} & \frac{1}{5} \end{bmatrix}$

51) Let $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & -1 & 1 \\ 2 & -2 & 1 \end{bmatrix}$ **Find** A^{-1} **and give its first row.**

a) $(1,\ 0, -2)$.

b) $(-1,\ 2, -1)$.

c) $(1,\ 1, -1)$.

d) $(1, -2, 1)$.

52) If $A = \begin{bmatrix} -1 & -1 & 2 \\ 2 & 1 & -2 \\ 1 & 1 & -1 \end{bmatrix}$ **, then** A^{-1}

(a) $\begin{bmatrix} 1 & 1 & 0 \\ 0 & -1 & 2 \\ 1 & 1 & 1 \end{bmatrix}$

(b) $\begin{bmatrix} 1 & 1 & 0 \\ 1 & -1 & 2 \\ 1 & 0 & 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 & 1 & 0 \\ 0 & -1 & 2 \\ 1 & 0 & 1 \end{bmatrix}$

(d) none of these.

53) Let A; B; C be square invertible matrices satisfying $AB = B^2C$.
Assume that, $\det B = 3$ and $\det C = 2$. Find a formula for A and calculate the determinant of A.

a) $A = BC$, $\det A = 6$.

b) $A = B^3C$, $\det A = 11$.

c) $A = B^2CB^{-1}$, $\det A = 6$.

d) $A = B^2CB^{-1}$, $\det A = 5$.

54) The aim of elimination steps in Gauss elimination method is to reduce the coefficient:

(a) diagonal

(b) lower triangular

(c) upper triangular

(d) Otherwise

55) The reduced form of the Matrix in Gauss Elimination method is also called:

(a) Row Echelon Form

(b) column Echelon Form.

(c) column – Row Form

(d) Otherwise

56) If $|A_{n\times n}| \neq 0$, then the reduced row-echelon form of $A_{n\times n}$ is I_n.

a) True

b) False

57) Which of the following matrices is not in row-echelon form

a) $\begin{bmatrix} 1 & 1 & 0 & 4 \\ 0 & 1 & 1 & 3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 2 & 1 & 1 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 0 & 3 & -1 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

d) $\begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

58) Which of the following matrices is not in reduced row-echelon form:

a) $\begin{bmatrix} 1 & 2 & 0 & 3 & 0 \\ 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 0 & -1 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{bmatrix}$

d) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 0 & 0 \end{bmatrix}$

59) Which of the following matrices is not in reduced row-echelon form:

a) $\begin{bmatrix} 1 & 1 & 0 & 4 \\ 0 & 1 & 1 & 3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

b) $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 0 & 3 & -1 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

d) $\begin{bmatrix} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & 1 \end{bmatrix}$