MATRICES AND DETERMINANTS MCQs

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

   (a) 8 **(b) –8** (c) 4 (d) 1 (e) 0

2. If $A^2 - A + I = 0$ Then the inverse of A is

   (a) A^{-2} (b) $A + I$ **(c) I – A** (d) $A - I$ (e) A

3. The value of $\begin{vmatrix} a & a+b & a+2b \\ a+2b & a & a+b \\ a+b & a+2b & a \end{vmatrix}$ is equal to

   (a) $9a^2(a+b)$ **(b) $9b^2(a+b)$** (c) $a^2(a+b)$ (d) $b^2(a+b)$ (e) $9b^2(a-b)$

4. If A and B are square matrices of order 3 such that $|A| = -1, |B| = 3$, then the determinant value of the matrix 3AB is equal to

   (a) 9 (b) –27 **(c) –81** (d) 81 (e) 9

5. The matrix $\begin{bmatrix} 5 & 10 & 3 \\ -2 & -4 & 6 \\ -1 & -2 & b \end{bmatrix}$ is a singular matrix if b =

   (a) –3 (b) 3 **(c) 0** (d) for any value of b (e) for no value of b

6. For non singular square matrices A,B and C of the same order, $(AB^{-1}C)^{-1}$ =

   (a) $A^{-1}BC^{-1}$ (b) $C^{-1}B^{-1}A^{-1}$ (c) CBA^{-1} **(d) $C^{-1}BA^{-1}$** (e) $C^{-1}BA$

7. Let $A = \begin{pmatrix} \cos^2\theta & \sin\theta\cos\theta \\ \cos\theta\sin\theta & \sin^2\theta \end{pmatrix}$ and $B = \begin{pmatrix} \cos^2\phi & \sin\phi\cos\phi \\ \cos\phi\sin\phi & \sin^2\phi \end{pmatrix}$ then $AB = 0$ if

   (a) $\theta = n\phi, n = 0,1,2.....$ (b) $\theta + \phi = n\pi, n =, 01,2,3,....$

   (c) $\theta = \phi + (2n+1)\frac{\pi}{2}, n = 0,1,2,.....$ (d) $\theta = \phi + n\frac{\pi}{2}, n = 0,1,2,.....$

(e) $\theta = \phi + 3n\frac{\pi}{2}, n = 0,1,2$

8. Let $X = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$, $A = \begin{pmatrix} 1 & -1 & 2 \\ 2 & 0 & 1 \\ 3 & 2 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 3 \\ 1 \\ 4 \end{pmatrix}$. If AX=B then X is equal to

(a) $\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ (b) $\begin{pmatrix} -1 \\ -2 \\ 3 \end{pmatrix}$ (c) $\begin{pmatrix} -1 \\ -2 \\ -3 \end{pmatrix}$ **(d)** $\begin{pmatrix} \mathbf{-1} \\ \mathbf{2} \\ \mathbf{3} \end{pmatrix}$ (e) $\begin{pmatrix} 0 \\ 2 \\ 1 \end{pmatrix}$

9. Let A and B are two square matrices such that AB=A and BA=B then A^2 =

(a) B **(b) A** (c) I (d) 0 (e) A^{-1}

10. The matrix $\begin{bmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 3 & -2 & 1 \end{bmatrix}$ is

(a) a scalar matrix (b) a symmetric matrix (c) a skew symmetric matrix

(d) an upper triangular matrix **(e) None of these**

11. If A, B and C are matrices of the same order, which of the following is not true

(a) A + B = B + A **(b) A – B = B – A** (c) A + (B + C) = (A + B) + C

(d) k(A + B) = kA + kB, k being a scalar (e) None of these

12. If A and B are matrices, the product AB exists only when

(a) A and B have the same order

(b) The number of rows in A equals the number of columns in B

(c) The number of columns of A equals the number of rows in B

(d) A and B are square matrices of the same order

(e) None of these

13. If $A = \begin{bmatrix} 3 & 6 \\ -1 & -2 \end{bmatrix}$, then A^2 = …….

(a) 0 **(b) A** (c) –A (d) I (e) None of these

14. If $A(\theta_k) = \begin{bmatrix} \cos\theta_k & -\sin\theta_k \\ \sin\theta_k & \cos\theta_k \end{bmatrix}$, k = 1, 2 then $A(\theta_1).(A(\theta_2)$ =

(a) $A(\theta 1 \times \theta 2)$ (b) $A(\theta 1 - \theta 2)$ **(c) $A(\theta 1 + \theta 2)$**

(d) $A(\theta 2 \times \theta 1)$ (e) None of these

15. If the product $AB \neq 0$ then

(a) either $A = 0$ or $B = 0$ (b) $A = 0$ and $B = 0$ (c) $A = 0, B \neq 0$

(d) A is symmetric and B is skew symmetric **(e) Neither A nor B need be equal to zero**

16. If A is a square matrix, then $A + B^T$ is

(a) unit matrix (b) null matrix **(c) symmetric matrix**

(d) skew symmetric matrix (e) None of these

17. If $\begin{bmatrix} 5 & a+2 \\ a+1 & -2 \end{bmatrix} = \begin{bmatrix} a+3 & 4 \\ 3 & -a \end{bmatrix}$, then a =……..

(a) 0 (b) 1 (c) –1 **(d) 2** (e) –2

18. A and B are matrices of order m x n and p x q respectively. They are conformable for addition and multiplication if and only if and only if

(a) p = n (b) m + p = n + q (c) m + q = n + p **(d) m = n = p=q**

(e). None of these

19. If $\begin{bmatrix} x-y & x+y & 1 \\ 4 & 3 & 5 \\ x+z & x-z & -1 \end{bmatrix}$ is symmetric, then (x, y, z) is …….

(a) (3, –1, 2) **(b) (3, 1, –2)** (c) (–3, 1, 2) (d) (3, –1, –2) (e) (3, 1, 2)

20. If $\begin{bmatrix} \text{Cos}\theta & \text{Sin}\theta \end{bmatrix} \begin{bmatrix} \text{Cos}\theta \\ -\text{Sin}\theta \end{bmatrix} = [1]$, then θ = …….

(a) $\pi/2$ (b) $\pi/4$ (c) 2π **(d) π** (e) None of these

21. If A is symmetric as well as skew symmetric, then A is ……..

(a) a diagonal matrix (b) unit matrix **(c) null matrix**

(d) triangular matrix (e) None of these

22. If A and B are symmetric matrices of the same order, consider the statements

(i) A + B is symmetric (ii) A – B is symmetric (iii) AB is symmetric. Then

(a) all the statements are true (b) (i) and (iii) are true (c) (ii) and (iii) are true

(d) (i) alone is true **(e) none of these**

23. If A and B are non singular matrices of order 3 then $(AB)^{-1}$ =

(a) $A^{-1}B^{-1}$ **(b) $B^{-1}A^{-1}$** (c) BA^{-1} (d) $B^{-1}A$ (e) None of these

24. If A is a square matrix such that $A^2 = I$, then A^{-1} =

(a) A (b) 2A (c) 0 (d) A + I (e) None of these

25. If A and B are square matrices of order 3 such that $|A| = -1$ and $|B| = 3$, then det (3AB) is equal to

(a) –9 (b) –27 **(c) –81** (d) 81 (e) None of these

26. A and B are 2 matrices with real numbers as elements. Which of the following statements is false

(a) If AB is defined then BT AT is also defined

(b) If A and B are square matrices and AB is defined, then BA is also defined

(c) If A and B are of the same order then A + B and AB are defined

(d) If A and B are non singular matrices of the same order then AB is also non singular

(e) None of these

27. If A and B are square matrices such AB = A and BA = B then

(a) A and B are idempotent (b) only A is idempotent

(c) only B is idempotent (d) AB is nilpotent of order 2 (e) none of these

28. If A is a square matrix, consider the following statements

(i) $A + A^T$ is skew symmetric (ii) $A - A^T$ is skew symmetric

(iii) $A.A^T$ is symmetric. Then

(a) all are true (b) (i) and (ii) are true **(c) (ii) and (iii) are true**

(d) (ii) alone is true (e) None of these

29. If A and B are square matrices of the same order such that $(A + B)^2 = A^2 + B^2 + 2AB$, then

(a) AB = BA (b) AB = I (c) A = BT (d) A + B = B + A (e) None of these

30. If A is a square matrix such that $AA^T = I = A^TA$, then A is

(a) symmetric (b) skew symmetric (c) a diagonal matrix

(d) orthogonal (e) None of these

31. If A is orthogonal, the A^{-1} = …….

(a) A (b) A^2 **(c) A^T** (d) –A (e) None of these

32. The inverse of a diagonal matrix is …….

(a) symmetric (b) skew symmetric **(c) a diagonal matrix**

(d) orthogonal (e) None of these

33. If A is symmetric and n is a positive integer, A^n is ……..

(a) symmetric (b) skew symmetric (c) diagonal

(d) orthogonal (e) None of these

34. If A and B are symmetric matrices of the same order then AB – BA is

(a) symmetric **(b) skew symmetric** (c) orthogonal (d) null matrix

(e) None of these

35. If A is a square matrix, then adj(A^T) – (adj $A)^T$ is equal to ……

(a) $|A|I$ (b) $2|A|I$ **(c) null matrix** (d) unit matrix (e) None of these

36. If each element of a third order determinant D is multiplied by 5, then the value of the new determinant is

(a) D (b) 5D (c) 25D **(d) 125D** (e) None of these

37. The value of the determinant $\begin{vmatrix} \cos 50^0 & \sin 10^0 \\ \sin 50^0 & \cos 10^0 \end{vmatrix}$ is equal to

(a) 0 **(b) 1/2** (c) 1 (d) $\sqrt{3}/2$ (e) None of these