TN 12TH MATHEMATICS

CHAPTERWISE MCQ'S

CHAPTER.1

Choose the Correct or the most suitable answer from the given four alternatives:

1. If $|adj(adj\ A)| = |A|^9$, then the order of the square matrix A is
(1) 3 (2) 4 (3) 2 (4) 5
2. If A is a 3x3 non-singular matrix such that $AA^T = A^T A$ and $B = A^{-1} A^T$, then BB^T =
(1) A (2) B (3) I3 (4) B^T
3. If $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, $B = adj\ A$ and C = 3A , then $\frac{|adj\ B|}{|C|} =$
(1) $\frac{1}{3}$ (2) $\frac{1}{9}$ (3) $\frac{1}{4}$ (4) 1
4. If $A\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 6 & 0 \\ 0 & 6 \end{bmatrix}$, then A =
(1) $\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix}$ (2) $\begin{bmatrix} 1 & 2 \\ -1 & 4 \end{bmatrix}$ (3) $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ (4) $\begin{bmatrix} 4 & -1 \\ 2 & 1 \end{bmatrix}$
5. If $\begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, then $9I2 – A$ =
(1) A^{-1} (2) $\frac{A^{-1}}{2}$ (3) $3A^{-1}$ (4) $2A^{-1}$
6. If $A = \begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then |adj(AB)| =
(1) -40 (2) -80 (3) -60 (4) -20
7. If $P = \begin{bmatrix} 1 & x & 0 \\ 1 & 3 & 0 \\ 2 & 4 & -2 \end{bmatrix}$ is the adjoint of 3×3 matrix A and $|A|$ = 4 , then x is
(1) 15 (2) 12 (3) 14 (4) 11
8. If $A = \begin{bmatrix} 3 & 1 & -1 \\ 2 & -2 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ then the value of a_{23} is
(1) 0 (2) -2 (3) -3 (4) -1
9. If A, B and C are invertible matrices of some order, then which one of the following is not true?
(1) adj A =| A | A-1 (2) adj(AB) = (adj A)(adj B)
(3) det A-1 = (det A)-1 (4) (ABC)-1 = C-1B-1A-1
10. If $(AB)^{-1} = \begin{bmatrix} 12 & -17 \\ -19 & 27 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$, then $B^{-1} =$
(1) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$ (2) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$ (3) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$ (4) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$
11. If $A^T A^{-1}$ is symmetric, then A^2 =
(1) A^{-1} (2) $(A^T)^2$ (3) A^T (4) $(A^{-1})^2$
12. If A is a non-singular matrix such that $A^{-1} = \begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$, then $(A^T)^{-1}$ =
(1) $\begin{bmatrix} -5 & 3 \\ 2 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$ (3) $\begin{bmatrix} -1 & -3 \\ 2 & 5 \end{bmatrix}$ (4) $\begin{bmatrix} 5 & -2 \\ 3 & -1 \end{bmatrix}$
13. If $A = \begin{bmatrix} \frac{3}{5} & \frac{4}{5} \\ x & \frac{3}{5} \end{bmatrix}$, and $A^T = A^{-1}$, then the value of x is
(1) -4/5 (2) -3/5 (3) 3/5 (4) 4/5

14. If $A = \begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}$, and $AB = I_2$, then $B=$

(1) $\left(\cos^2\frac{\theta}{2}\right)A$ (2) $\left(\cos^2\frac{\theta}{2}\right)A^T$ (3) $(\cos^2\theta)I$ (4) $\left(\sin^2\frac{\theta}{2}\right)A$

15. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, and $A(\text{adj } A) = \begin{bmatrix} k & 0 \\ 0 & k \end{bmatrix}$, then k

(1) 0 (2) sin θ (3) cos θ (4) 1

16. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, be such that $\lambda A^{-1} = A$, then λ is

(1) 17 (2) 14 (3) 19 (4) 21

17. If $adj\ A = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}, adj\ B = \begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ then adj (*AB*) is

(1) $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$ (2) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$ (3) $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$ (4) $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

18. The rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 6 & 8 \\ -1 & -2 & -3 & -4 \end{bmatrix}$ is

(1) 1 (2) 2 (3) 4 (4) 3

19. If $x^a y^b = e^m$, $x^c y^d = e^n$, $\Delta_1 = \begin{vmatrix} m & b \\ n & d \end{vmatrix}, \Delta_2 = \begin{vmatrix} a & m \\ c & n \end{vmatrix}, \Delta_3 = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$, then the values of *x* and *y* are respectively,

(1) $e^{(\Delta 2/\Delta 1)}$, $e^{(\Delta 3/\Delta 1)}$ (2) log(Δ1/ Δ3), log(Δ2/Δ3)

(3) log(Δ2/ Δ1), log(Δ3/Δ1) (4) $e^{(\Delta 1/\Delta 3)}$, $e^{(\Delta 2/\Delta 3)}$

20. Which of the following is/are correct?

(i) Adjoint of a symmetric matrix is also a symmetric matrix.

(ii) Adjoint of a diagonal matrix is also a diagonal matrix.

(iii) If A is a square matrix of order *n* and λ is a scalar, then adj(λ *A*) = λn adj(*A*) .

(iv) A(adjA) = (adjA) A =| A | I

(1) Only (i) (2) (ii) and (iii) (3) (iii) and (iv) (4) (i), (ii) and (iv)

21. If $\rho(A) = \rho([A \mid B])$, then the system $AX = B$ of linear equations is

(1) consistent and has a unique solution (2) consistent

(3) consistent and has infinitely many solution (4) inconsistent

22. If $0 \le \vartheta \le \pi$ and the system of equations x + (sinθ)y − (cosθ)z = 0, (cosθ)x − y + z = 0, (sinθ)x + y − z = 0 has a non-trivial solution then ϑ is

(1) 2π/3 (2) 3π/4 (3) 5π/6 (4) π/4

23. The augmented matrix of a system of linear equations is $\begin{bmatrix} 1 & 2 & 7 & 3 \\ 0 & 1 & 4 & 6 \\ 0 & 0 & \lambda-7 & \mu+5 \end{bmatrix}$. The system has infinitely many solutions if

(1) λ = 7, μ ≠ -5 (2) λ = -7, μ = 5 (3) λ ≠ 7, μ ≠ -5 (4) λ = 7, μ = -5

24. Let $A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$, and $4B = \begin{bmatrix} 3 & 1 & -1 \\ 1 & 3 & x \\ -1 & 1 & 3 \end{bmatrix}$, If *B* is the inverse of *A* , then the value of *x* is

(1) 2 (2) 4 (3) 3 (4) 1

25. If $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, then adj(adj *A*) is

(1) $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} 6 & -6 & 8 \\ 4 & -6 & 8 \\ 0 & -2 & 2 \end{bmatrix}$ (3) $\begin{bmatrix} -3 & 3 & -4 \\ -2 & 3 & -4 \\ 0 & 1 & -1 \end{bmatrix}$ (4) $\begin{bmatrix} 3 & -3 & 4 \\ 0 & -1 & 1 \\ 2 & -3 & 4 \end{bmatrix}$

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CHAPTER. 2

Choose the correct or the most suitable answer from the given four alternatives :

1. $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is
   (1) 0 (2) 1 (3) −1 (4) i
2. The value of $\sum_{i=1}^{13}(i^n + i^{n-1})$ is
   (1) 1+ i (2) i (3) 1 (4) 0
3. The area of the triangle formed by the complex numbers z, iz, and $z + iz$ in the Argand's diagram is
   (1) $\frac{1}{2}|z|^2$ (2) $|z|^2$ (3) $\frac{3}{2}|z|^2$ (4) $2|z|^2$
4. The conjugate of a complex number is $\frac{1}{i-2}$ Then, the complex number is
   (1) $\frac{1}{i+2}$ (2) $\frac{-1}{i+2}$ (3) $\frac{-1}{i-2}$ (4) $\frac{1}{i-2}$
5. If $z = \frac{(\sqrt{3}+i)^3(3i+4)^2}{(8+6i)^2}$, then $|z|$ is equal to
   (1) 0 (2) 1 (3) 2 (4) 3
6. If z is a non zero complex number, such that $2iz^2 = \bar{z}$, then $|z|$ is
   (1) 1/2 (2) 1 (3) 2 (4) 3
7. If $|z - 2 + i| \le 2$, then the greatest value of $|z|$ is
   (1) $\sqrt{3} - 2$ (2) $\sqrt{3} + 2$ (3) $\sqrt{5} - 2$ (4) $\sqrt{5} + 2$
8. If $\left|z - \frac{3}{z}\right| = 2$, then the least value of $|z|$ is
   (1) 1 (2) 2 (3) 3 (4) 5
9. If $|z| = 1$, then the value of $\frac{1+z}{1+\bar{z}}$ is
   (1) z (2) $\bar{z}$ (3) $\frac{1}{z}$ (4) 1
10. The solution of the equation $|z| - z = 1 + 2i$ is
   (1) $\frac{3}{2} - 2i$ (2) $-\frac{3}{2} + 2i$ (3) $2 - \frac{3}{2}i$ (4) $2 + \frac{3}{2}i$
11. If $|z_1| = 1, |z_2| = 2, |z_3| = 3$ and $|9z_1z_2 + 4z_1z_3 + z_2z_3 = 12,|$ then the value of $|z_1 + z_2 + z_3|$ is
   (1) 1 (2) 2 (3) 3 (4) 4
12. If z is a complex number such that $z \in C \setminus R$ and $z + \frac{1}{z} \in R$, then $|z|$ is
   (1) 0 (2) 1 (3) 2 (4) 3
13. z_1, z_3 and z_3 are complex numbers such that $z_1 + z_2 + z_3 = 0$ and $|z_1| = |z_2| = |z_3| = 1$ then $z_1^2 + z_2^2 + z_3^2$ is
   (1) 3 (2) 2 (3) 1 (4) 0
14. If $\frac{z-1}{z+1}$ is purely imaginary, then $|z|$ is
   (1) $\frac{1}{2}$ (2) 1 (3) 2 (4) 3
15. If $z = x + iy$ is a complex number such that $|z + 2| = |z - 2|$, then the locus of z is
   (1) real axis (2) imaginary axis (3) ellipse (4) circle
16. The principal argument of $3/(-1+i)$ is
   (1) $-5\pi/6$ (2) $-2\pi/3$ (3) $-3\pi/4$ (4) $-\pi/2$
17. The principal argument of $(\sin 40° + i \cos 40°)^5$ is
   (1) −110° (2) −70° (3) 70° (4) 110°
18. If $(1+ i)(1+ 2i)(1+ 3i)L(1+ ni) = x + iy$, then $2 \cdot 5 \cdot 10L(1+ n^2)$ is
   (1) 1 (2) i (3) $x^2 + y^2$ (4) $1 + n^2$

19. If $\omega \neq 1$ is a cubic root of unity and $(1+\omega)^7 = A + B\omega$, then (A, B) equals

(1) (1, 0) (2) (−1, 1) (3) (0, 1) (4) (1, 1)

20. The principal argument of the complex number $\frac{(1+i\sqrt{3})^2}{4i(1+i\sqrt{3})}$ is

(1) 2π/3 (2) π/6 (3) 5π/6 (4) π/2

21. If α and β are the roots of $x^2 + x + 1 = 0$, then $\alpha^{2020} + \beta^{2020}$ is

(1) −2 (2) −1 (3) 1 (4) 2

22. The product of all four values of $\left(\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}\right)^{\frac{3}{4}}$ is

(1) −2 (2) −1 (3) 1 (4) 2

23. If $\omega \neq 1$ is a cubic root of unity and $\begin{vmatrix} 1 & 1 & 1 \\ 1 & -\omega^2 - 1 & \omega^2 \\ 1 & \omega^2 & \omega^7 \end{vmatrix} = 3k$ then k is equal to

(1) 1 (2) −1 (3) $\sqrt{3}i$ (4) $-\sqrt{3}i$

24. The value of $\left(\frac{1+\sqrt{3}i}{1-\sqrt{3}i}\right)^{10}$ is

(1) $cis\ \frac{2\pi}{3}$ (2) $cis\ \frac{4\pi}{3}$ (3) $-cis\ \frac{\pi}{3}$ (4) $-cis\ \frac{4\pi}{3}$

25. If $\omega = cis\ \frac{2\pi}{3}$ then the number of distinct roots of $\begin{vmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{vmatrix}$

(1) 1 (2) 2 (3) 3 (4) 4

CHAPTER. 3

Choose the correct or the most suitable answer from the given four alternatives :

1. A zero of $x^3 + 64$ is

(1) 0 (2) 4 (3) 4i (4) -4

2. If f and g are polynomials of degrees m and n respectively, and if $h(x) = (f \circ g)(x)$, then the degree of h is

(1) *mn* (2) *m* + *n* (3) *mn* (4) *nm*

3. A polynomial equation in x of degree n always has

(1) n distinct roots (2) n real roots (3) n imaginary roots (4) at most one root.

4. If α , β , and γ are the zeros of $x^3 + px^2 + qx + r$, then $\sum\frac{1}{\alpha}$ is

(1) $-\frac{q}{r}$ (2) $-\frac{p}{r}$ (3) $\frac{q}{r}$ (4) $-\frac{q}{p}$

5. According to the rational root theorem, which number is not possible rational zero of $4x^7 + 2x^4 - 10x^3 - 5$?

(1) −1 (2) $\frac{5}{4}$ (3) $\frac{4}{5}$ (4) 5

6. The polynomial $x^3 - kx^2 + 9x$ has three real zeros if and only if, k satisfies

(1) $|k| \leq 6$ (2) $k = 0$ (3) $|k| > 6$ (4) $|k| \geq 6$

7. The number of real numbers in $[0, 2\pi]$ satisfying $\sin^4 x - 2\sin^2 x + 1$ is

(1) 2 (2) 4 (3) 1 (4) ∞

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8. If $x^3 + 12x^2 + 10ax + 1999$ definitely has a positive zero, if and only if

(1) $a \geq 0$ (2) $a > 0$ (3) $a < 0$ (4) $a \leq 0$

9. The polynomial $x^3 + 2x + 3$ has

(1) one negative and two imaginary zeros (2) one positive and two imaginary zeros

(3) three real zeros (4) no zeros

10. The number of positive zeros of the polynomial $\sum_{j=0}^{n} nC_r(-1)^r x^r$ is

(1) 0 (2) n (3) $< n$ (4) r

CHAPTER.4

Choose the correct or the most suitable answer from the given four alternatives.

1. The value of $\sin^{-1}(\cos x)$, $0 \leq x \leq \pi$ is

(1) $\pi - x$ (2) $x - \frac{\pi}{2}$ (3) $\frac{\pi}{2} - x$ (4) $x - \pi$

2. If $\sin^{-1} x + \sin^{-1} y = \frac{2\pi}{3}$; then $\cos^{-1} x + \cos^{-1} y$ is equal to

(1) $2\pi/3$ (2) $\pi/3$ (3) $\pi/6$ (4) π

3. $\sin^{-1}\frac{3}{5} - \cos^{-1}\frac{12}{13} + \sec^{-1}\frac{5}{3} - \mathrm{cosec}^{-1}\frac{13}{12}$ is equal to

(1) 2π (2) π (3) 0 (4) $\tan^{-1}\frac{12}{65}$

4. If $\sin^{-1} x = 2\sin^{-1}\alpha$ has a solution, then

(1) $|\alpha| \leq \frac{1}{\sqrt{2}}$ (2) $|\alpha| \geq \frac{1}{\sqrt{2}}$ (3) $|\alpha| < \frac{1}{\sqrt{2}}$ (4) $|\alpha| > \frac{1}{\sqrt{2}}$

5. $\sin^{-1}(\cos x) = \frac{\pi}{2} - x$ is valid for

(1) $-\pi \leq x \leq 0$ (2) $0 \leq x \leq \pi$ (3) $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ (4) $-\frac{\pi}{4} \leq x \leq \frac{3\pi}{4}$

6. If $\sin^{-1} x + \sin^{-1} y + \sin^{-1} z = \frac{3\pi}{2}$, the value of $x^{2017} + y^{2018} + z^{2019} - \frac{9}{x^{101}+y^{101}+z^{101}}$ is

(1) 0 (2) 1 (3) 2 (4) 3

7. If $\cot^{-1} x = \frac{2\pi}{5}$ for some $x \in R$, the value of $\tan^{-1} x$ is

(1) $-\frac{\pi}{10}$ (2) $\frac{\pi}{5}$ (3) $\frac{\pi}{10}$ (4) $-\frac{\pi}{5}$

8. The domain of the function defined by $f(x) = \sin^{-1}\sqrt{x-1}$ is

(1) [1,2] (2) [-1,1] (3) [0,1] (4) [-1,0]

9. If $x = \frac{1}{5}$, the value of $\cos(\cos^{-1} x + 2\sin^{-1} x)$ is

(1) $-\sqrt{\frac{24}{25}}$ (2) $\sqrt{\frac{24}{25}}$ (3) $\frac{1}{5}$ (4) $-\frac{1}{5}$

10. $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right)$ is equal to

(1) $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$ (2) $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$ (3) $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$ (4) $\tan^{-1}\left(\frac{1}{2}\right)$

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11. If the function $f(x) = \sin^{-1}(x^2 - 3)$, then x belongs to

(1) [-1,1] (2) $[\sqrt{2}, 2]$ (3) $[-2-\sqrt{2}] \cup [\sqrt{2}, 2]$ (4) $[-2, -\sqrt{2}]$

12. If $\cot^{-1} 2$ and $\cot^{-1} 3$ are two angles of a triangle, then the third angle is

(1) $\frac{\pi}{4}$ (2) $\frac{3\pi}{4}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{3}$

13. $\sin^{-1}\left(\tan\frac{\pi}{4}\right) - \sin^{-1}\left(\sqrt{\frac{3}{x}}\right) = \frac{\pi}{6}$. Then x is a root of the equation

(1) $x^2 - x - 6 = 0$ (2) $x^2 - x - 12 = 0$ (3) $x^2 + x - 12 = 0$ (4) $x^2 + x - 6 = 0$

14. $\sin^{-1}(2\cos^2 x - 1) + \cos^{-1}(1 - 2\sin^2 x) =$

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{6}$

15. If $\cot^{-1}(\sqrt{\sin\alpha}) + \tan^{-1}(\sqrt{\sin\alpha}) = u$, then $\cos 2u$ is equal to

(1) $\tan^2\alpha$ (2) 0 (3) -1 (4) $\tan 2\alpha$

16. If $|x| \le 1$, then $2\tan^{-1} x - \sin^{-1}\frac{2x}{1+x^2}$ is equal to

(1) $\tan^{-1} x$ (2) $\sin^{-1} x$ (3) 0 (4) π

17. The equation $\tan^{-1} x - \cot^{-1} x = \tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ has

(1) no solution (2) unique solution

(3) two solutions (4) infinite number of solutions

18. If $\sin^{-1} x + \cot^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{2}$, then x is equal to

(1) $\frac{1}{2}$ (2) $\frac{1}{\sqrt{5}}$ (3) $\frac{2}{\sqrt{5}}$ (4) $\frac{\sqrt{3}}{2}$

19. If $\sin^{-1}\frac{x}{5} + \operatorname{cosec}^{-1}\frac{5}{4} = \frac{\pi}{2}$ then the value of x is

(1) 4 (2) 5 (3) 2 (4) 3

20. $\sin(\tan^{-1} x), |x| < 1$ is equal to

(1) $\frac{x}{\sqrt{1-x^2}}$ (2) $\frac{1}{\sqrt{1-x^2}}$ (3) $\frac{1}{\sqrt{1+x^2}}$ (4) $\frac{x}{\sqrt{1+x^2}}$

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