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CHAPTER 1

1. If $|\text{adj}(\text{adj}\, A)| = |A|^9$, then the order of the square matrix A is
   (1) 3 (2) 4 (3) 2 (4) 5
2. If A is a 3×3 non-singular matrix such that $AA^T = A^T A$ and $B = A^{-1}A^T$, then $BB^T =$
   (1) A (2) B (3) I_3 (4) B^T
3. If $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, $B = \text{adj}\, A$ and $C = 3A$, then $\frac{|\text{adj}\, B|}{|C|} =$
   (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 $A = \begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, then $9I_2 - A =$
   (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 $|\text{adj}\,(AB)| =$
   (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) $\text{adj}\, A = |A| A^{-1}$ (2) $\text{adj}(AB) = (\text{adj}\, A)(\text{adj}\, B)$
   (3) $\det A^{-1} = (\det A)^{-1}$ (4) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$
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) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

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

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) $\sin\theta$ (3) $\cos\theta$ (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 $\text{adj } A = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and $\text{adj } B = \begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ then $\text{adj}(AB)$ 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) $\log(\Delta_1/\Delta_3), \log(\Delta_2/\Delta_3)$

(3) $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$ (4)) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

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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 $\text{adj}(\lambda A) = \lambda^n \text{adj}(A)$.

(iv) $A(\text{adj}A) = (\text{adj}A)A = |A|I$

(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 $0 \le \theta \le \pi$ and the system of equations $x + (\sin\theta)y - (\cos\theta)z = 0, (\cos\theta)x - y + z = 0,$ $(\sin\theta)x + y - z = 0$ has a non-trivial solution then θ is

(1) $\frac{2\pi}{3}$ (2) $\frac{3\pi}{4}$ (3) $\frac{5\pi}{6}$ (4) $\frac{\pi}{4}$

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) $\lambda = 7, \mu \ne -5$ (2) $\lambda = -7, \mu = 5$ (3) $\lambda \ne 7, \mu \ne -5$ (4) $\lambda = 7, \mu = -5$

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 $\text{adj}(\text{adj}\,A)$ 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) $\begin{bmatrix} 3 & -3 & 4 \\ 0 & -1 & 1 \\ 2 & -3 & 4 \end{bmatrix}$

CHAPTER 2

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 $z = \frac{\left(\sqrt{3}+i\right)^3 (3i+4)^2}{(8+6i)^2}$, 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) $\frac{1}{2}$ (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 $z \in \mathbb{C} \setminus \mathbb{R}$ and $z + \frac{1}{z} \in \mathbb{R}$, 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 $\frac{3}{-1+i}$ is

(1) $\frac{-5\pi}{6}$ (2) $\frac{-2\pi}{3}$ (3) $\frac{-3\pi}{4}$ (4) $\frac{-\pi}{2}$

17. The principal argument of $(\sin 40° + i\cos 40°)^5$ is

(1) $-110°$ (2) $-70°$ (3) $70°$ (4) $110°$

18. If $(1+i)(1+2i)(1+3i)\cdots(1+ni) = x + iy$, then $2 \cdot 5 \cdot 10 \cdots (1+n^2)$ 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 $\frac{\left(1+i\sqrt{3}\right)^2}{4i\left(1-i\sqrt{3}\right)}$ is

(1) $\frac{2\pi}{3}$ (2) $\frac{\pi}{6}$ (3) $\frac{5\pi}{6}$ (4) $\frac{\pi}{2}$

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

25. If $\omega = cis\frac{2\pi}{3}$, then the number of distinct roots of $\begin{vmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{vmatrix} = 0$

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

CHAPTER 3

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) m^n (4) n^m
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) $|k|\le 6$ (2) $k=0$ (3) $|k|>6$ (4) $|k|\ge 6$
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) ∞
8. If $x^3+12x^2+10ax+1999$ definitely has a positive zero, if and only if
   (1) $a\ge 0$ (2) $a>0$ (3) $a<0$ (4) $a\le 0$
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

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CHAPTER 4

1. The value of $\sin^{-1}(\cos x),\ 0 \le x \le \pi$ 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) $\frac{2\pi}{3}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{6}$ (4) π

3. $\sin^{-1}\frac{3}{5} - \cos^{-1}\frac{12}{13} + \sec^{-1}\frac{5}{3} - \operatorname{cosec}^{-1}\frac{13}{12}$ 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) $|\alpha| \le \frac{1}{\sqrt{2}}$ (2) $|\alpha| \ge \frac{1}{\sqrt{2}}$ (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) $-\pi \le x \le 0$ (2) $0 \le x \le \pi$ (3) $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$ (4) $-\frac{\pi}{4} \le x \le \frac{3\pi}{4}$

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 $\cos\left(\cos^{-1} x + 2\sin^{-1} x\right)$ 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) $\tan^{-1}\left(\frac{1}{2}\right)$

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

(1) $[-1, 1]$ (2) $\left[\sqrt{2}, 2\right]$

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

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

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

15. If $\cot^{-1}\left(\sqrt{\sin\alpha}\right)+\tan^{-1}\left(\sqrt{\sin\alpha}\right)=u$, 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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CHAPTER 5

1. The equation of the circle passing through $(1,5)$ and $(4,1)$ and touching y-axis is $x^2+y^2-5x-6y+9+\lambda(4x+3y-19)=0$ where λ is equal to

   (1) $0,-\frac{40}{9}$ (2) 0 (3) $\frac{40}{9}$ (4) $\frac{-40}{9}$

2. The eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half the distance between the foci is

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

3. The circle $x^2+y^2=4x+8y+5$ intersects the line $3x-4y=m$ at two distinct points if

   (1) $15<m<65$ (2) $35<m<85$ (3) $-85<m<-35$ (4) $-35<m<15$

4. The length of the diameter of the circle which touches the x-axis at the point $(1,0)$ and passes through the point $(2,3)$.

   (1) $\frac{6}{5}$ (2) $\frac{5}{3}$ (3) $\frac{10}{3}$ (4) $\frac{3}{5}$

5. The radius of the circle $3x^2+by^2+4bx-6by+b^2=0$ is

   (1) 1 (2) 3 (3) $\sqrt{10}$ (4) $\sqrt{11}$

6. The centre of the circle inscribed in a square formed by the lines $x^2-8x-12=0$ and $y^2-14y+45=0$ is

   (1) $(4,7)$ (2) $(7,4)$ (3) $(9,4)$ (4) $(4,9)$

7. The equation of the normal to the circle $x^2+y^2-2x-2y+1=0$ which is parallel to the line $2x+4y=3$ is

   (1) $x+2y=3$ (2) $x+2y+3=0$ (3) $2x+4y+3=0$ (4) $x-2y+3=0$

8. If $P(x,y)$ be any point on $16x^2+25y^2=400$ with foci $F_1(3,0)$ and $F_2(-3,0)$ then PF_1+PF_2 is

   (1) 8 (2) 6 (3) 10 (4) 12

9. The radius of the circle passing through the point $(6,2)$ two of whose diameter are $x+y=6$ and $x+2y=4$ is

   (1) 10 (2) $2\sqrt{5}$ (3) 6 (4) 4

10. The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ and $\frac{x^2}{a^2}-\frac{y^2}{b^2}=-1$ is

    (1) $4(a^2+b^2)$ (2) $2(a^2+b^2)$ (3) a^2+b^2 (4) $\frac{1}{2}(a^2+b^2)$

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11. If the normals of the parabola $y^2 = 4x$ drawn at the end points of its latus rectum are tangents to the circle $(x-3)^2 + (y+2)^2 = r^2$, then the value of r^2 is

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

12. If $x + y = k$ is a normal to the parabola $y^2 = 12x$, then the value of k is

(1) 3 (2) -1 (3) 1 (4) 9

13. The ellipse $E_1 : \frac{x^2}{9} + \frac{y^2}{4} = 1$ is inscribed in a rectangle R whose sides are parallel to the coordinate axes. Another ellipse E_2 passing through the point $(0,4)$ circumscribes the rectangle R. The eccentricity of the ellipse is

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

14. Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ parallel to the straight line $2x - y = 1$. One of the points of contact of tangents on the hyperbola is

(1) $\left(\frac{9}{2\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$ (2) $\left(\frac{-9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ (3) $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ (4) $\left(3\sqrt{3}, -2\sqrt{2}\right)$

15. The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ having centre at $(0,3)$ is

(1) $x^2 + y^2 - 6y - 7 = 0$ (2) $x^2 + y^2 - 6y + 7 = 0$

(3) $x^2 + y^2 - 6y - 5 = 0$ (4) $x^2 + y^2 - 6y + 5 = 0$

16. Let C be the circle with centre at $(1,1)$ and radius $= 1$. If T is the circle centered at $(0, y)$ passing through the origin and touching the circle C externally, then the radius of T is equal to

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

17. Consider an ellipse whose centre is of the origin and its major axis is along x-axis. If its eccentrcity is $\frac{3}{5}$ and the distance between its foci is 6, then the area of the quadrilateral inscribed in the ellipse with diagonals as major and minor axis of the ellipse is

(1) 8 (2) 32 (3) 80 (4) 40

18. Area of the greatest rectangle inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

(1) $2ab$ (2) ab (3) $\sqrt{ab}$ (4) $\frac{a}{b}$

19. An ellipse has OB as semi minor axes, F and F' its foci and the angle FBF' is a right angle. Then the eccentricity of the ellipse is

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

20. The eccentricity of the ellipse $(x-3)^2+(y-4)^2=\frac{y^2}{9}$ is

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

21. If the two tangents drawn from a point P to the parabola $y^2=4x$ are at right angles then the locus of P is

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

22. The circle passing through $(1,-2)$ and touching the axis of x at $(3,0)$ passing through the point

(1) $(-5,2)$ (2) $(2,-5)$ (3) $(5,-2)$ (4) $(-2,5)$

23. The locus of a point whose distance from $(-2,0)$ is $\frac{2}{3}$ times its distance from the line $x=\frac{-9}{2}$ is

(1) a parabola (2) a hyperbola (3) an ellipse (4) a circle

24. The values of m for which the line $y=mx+2\sqrt{5}$ touches the hyperbola $16x^2-9y^2=144$ are the roots of $x^2-(a+b)x-4=0$, then the value of $(a+b)$ is

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

25. If the coordinates at one end of a diameter of the circle $x^2+y^2-8x-4y+c=0$ are $(11,2)$, the coordinates of the other end are

(1) $(-5,2)$ (2) $(2,-5)$ (3) $(5,-2)$ (4) $(-2,5)$

CHAPTER 6

1. If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $[\vec{a},\vec{c},\vec{b}]$ is equal to
(1) 2 (2) -1 (3) 1 (4) 0

2. If a vector $\vec{\alpha}$ lies in the plane of $\vec{\beta}$ and $\vec{\gamma}$, then
(1) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]=1$ (2) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]=-1$ (3) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]=0$ (4) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]=2$

3. If $\vec{a}\cdot\vec{b}=\vec{b}\cdot\vec{c}=\vec{c}\cdot\vec{a}=0$, then the value of $[\vec{a},\vec{b},\vec{c}]$ is
(1) $|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ (2) $\frac{1}{3}|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ (3) 1 (4) -1

4. If $\vec{a},\vec{b},\vec{c}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$, and is parallel to $\vec{c}$ then $\vec{a}\times(\vec{b}\times\vec{c})$ is equal to
(1) $\vec{a}$ (2) $\vec{b}$ (3) $\vec{c}$ (4) $\vec{0}$

5. If $[\vec{a},\vec{b},\vec{c}]=1$, then the value of $\frac{\vec{a}\cdot(\vec{b}\times\vec{c})}{(\vec{c}\times\vec{a})\cdot\vec{b}}+\frac{\vec{b}\cdot(\vec{c}\times\vec{a})}{(\vec{a}\times\vec{b})\cdot\vec{c}}+\frac{\vec{c}\cdot(\vec{a}\times\vec{b})}{(\vec{c}\times\vec{b})\cdot\vec{a}}$ is
(1) 1 (2) -1 (3) 2 (4) 3

6. The volume of the parallelepiped with its edges represented by the vectors $\hat{i}+\hat{j},\ \hat{i}+2\hat{j},\ \hat{i}+\hat{j}+\pi\hat{k}$ is
(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) π (4) $\frac{\pi}{4}$

7. If $\vec{a}$ and $\vec{b}$ are unit vectors such that $[\vec{a},\ \vec{b},\ \vec{a}\times\vec{b}]=\frac{\pi}{4}$, then the angle between $\vec{a}$ and $\vec{b}$ is
(1) $\frac{\pi}{6}$ (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{2}$

8. If $\vec{a}=\hat{i}+\hat{j}+\hat{k},\ \vec{b}=\hat{i}+\hat{j},\ \vec{c}=\hat{i}$ and $(\vec{a}\times\vec{b})\times\vec{c}=\lambda\vec{a}+\mu\vec{b}$, then the value of $\lambda+\mu$ is
(1) 0 (2) 1 (3) 6 (4) 3

9. If $\vec{a},\vec{b},\vec{c}$ are non-coplanar, non-zero vectors such that $[\vec{a},\ \vec{b},\ \vec{c}]=3$, then $\{[\vec{a}\times\vec{b},\ \vec{b}\times\vec{c},\ \vec{c}\times\vec{a}]\}^2$ is equal to
(1) 81 (2) 9 (3) 27 (4)18

10. If $\vec{a},\vec{b},\vec{c}$ are three non-coplanar vectors such that $\vec{a}\times(\vec{b}\times\vec{c})=\frac{\vec{b}+\vec{c}}{\sqrt{2}}$, then the angle between $\vec{a}$ and $\vec{b}$ is
(1) $\frac{\pi}{2}$ (2) $\frac{3\pi}{4}$ (3) $\frac{\pi}{4}$ (4) π

11. If the volume of the parallelepiped with $\vec{a}\times\vec{b}$, $\vec{b}\times\vec{c}$, $\vec{c}\times\vec{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c}),(\vec{b}\times\vec{c})\times(\vec{c}\times\vec{a})$ and $(\vec{c}\times\vec{a})\times(\vec{a}\times\vec{b})$ as coterminous edges is,

(1) 8 cubic units (2) 512 cubic units (3) 64 cubic units (4) 24 cubic units

12. Consider the vectors $\vec{a},\vec{b},\vec{c},\vec{d}$ such that $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d})=\vec{0}$. Let P_1 and P_2 be the planes determined by the pairs of vectors $\vec{a},\vec{b}$ and $\vec{c},\vec{d}$ respectively. Then the angle between P_1 and P_2 is

(1) $0°$ (2) $45°$ (3) $60°$ (4) $90°$

13. If $\vec{a}\times(\vec{b}\times\vec{c})=(\vec{a}\times\vec{b})\times\vec{c}$, where $\vec{a},\vec{b},\vec{c}$ are any three vectors such that $\vec{b}\cdot\vec{c}\neq 0$ and $\vec{a}\cdot\vec{b}\neq 0$, then $\vec{a}$ and $\vec{c}$ are

(1) perpendicular (2) parallel

(3) inclined at an angle $\frac{\pi}{3}$ (4) inclined at an angle $\frac{\pi}{6}$

14. If $\vec{a}=2\hat{i}+3\hat{j}-\hat{k}$, $\vec{b}=\hat{i}+2\hat{j}-5\hat{k}$, $\vec{c}=3\hat{i}+5\hat{j}-\hat{k}$, then a vector perpendicular to $\vec{a}$ and lies in the plane containing $\vec{b}$ and $\vec{c}$ is

(1) $-17\hat{i}+21\hat{j}-97\hat{k}$ (2) $17\hat{i}+21\hat{j}-123\hat{k}$

(3) $-17\hat{i}-21\hat{j}+97\hat{k}$ (4) $-17\hat{i}-21\hat{j}-97\hat{k}$

15. The angle between the lines $\frac{x-2}{3}=\frac{y+1}{-2}, z=2$ and $\frac{x-1}{1}=\frac{2y+3}{3}=\frac{z+5}{2}$ is

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

16. If the line $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+2}{2}$ lies in the plane $x+3y-\alpha z+\beta=0$, then (α,β) is

(1) $(-5,5)$ (2) $(-6,7)$ (3) $(5,-5)$ (4) $(6,-7)$

17. The angle between the line $\vec{r}=(\hat{i}+2\hat{j}-3\hat{k})+t(2\hat{i}+\hat{j}-2\hat{k})$ and the plane $\vec{r}\cdot(\hat{i}+\hat{j})+4=0$ is

(1) $0°$ (2) $30°$ (3) $45°$ (4) $90°$

18. The coordinates of the point where the line $\vec{r}=(6\hat{i}-\hat{j}-3\hat{k})+t(-\hat{i}+4\hat{k})$ meets the plane $\vec{r}.(\hat{i}+\hat{j}-\hat{k})=3$ are

(1) $(2,1,0)$ (2) $(7,-1,-7)$ (3) $(1,2,-6)$ (4) $(5,-1,1)$

[redacted] [redacted]

19. Distance from the origin to the plane $3x-6y+2z+7=0$ is

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

20. The distance between the planes $x+2y+3z+7=0$ and $2x+4y+6z+7=0$ is

(1) $\frac{\sqrt{7}}{2\sqrt{2}}$ (2) $\frac{7}{2}$ (3) $\frac{\sqrt{7}}{2}$ (4) $\frac{7}{2\sqrt{2}}$

21. If the direction cosines of a line are $\frac{1}{c},\frac{1}{c},\frac{1}{c}$, then

(1) $c=\pm 3$ (2) $c=\pm\sqrt{3}$ (3) $c>0$ (4) $0<c<1$

22. The vector equation $\vec{r}=(\hat{i}-2\hat{j}-\hat{k})+t(6\hat{i}-\hat{k})$ represents a straight line passing through the points

(1) $(0,6,-1)$ and $(1,-2,-1)$ (2) $(0,6,-1)$ and $(-1,-4,-2)$

(3) $(1,-2,-1)$ and $(1,4,-2)$ (4) $(1,-2,-1)$ and $(0,-6,1)$

23. If the distance of the point $(1,1,1)$ from the origin is half of its distance from the plane $x+y+z+k=0$, then the values of k are

(1) ± 3 (2) ± 6 (3) $-3,9$ (4) $3,-9$

24. If the planes $\vec{r}.(2\hat{i}-\lambda\hat{j}+\hat{k})=3$ and $\vec{r}.(4\hat{i}+\hat{j}-\mu\hat{k})=5$ are parallel, then the value of λ and μ are

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

25. If the length of the perpendicular from the origin to the plane $2x+3y+\lambda z=1$, $\lambda>0$ is $\frac{1}{5}$, then the value of λ is

(1) $2\sqrt{3}$ (2) $3\sqrt{2}$ (3) 0 (4) 1

CHAPTER 7

1. The volume of a sphere is increasing in volume at the rate of $3\pi \text{ cm}^3/\text{sec}$.

   The rate of change of its radius when radius is $\frac{1}{2}$ cm

   (1) 3 cm/s (2) 2 cm/s (3) 1 cm/s (4) $\frac{1}{2}$ cm/s

2. A balloon rises straight up at 10 m/s. An observer is 40 m away from the spot where the balloon left the ground. Find the rate of change of the balloon's angle of elevation in radian per second when the balloon is 30 metres above the ground.

   (1) $\frac{3}{25}$ radians/sec (2) $\frac{4}{25}$ radians/sec (3) $\frac{1}{5}$ radians/sec (4) $\frac{1}{3}$ radians/sec

3. The position of a particle moving along a horizontal line of any time t is given by $s(t) = 3t^2 - 2t - 8$. The time at which the particle is at rest is

   (1) $t = 0$ (2) $t = \frac{1}{3}$ (3) $t = 1$ (4) $t = 3$

4. A stone is thrown up vertically. The height it reaches at time t seconds is given by $x = 80t - 16t^2$. The stone reaches the maximum height in time t seconds is given by

   (1) 2 (2) 2.5 (3) 3 (4) 3.5

5. Find the point on the curve $6y = x^3 + 2$ at which y-coordinate changes 8 times as fast as x-coordinate is

   (1) $(4, 11)$ (2) $(4, -11)$ (3) $(-4, 11)$ (4) $(-4, -11)$

6. The abscissa of the point on the curve $f(x) = \sqrt{8 - 2x}$ at which the slope of the tangent is -0.25?

   (1) -8 (2) -4 (3) -2 (4) 0

7. The slope of the line normal to the curve $f(x) = 2\cos 4x$ at $x = \frac{\pi}{12}$ is

   (1) $-4\sqrt{3}$ (2) -4 (3) $\frac{\sqrt{3}}{12}$ (4) $4\sqrt{3}$

8. The tangent to the curve $y^2 - xy + 9 = 0$ is vertical when

   (1) $y = 0$ (2) $y = \pm\sqrt{3}$ (3) $y = \frac{1}{2}$ (4) $y = \pm 3$

9. Angle between $y^2 = x$ and $x^2 = y$ at the origin is

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

10. What is the value of the limit $\lim_{x \to 0}\left(\cot x - \frac{1}{x}\right)$?

    (1) 0 (2) 1 (3) 2 (4) ≤

[redacted] [redacted]

11. The function $\sin^4 x + \cos^4 x$ is increasing in the interval

(1) $\left[\frac{5\pi}{8}, \frac{3\pi}{4}\right]$ (2) $\left[\frac{\pi}{2}, \frac{5\pi}{8}\right]$ (3) $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$ (4) $\left[0, \frac{\pi}{4}\right]$

12. The number given by the Rolle's theorem for the function $x^3 - 3x^2, x \in [0,3]$ is

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

13. The number given by the Mean value theorem for the function $\frac{1}{x}, x \in [1,9]$ is

(1) 2 (2) 2.5 (3) 3 (4) 3.5

14. The minimum value of the function $|3 - x| + 9$ is

(1) 0 (2) 3 (3) 6 (4) 9

15. The maximum slope of the tangent to the curve $y = e^x \sin x, x \in [0, 2\pi]$ is at

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

16. The maximum value of the function $x^2 e^{-2x}, x > 0$ is

(1) $\frac{1}{e}$ (2) $\frac{1}{2e}$ (3) $\frac{1}{e^2}$ (4) $\frac{4}{e^4}$

17. One of the closest points on the curve $x^2 - y^2 = 4$ to the point $(6,0)$ is

(1) $(2,0)$ (2) $(\sqrt{5},1)$ (3) $(3,\sqrt{5})$ (4) $(\sqrt{13},-\sqrt{3})$

18. The maximum product of two positive numbers, when their sum of the squares is 200, is

(1) 100 (2) $25\sqrt{7}$ (3) 28 (4) $24\sqrt{14}$

19. The curve $y = ax^4 + bx^2$ with $ab > 0$

(1) has no horizontal tangent (2) is concave up

(3) is concave down (4) has no points of inflection

20. The point of inflection of the curve $y = (x-1)^3$ is

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

CHAPTER 8

1. A circular template has a radius of 10 cm. The measurement of radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this template is

   (1) 0.2% (2) 0.4% (3) 0.04% (4) 0.08%

2. The percentage error of fifth root of 31 is approximately how many times the percentage error in 31?

   (1) $\frac{1}{31}$ (2) $\frac{1}{5}$ (3) 5 (4) 31

3. If $u(x,y) = e^{x^2+y^2}$, then $\frac{\partial u}{\partial x}$ is equal to

   (1) $e^{x^2+y^2}$ (2) $2xu$ (3) x^2u (4) y^2u

4. If $v(x,y) = \log(e^x + e^y)$, then $\frac{\partial v}{\partial x} + \frac{\partial v}{\partial y}$ is equal to

   (1) $e^x + e^y$ (2) $\frac{1}{e^x + e^y}$ (3) 2 (4) 1

5. If $w(x,y) = x^y, x > 0$, then $\frac{\partial w}{\partial x}$ is equal to

   (1) $x^y \log x$ (2) $y \log x$ (3) yx^{y-1} (4) $x \log y$

6. If $f(x,y) = e^{xy}$, then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to

   (1) xye^{xy} (2) $(1+xy)e^{xy}$ (3) $(1+y)e^{xy}$ (4) $(1+x)e^{xy}$

7. If we measure the side of a cube to be 4 cm with an error of 0.1 cm, then the error in our calculation of the volume is

   (1) 0.4 cu.cm (2) 0.45 cu.cm (3) 2 cu.cm (4) 4.8 cu.cm

8. The change in the surface area $S = 6x^2$ of a cube when the edge length varies from x_0 to $x_0 + dx$ is

   (1) $12x_0 + dx$ (2) $12x_0 dx$ (3) $6x_0 dx$ (4) $6x_0 + dx$

9. The approximate change in the volume V of a cube of side x metres caused by increasing the side by 1% is

   (1) $0.3xdx\, m^3$ (2) $0.03x\, m^3$ (3) $0.03x^2 m^3$ (4) $0.03x^3 m^3$

10. If $g(x,y) = 3x^2 - 5y + 2y^2, x(t) = e^t$ and $y(t) = \cos t$, then $\frac{dg}{dt}$ is equal to

    (1) $6e^{2t} + 5\sin t - 4\cos t \sin t$ (2) $6e^{2t} - 5\sin t + 4\cos t \sin t$

    (3) $3e^{2t} + 5\sin t + 4\cos t \sin t$ (4) $3e^{2t} - 5\sin t + 4\cos t \sin t$

11. If $f(x) = \dfrac{x}{x+1}$, then its differential is given by

(1) $\dfrac{-1}{(x+1)^2}dx$ (2) $\dfrac{1}{(x+1)^2}dx$ (3) $\dfrac{1}{x+1}dx$ (4) $\dfrac{-1}{x+1}dx$

12. If $u(x,y) = x^2 + 3xy + y - 2019$, then $\left.\dfrac{\partial u}{\partial x}\right|_{(4,-5)}$ is equal to

(1) -4 (2) -3 (3) -7 (4) 13

13. Linear approximation for $g(x) = \cos x$ at $x = \dfrac{\pi}{2}$ is

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

14. If $w(x,y,z) = x^2(y-z) + y^2(z-x) + z^2(x-y)$, then $\dfrac{\partial w}{\partial x} + \dfrac{\partial w}{\partial y} + \dfrac{\partial w}{\partial z}$ is

(1) $xy + yz + zx$ (2) $x(y+z)$ (3) $y(z+x)$ (4) 0

15. If $f(x,y,z) = xy + yz + zx$, then $f_x - f_z$ is equal to

(1) $z - x$ (2) $y - z$ (3) $x - z$ (4) $y - x$

CHAPTER 9

1. The value of $\displaystyle\int_0^{\frac{2}{3}} \frac{dx}{\sqrt{4-9x^2}}$ is

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

2. The value of $\int_{-1}^{2} |x|\, dx$ is

(1) $\frac{1}{2}$ (2) $\frac{3}{2}$ (3) $\frac{5}{2}$ (4) $\frac{7}{2}$

3. For any value of $n \in \mathbb{Z}$, $\int_{0}^{\pi} e^{\cos^2 x} \cos^3 \left[(2n+1)x\right] dx$ is

(1) $\frac{\pi}{2}$ (2) π (3) 0 (4) 2

4. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x \cos x \, dx$ is

(1) $\frac{3}{2}$ (2) $\frac{1}{2}$ (3) 0 (4) $\frac{2}{3}$

5. The value of $\int_{-4}^{4} \left[\tan^{-1}\left(\frac{x^2}{x^4+1}\right) + \tan^{-1}\left(\frac{x^4+1}{x^2}\right)\right] dx$ is

(1) π (2) 2π (3) 3π (4) 4π

6. The value of $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \left(\frac{2x^7 - 3x^5 + 7x^3 - x + 1}{\cos^2 x}\right) dx$ is

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

7. If $f(x) = \int_{0}^{x} t \cos t \, dt$, then $\frac{df}{dx} =$

(1) $\cos x - x \sin x$ (2) $\sin x + x \cos x$ (3) $x \cos x$ (4) $x \sin x$

8. The area between $y^2 = 4x$ and its latus rectum is

(1) $\frac{2}{3}$ (2) $\frac{4}{3}$ (3) $\frac{8}{3}$ (4) $\frac{5}{3}$

9. The value of $\int_{0}^{1} x(1-x)^{99} dx$ is

(1) $\frac{1}{11000}$ (2) $\frac{1}{10100}$ (3) $\frac{1}{10010}$ (4) $\frac{1}{10001}$

10. The value of $\int_{0}^{\pi} \frac{dx}{1+5^{\cos x}}$ is

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

11. If $\frac{\Gamma(n+2)}{\Gamma(n)} = 90$ then n is

(1) 10 (2) 5 (3) 8 (4) 9

12. The value of $\int_{0}^{\frac{\pi}{6}} \cos^3 3x \, dx$ is

(1) $\frac{2}{3}$ (2) $\frac{2}{9}$ (3) $\frac{1}{9}$ (4) $\frac{1}{3}$

[redacted] [redacted]

13. The value of $\int_0^{\pi} \sin^4 x \, dx$ is

(1) $\frac{3\pi}{10}$ (2) $\frac{3\pi}{8}$ (3) $\frac{3\pi}{4}$ (4) $\frac{3\pi}{2}$

14. The value of $\int_0^{\infty} e^{-3x} x^2 dx$ is

(1) $\frac{7}{27}$ (2) $\frac{5}{27}$ (3) $\frac{4}{27}$ (4) $\frac{2}{27}$

15. If $\int_0^a \frac{1}{4+x^2} dx = \frac{\pi}{8}$ then a is

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

16. The volume of solid of revolution of the region bounded by $y^2 = x(a-x)$ about x-axis is

(1) πa^3 (2) $\frac{\pi a^3}{4}$ (3) $\frac{\pi a^3}{5}$ (4) $\frac{\pi a^3}{6}$

17. If $f(x) = \int_1^x \frac{e^{\sin u}}{u} du, x > 1$ and

$\int_1^3 \frac{e^{\sin x^2}}{x} dx = \frac{1}{2}[f(a) - f(1)]$, then one of the possible value of a is

(1) 3 (2) 6 (3) 9 (5)

18. The value of $\int_0^1 (\sin^{-1} x)^2 \, dx$ is

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

19. The value of $\int_0^a \left(\sqrt{a^2 - x^2}\right)^3 dx$ is

(1) $\frac{\pi a^3}{16}$ (2) $\frac{3\pi a^4}{16}$ (3) $\frac{3\pi a^2}{8}$ (4) $\frac{3\pi a^4}{8}$

20. If $\int_0^x f(t)\,dt = x + \int_x^1 t f(t)\,dt$, then the value of $f(1)$ is

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

CHAPTER 10

1. The order and degree of the differential equation $\frac{d^2y}{dx^2}+\left(\frac{dy}{dx}\right)^{1/3}+x^{1/4}=0$ are respectively

   (1) 2, 3 (2) 3, 3 (3) 2, 6 (4) 2, 4

2. The differential equation representing the family of curves $y = A\cos(x+B)$, where A and B are parameters, is

   (1) $\frac{d^2y}{dx^2}-y=0$ (2) $\frac{d^2y}{dx^2}+y=0$ (3) $\frac{d^2y}{dx^2}=0$ (4) $\frac{d^2x}{dy^2}=0$

3. The order and degree of the differential equation $\sqrt{\sin x}\,(dx+dy)=\sqrt{\cos x}\,(dx-dy)$ is

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

4. The order of the differential equation of all circles with centre at (h, k) and radius 'a' is

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

5. The differential equation of the family of curves $y = Ae^{x}+Be^{-x}$, where A and B are arbitrary constants is

   (1) $\frac{d^2y}{dx^2}+y=0$ (2) $\frac{d^2y}{dx^2}-y=0$ (3) $\frac{dy}{dx}+y=0$ (4) $\frac{dy}{dx}-y=0$

6. The general solution of the differential equation $\frac{dy}{dx}=\frac{y}{x}$ is

   (1) $xy=k$ (2) $y=k\log x$ (3) $y=kx$ (4) $\log y=kx$

7. The solution of the differential equation $2x\frac{dy}{dx}-y=3$ represents

   (1) straight lines (2) circles (3) parabola (4) ellipse

8. The solution of $\frac{dy}{dx}+p(x)y=0$ is

   (1) $y=ce^{\int pdx}$ (2) $y=ce^{-\int pdx}$ (3) $x=ce^{-\int pdy}$ (4) $x=ce^{\int pdy}$

9. The integrating factor of the differential equation $\frac{dy}{dx}+y=\frac{1+y}{\lambda}$ is

   (1) $\frac{x}{e^{\lambda}}$ (2) $\frac{e^{\lambda}}{x}$ (3) λe^{x} (4) e^{x}

[redacted] [redacted]

10. The integrating factor of the differential equation $\frac{dy}{dx}+P(x)y=Q(x)$ is x, then $P(x)$

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

11. The degree of the differential equation $y(x)=1+\frac{dy}{dx}+\frac{1}{1\cdot 2}\left(\frac{dy}{dx}\right)^2+\frac{1}{1\cdot 2\cdot 3}\left(\frac{dy}{dx}\right)^3+....$ is

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

12. If *p* and *q* are the order and degree of the differential equation $y\frac{dy}{dx}+x^3\left(\frac{d^2y}{dx^2}\right)+xy=\cos x$, when

(1) $p<q$ (2) $p=q$ (3) $p>q$ (4) *p* exists and *q* does not exist

13. The solution of the differential equation $\frac{dy}{dx}+\frac{1}{\sqrt{1-x^2}}=0$ is

(1) $y+\sin^{-1}x=c$ (2) $x+\sin^{-1}y=0$ (3) $y^2+2\sin^{-1}x=C$ (4) $x^2+2\sin^{-1}y=0$

14. The solution of the differential equation $\frac{dy}{dx}=2xy$ is

(1) $y=Ce^{x^2}$ (2) $y=2x^2+C$ (3) $y=Ce^{-x^2}+C$ (4) $y=x^2+C$

15. The general solution of the differential equation $\log\left(\frac{dy}{dx}\right)=x+y$ is

(1) $e^x+e^y=C$ (2) $e^x+e^{-y}=C$ (3) $e^{-x}+e^y=C$ (4) $e^{-x}+e^{-y}=C$

16. The solution of $\frac{dy}{dx}=2^{y-x}$ is

(1) $2^x+2^y=C$ (2) $2^x-2^y=C$ (3) $\frac{1}{2^x}-\frac{1}{2^y}=C$ (4) $x+y=C$

17. The solution of the differential equation $\frac{dy}{dx}=\frac{y}{x}+\frac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

(1) $x\phi\left(\frac{y}{x}\right)=k$ (2) $\phi\left(\frac{y}{x}\right)=kx$ (3) $y\phi\left(\frac{y}{x}\right)=k$ (4) $\phi\left(\frac{y}{x}\right)=ky$

18. If $\sin x$ is the integrating factor of the linear differential equation $\frac{dy}{dx}+Py=Q$, then P is

(1) $\log\sin x$ (2) $\cos x$ (3) $\tan x$ (4) $\cot x$

19. The number of arbitrary constants in the general solutions of order n and $n+1$ are respectively

(1) $n-1,\ n$ (2) $n,\ n+1$ (3) $n+1,\ n+2$ (4) $n+1,\ n$

20. The number of arbitrary constants in the particular solution of a differential equation of third order is

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

21. Integrating factor of the differential equation $\frac{dy}{dx}=\frac{x+y+1}{x+1}$ is

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

22. The population P in any year t is such that the rate of increase in the population is proportional to the population. Then

(1) $P=Ce^{kt}$ (2) $P=Ce^{-kt}$ (3) $P=Ckt$ (4) $P=C$

23. P is the amount of certain substance left in after time t. If the rate of evaporation of the substance is proportional to the amount remaining, then

(1) $P=Ce^{kt}$ (2) $P=Ce^{-kt}$ (3) $P=Ckt$ (4) $Pt=C$

24. If the solution of the differential equation $\frac{dy}{dx}=\frac{ax+3}{2y+f}$ represents a circle, then the value of a is

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

25. The slope at any point of a curve $y = f(x)$ is given by $\frac{dy}{dx} = 3x^2$ and it passes through (-1,1). Then the equation of the curve is

(1) $y = x^3 + 2$ (2) $y = 3x^2 + 4$ (3) $y = 3x^3 + 4$ (4) $y = x^3 + 5$

CHAPTER 11

1. Let X be random variable with probability density function

$$f(x)=\begin{cases}\frac{2}{x^3} & x\geq 1\\ 0 & x<1\end{cases}$$

Which of the following statement is correct

(1) both mean and variance exist
(2) mean exists but variance does not exist
(3) both mean and variance do not exist
(4) variance exists but Mean does not exist.

2. A rod of length $2l$ is broken into two pieces at random. The probability density function of the shorter of the two pieces is

$$f(x)=\begin{cases}\frac{1}{l} & 0<x<l\\ 0 & l\le x<2l\end{cases}$$

The mean and variance of the shorter of the two pieces are respectively

(1) $\frac{l}{2}, \frac{l^2}{3}$ (2) $\frac{l}{2}, \frac{l^2}{6}$ (3) $l, \frac{l^2}{12}$ (4) $\frac{l}{2}, \frac{l^2}{12}$

3. Consider a game where the player tosses a six-sided fair die. If the face that comes up is 6, the player wins ₹ 36, otherwise he loses ₹ k^2, where k is the face that comes up $k=\{1, 2, 3, 4, 5\}$.

The expected amount to win at this game in ₹ is

(1) $\frac{19}{6}$ (2) $-\frac{19}{6}$ (3) $\frac{3}{2}$ (4) $-\frac{3}{2}$

4. A pair of dice numbered 1, 2, 3, 4, 5, 6 of a six-sided die and 1, 2, 3, 4 of a four-sided die is rolled and the sum is determined. Let the random variable X denote this sum. Then the number of elements in the inverse image of 7 is

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

5. A random variable X has binomial distribution with $n = 25$ and $p = 0.8$ then standard deviation of X is

(1) 6 (2) 4 (3) 3 (4) 2

6. Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed n times. Then the possible values of X are

(1) $i+2n$, $i = 0,1,2...n$ (2) $2i-n$, $i = 0,1,2...n$ (3) $n-i$, $i = 0,1,2...n$ (4) $2i+2n$, $i = 0,1,2...n$

7. If the function $f(x)=\frac{1}{12}$ for $a<x<b$, represents a probability density function of a continuous random variable X, then which of the following cannot be the value of a and b?

(1) 0 and 12 (2) 5 and 17 (3) 7 and 19 (4) 16 and 24

8. Four buses carrying 160 students from the same school arrive at a football stadium. The buses carry, respectively, 42, 36, 34, and 48 students. One of the students is randomly selected. Let X denote the number of students that were on the bus carrying the randomly selected student. One of the 4 bus drivers is also randomly selected. Let Y denote the number of students on that bus.

Then $E[X]$ and $E[Y]$ respectively are

(1) $50, 40$ (2) $40, 50$ (3) $40.75, 40$ (4) $41, 41$

9. Two coins are to be flipped. The first coin will land on heads with probability 0.6, the second with Probability 0.5. Assume that the results of the flips are independent, and let X equal the total number of heads that result. The value of $E[X]$ is

(1) 0.11 (2) 1.1 (3) 11 (4) 1

10. On a multiple-choice exam with 3 possible destructives for each of the 5 questions, the probability that a student will get 4 or more correct answers just by guessing is

(1) $\frac{11}{243}$ (2) $\frac{3}{8}$ (3) $\frac{1}{243}$ (4) $\frac{5}{243}$

11. If $P\{X=0\}=1-P\{X=1\}$. If $E[X]=3\text{Var}(X)$, then $P\{X=0\}$.

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

12. If X is a binomial random variable with expected value 6 and variance 2.4, Then $P\{X=5\}$ is

(1) $\binom{10}{5}\left(\frac{3}{5}\right)^6\left(\frac{2}{5}\right)^4$ (2) $\binom{10}{5}\left(\frac{3}{5}\right)^5$

(3) $\binom{10}{5}\left(\frac{3}{5}\right)^4\left(\frac{2}{5}\right)^6$ (4) $\binom{10}{5}\left(\frac{3}{5}\right)^5\left(\frac{2}{5}\right)^5$

13. The random variable X has the probability density function

$$f(x)=\begin{cases} ax+b & 0<x<1 \\ 0 & \text{otherwise} \end{cases}$$

and $E(X)=\frac{7}{12}$, then a and b are respectively

(1) 1 and $\frac{1}{2}$ (2) $\frac{1}{2}$ and 1 (3) 2 and 1 (4) 1 and 2

14. Suppose that X takes on one of the values 0, 1, and 2. If for some constant k, $P(X=i)=kP(X=i-1)$ for $i=1,2$ and $P(X=0)=\frac{1}{7}$. Then the value of k is

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

15. Which of the following is a discrete random variable?

I. The number of cars crossing a particular signal in a day.

II. The number of customers in a queue to buy train tickets at a moment.

III. The time taken to complete a telephone call.

(1) I and II (2) II only (3) III only (4) II and III

16. If $f(x)=\begin{cases} 2x & 0\le x\le a \\ 0 & \text{otherwise} \end{cases}$ is a probability density function of a random variable, then the value of a is

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

17. The probability function of a random variable is defined as:

x	–2	–1	0	1	2
$f(x)$	k	$2k$	$3k$	$4k$	$5k$

Then $E(X)$ is equal to:

(1) $\frac{1}{15}$ (2) $\frac{1}{10}$ (3) $\frac{1}{3}$ (4) $\frac{2}{3}$

18. Let X have a Bernoulli distribution with mean 0.4, then the variance of $(2X–3)$ is

(1) 0.24 b) 0.48 (3) 0.6 (4) 0.96

19. If in 6 trials, X is a binomial variate which follows the relation $9P(X=4) = P(X=2)$, then the probability of success is

(1)0.125 (2) 0.25 (3) 0.375 (4) 0.75

20. A computer salesperson knows from his past experience that he sells computers to one in every twenty customers who enter the showroom. What is the probability that he will sell a computer to exactly two of the next three customers?

(1) $\frac{57}{20^3}$ (2) $\frac{57}{20^2}$ (3) $\frac{19^3}{20^3}$ (4) $\frac{57}{20}$

CHAPTER 12

1. A binary operation on a set S is a function from

(1) $S \to S$ (2) $(S \times S) \to S$ (3) $S \to (S \times S)$ (4) $(S \times S) \to (S \times S)$

2. Subtraction is not a binary operation in

(1) $\mathbb{R}$ (2) $\mathbb{Z}$ (3) $\mathbb{N}$ (4) $\mathbb{Q}$

3. Which one of the following is a binary operation on $\mathbb{N}$?

(1) Subtraction (2) Multiplication (3) Division (4) All the above

4. In the set $\mathbb{R}$ of real numbers '$*$' is defined as follows. Which one of the following is not a binary operation on $\mathbb{R}$?

(1) $a * b = \min(a \cdot b)$ (2) $a * b = \max(a, b)$

(3) $a * b = a$ (4) $a * b = a^b$

5. The operation $*$ defined by $a * b = \frac{ab}{7}$ is not a binary operation on

(1) $\mathbb{Q}^+$ (2) $\mathbb{Z}$ (3) $\mathbb{R}$ (4) $\mathbb{C}$

6. In the set $\mathbb{Q}$ define $a \odot b = a + b + ab$. For what value of y, $3 \odot (y \odot 5) = 7$?

(1) $y = \frac{2}{3}$ (2) $y = \frac{-2}{3}$ (3) $y = \frac{-3}{2}$ (4) $y = 4$

7. If $a * b = \sqrt{a^2 + b^2}$ on the real numbers then $*$ is

(1) commutative but not associative (2) associative but not commutative

(3) both commutative and associative (4) neither commutative nor associative

8. Which one of the following statements has the truth value T ?
   (1) $\sin x$ is an even function.
   (2) Every square matrix is non-singular
   (3) The product of complex number and its conjugate is purely imaginary
   (4) $\sqrt{5}$ is an irrational number

9. Which one of the following statements has truth value F ?
   (1) Chennai is in India or $\sqrt{2}$ is an integer
   (2) Chennai is in India or $\sqrt{2}$ is an irrational number
   (3) Chennai is in China or $\sqrt{2}$ is an integer
   (4) Chennai is in China or $\sqrt{2}$ is an irrational number

10. If a compound statement involves 3 simple statements, then the number of rows in the truth table is
    (1) 9 (2) 8 (3) 6 (4) 3

11. Which one is the inverse of the statement $(p \vee q) \rightarrow (p \wedge q)$?
    (1) $(p \wedge q) \rightarrow (p \vee q)$ (2) $\neg(p \vee q) \rightarrow (p \wedge q)$
    (3) $(\neg p \vee \neg q) \rightarrow (\neg p \wedge \neg q)$ (4) $(\neg p \wedge \neg q) \rightarrow (\neg p \vee \neg q)$

12. Which one is the contrapositive of the statement $(p \vee q) \rightarrow r$?
    (1) $\neg r \rightarrow (\neg p \wedge \neg q)$ (2) $\neg r \rightarrow (p \vee q)$
    (3) $r \rightarrow (p \wedge q)$ (4) $p \rightarrow (q \vee r)$

13. The truth table for $(p \wedge q) \vee \neg q$ is given below

p	q	$(p \wedge q) \vee (\neg q)$
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is true?

	(a)	(b)	(c)	(d)
(1)	T	T	T	T
(2)	T	F	T	T
(3)	T	T	F	T
(4)	T	F	F	F

14. In the last column of the truth table for $\neg(p \vee \neg q)$ the number of final outcomes of the truth value 'F' are
    (1) 1 (2) 2 (3) 3 (4) 4

15. Which one of the following is incorrect? For any two propositions p and q, we have

(1) $\neg(p \vee q) \equiv \neg p \wedge \neg q$ (2) $\neg(p \wedge q) \equiv \neg p \vee \neg q$

(3) $\neg(p \vee q) \equiv \neg p \vee \neg q$ (4) $\neg(\neg p) \equiv p$

16.

p	q	$(p \wedge q) \rightarrow \neg p$
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is correct for the truth value of $(p \wedge q) \rightarrow \neg p$?

	(a)	(b)	(c)	(d)
(1)	T	T	T	T
(2)	F	T	T	T
(3)	F	F	T	T
(4)	T	T	T	F

17. The dual of $\neg(p \vee q) \vee [p \vee (p \wedge \neg r)]$ is

(1) $\neg(p \wedge q) \wedge [p \vee (p \wedge \neg r)]$ (2) $(p \wedge q) \wedge [p \wedge (p \vee \neg r)]$

(3) $\neg(p \wedge q) \wedge [p \wedge (p \wedge r)]$ (4) $\neg(p \wedge q) \wedge [p \wedge (p \vee \neg r)]$

18. The proposition $p \wedge (\neg p \vee q)$ is

(1) a tautology (2) a contradiction

(3) logically equivalent to $p \wedge q$ (4) logically equivalent to $p \vee q$

19. Determine the truth value of each of the following statements:

(a) $4+2=5$ and $6+3=9$ (b) $3+2=5$ and $6+1=7$

(c) $4+5=9$ and $1+2=4$ (d) $3+2=5$ and $4+7=11$

	(a)	(b)	(c)	(d)
(1)	F	T	F	T
(2)	T	F	T	F
(3)	T	T	F	F
(4)	F	F	T	T

20. Which one of the following is not true?

(1) Negation of a negation of a statement is the statement itself.

(2) If the last column of the truth table contains only T then it is a tautology.

(3) If the last column of its truth table contains only F then it is a contradiction

(4) If p and q are any two statements then $p \leftrightarrow q$ is a tautology.

QR CODE 1 MARKS

XII STANDARD MATHEMATICS

APPLICATIONS OF MATRICES AND DETERMINANTS

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

(1) If a matrix A is orthogonal then which of the following is/are true?

(i) $A^{-1}A^{T}=I$ (i) $AA^{T}=I$ (iii) $A^{T}A^{T}=I$ (iv) $A^{-1}=A^{T}$

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

(2) If $\frac{1}{|A|}=(AB)=I$, $|A|\neq 0$ and I is the unit matrix, then the matrix B is the

(1) inverse of A (2) transpose of A

(3) adjoint of A (4) cofactor matrix of A

(3) If $A=\begin{pmatrix}1 & -2\\ 3 & 4\end{pmatrix}$, then $|A|(\text{adj}\,A)$ is

(1) $\begin{pmatrix}4 & 2\\ -3 & 1\end{pmatrix}$ (2) $\begin{pmatrix}1 & -2\\ 3 & 4\end{pmatrix}$ (3) $\frac{1}{10}\begin{pmatrix}4 & 2\\ -3 & 1\end{pmatrix}$ (4) $100\begin{pmatrix}1 & -2\\ 3 & 4\end{pmatrix}$

(4) If A is a square matrix such that $A^{3}=I$, then $A^{-1}=$

(1) A (2) A^{2} (3) A^{3} (4) A^{4}

(5) If A is an orthogonal matrix then

(1) $|A|=\pm 2$ (2) $|A|=0$ (3) $|A|=\pm 1$ (4) $|A|=\pm 3$

(6) If $A=\begin{bmatrix}a & 0 & 0\\ 0 & b & 0\\ 0 & 0 & c\end{bmatrix}$, then $A^{-1}=$

(1) $\begin{bmatrix}\frac{1}{b} & 0 & 0\\ 0 & \frac{1}{c} & 0\\ 0 & 0 & \frac{1}{a}\end{bmatrix}$ (2) $\begin{bmatrix}\frac{1}{a} & 0 & 0\\ 0 & \frac{1}{b} & 0\\ 0 & 0 & \frac{1}{c}\end{bmatrix}$ (3) $\begin{bmatrix}0 & 0 & \frac{1}{a}\\ 0 & \frac{1}{b} & 0\\ \frac{1}{c} & 0 & 0\end{bmatrix}$ (4) $\begin{bmatrix}0 & 0 & \frac{1}{b}\\ 0 & \frac{1}{c} & 0\\ \frac{1}{a} & 0 & 0\end{bmatrix}$

(7) If $A=\begin{bmatrix}2 & 3 & 4\end{bmatrix}$ then rank of AA^{T} is

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

(8)If $\frac{a_1}{x}+\frac{b_1}{y}=d_1,\ \frac{a_2}{x}+\frac{b_2}{y}=d_2$

$\Delta_1=\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix},\ \Delta_2=\begin{vmatrix} a_1 & d_1 \\ a_2 & d_2 \end{vmatrix}$ and $\Delta_3=\begin{vmatrix} d_1 & b_1 \\ d_2 & b_2 \end{vmatrix}$, then x and y are respectively

(1) $\frac{\Delta_1}{\Delta_2}$ and $\frac{\Delta_1}{\Delta_3}$ (2) $\frac{\Delta_2}{\Delta_3}$ and $\frac{\Delta_1}{\Delta_2}$ (3) $\frac{\Delta_3}{\Delta_1}$ and $\frac{\Delta_2}{\Delta_1}$ (4) $\frac{\Delta_2}{\Delta_1}$ and $\frac{\Delta_3}{\Delta_1}$

(9)If a,b,c are positive real numbers then the following system of equations in x,y and z,

$\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1,\ \frac{x^2}{a^2}-\frac{y^2}{b^2}+\frac{z^2}{c^2}=1,\ \frac{-x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ has

(1) infinitely many solutions (2) finitely many solutions

(3) no solution (4) unique solution

(10)If the system of equations $ax+y+z=0,\ x+by+z=0,\ x+y+cz=0$, (where $a\neq 1, b\neq 1, c\neq 1$) has a non-trivial solution, then the value of $\frac{a}{1-a}+\frac{b}{1-c}+\frac{c}{1-c}=$

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

(11) If $|A|\neq 0$, then which of the following is not true?

(1) $(A^2)^{-1}=(A^{-1})^2$ (2) $(A^T)^{-1}=(A^{-1})^T$

(3) $A^{-1}=|A|^{-1}$ (4) $(\text{adj}\,A)^T=(\text{adj}\,A^T)$

(12) If A is an invertible square matrix and k is a non-negative real number, then $(kA)^{-1}=$

(1) kA^{-1} (2) $\frac{1}{k}k^{-1}$ (3) $-kA^{-1}$ (4) $-\frac{1}{k}A^{-1}$

(13) If $A=\begin{bmatrix} 3 & 4 & 5 \\ -6 & 2 & -3 \\ 8 & 1 & 7 \end{bmatrix}$ then $|A^{-1}|=$

(1) 13 (2) $\frac{1}{13}$ (3) -13 (4) $\frac{-1}{13}$

(14) If A is a non-singular matrix and $A^2-2A+2I=0$ then $A^{-1}=$

(1) $I-A$ (2) $\frac{1}{2}(I+A)$ (3) $I+A$ (4) $\frac{1}{2}(I-A)$

(15) If $A=\begin{bmatrix} 3 & 1 \\ 7 & 5 \end{bmatrix}$ and $A^2+xI=yA$, then the values of x and y are respectively

(1) 6,4 (2) 8,6 (3) (3,8) (4) (5,8)

XII STANDARD MATHEMATICS

Complex Numbers

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

(1)Which of the following is not true?

(1) $i^4 = 1$ 2) $\frac{1}{i^3} - i = 0$ (3) $\frac{1}{i} + i^3 = 0$ (4) $\frac{1}{i^2} = i^2$

(2)Which of the following statement is not true?

(1) $\frac{z}{\bar{z}}$ is real (2) $z + \bar{z}$ is real

(3) $z - \bar{z}$ is purely imaginary (4) $z\bar{z}$ is real

(3)If $z = \frac{3+4i}{2-3i}$, the complex number ω which satisfies the equation $z\omega = 1$ is

(1) $\omega = \frac{6+17i}{25}$ (2) $\omega = \frac{-6-17i}{25}$ (3) $\omega = \frac{-6-17i}{5}$ (4) $\omega = \frac{6+17i}{5}$

(4)The set of points for which $|z - 2 + 3i| = 4$ is a circle with

(1) centre $-2+3i$, radius 4 (2) centre $2-3i$, radius 2

(3) centre $2-3i$, radius 4 (4) centre $-2+3i$, radius 2

(5)The complex number $3\left(\cos\frac{5\pi}{6} + i\sin\frac{5\pi}{6}\right)$ is equal to

(1) $\frac{-3\sqrt{3}}{2} + \frac{3}{2}i$ (b) $\frac{3}{2} - \frac{3\sqrt{3}}{2}i$ (3) $-\frac{3}{2} + \frac{3\sqrt{3}}{2}i$ (4) $\frac{3\sqrt{3}}{2} - \frac{3}{2}i$

(6)The modulus and principal argument of the complex number $z = -2(\cos\theta - i\sin\theta)$ $\left(\text{where } 0 < \theta \le \frac{\pi}{2}\right)$ are, respectively,

(1) $2, -\theta$ (2) $2, \pi - \theta$ (3) $-2, \theta$ (4) $2, -\pi + \theta$

(7)The value of $\left(\sqrt{3} - i\right)^6$ is

(1) 2^6 (2) -2^6 (3) $i2^6$ (4) $-i2^6$

(8)If $x + iy = \left(-1 + i\sqrt{3}\right)^{2019}$, then x is

(1) 2^{2019} (2) -2^{2019} (3) -1 (4) 1

(9)If $\omega \ne 1$ is the cubic root of unity then $\frac{a + b\omega + c\omega^2}{a\omega^2 + b + c\omega} + \frac{a\omega^2 + b\omega + c}{a + b\omega^2 + c\omega}$ is

(1) 1 (2) -1 (3) ω (4) $-\omega$

XII STANDARD MATHEMATICS

THEORY OF EQUATIONS

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

(1) If α,β,γ are the roots of the equation $x^3+ax^2+bx+c=0$. The value of $(1+\alpha)(1+\beta)(1+\gamma)$ is

(1) $(1+b)-(a+c)$ (2) $(1-b)+(a-c)$ (3) $(1-b)-(a-c)$ (4) $(1+b)+(a+c)$

(2) $2x^3-x^2-2x+2=Q(x)(2x-1)+R(x)$ for all values of x. The value of $R(x)$ is

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

(3) Roots of $x^3+x^2-4x-4=0$ is

(1) $1,-1,0$ (2) $3,-3,1$ (3) $1,2,2$ (4) $2,-2,-1$

(4) The value of x that satisfies $f(x)=0$ is called the

(1) root of an equation $f(x)=0$ (2) root of a function $f(x)$

(3) zero of an equation $f(x)=0$ (4) none of the above

(5) A monic polynomial which crosses the x-axis at $-4,0$, and 2; lies below the x-axis between -4 and 0; lies above the x-axis between 0 and 2 is

(1) x^3+2x^2-8x (2) x^3-2x^2-8x (3) $-x^3-2x^2+8x$ (4) $-x^3+2x^2+8x$

(6) A monic polynomial touches the x-axis at 0 and crosses the x-axis at 3; lies above the x-axis between 0 and 3.

(1) $-x^3-3x^2$ (2) x^3+3x^2 (3) x^3-3x^2 (4) $-x^3+3x^2$

(7) The list of all possible rational roots for x^5-4x^2+6x+5

(1) $\pm1,\pm5$ (2) $\pm5,\pm\frac{1}{5}$ (3) $\pm1,\pm\frac{1}{5}$ (4) $\pm\frac{1}{4},\pm\frac{5}{4},\pm5$

(8) The list of all possible rational roots for $7x^3-x^2+3$

(1) $\pm\frac{1}{7},\pm\frac{3}{7},\pm1,\pm3$ (2) $\pm\frac{1}{7},\pm\frac{1}{3},\pm1,\pm3,\pm7$

(3) $\pm\frac{1}{7},\pm\frac{3}{7},\pm1,\pm3,\pm7$ (4) $\pm\frac{1}{3},\pm\frac{7}{3},\pm1,\pm7$

(9) The list of all possible rational roots for $6x^4+3x^3-3x^2+3x-5$

(1) $\pm1,\pm2,\pm3,\pm6,\pm\frac{1}{2},\pm\frac{5}{2},\pm\frac{1}{3},\pm\frac{5}{3},\pm\frac{1}{6},\pm\frac{5}{6}$ (2) $\pm1,\pm5,\pm\frac{1}{5},\pm\frac{2}{5},\pm\frac{3}{5},\pm\frac{6}{5}$

(3) $\pm1,\pm5,\pm\frac{1}{2},\pm\frac{5}{2},\pm\frac{1}{3},\pm\frac{5}{3},\pm\frac{1}{6},\pm\frac{5}{6}$ (4) $\pm1,\pm2,\pm3,\pm6,\pm\frac{1}{5},\pm\frac{2}{5},\pm\frac{3}{5},\pm\frac{6}{5}$

(10) The list of all possible rational roots for $3x^4+7x^3-3x^2+5x-12$

(1) $\pm1,\pm3,\pm\frac{1}{2},\pm\frac{3}{2},\pm\frac{1}{3},\pm\frac{1}{4},\pm\frac{3}{4},\pm\frac{1}{6},\pm\frac{1}{12}$

(2) $\pm1,\pm2,\pm3,\pm4,\pm6,\pm12,\pm\frac{1}{2},\pm\frac{3}{2},\pm\frac{1}{3},\pm\frac{1}{4},\pm\frac{3}{4},\pm\frac{1}{6},\pm\frac{1}{12}$

(3) $\pm1,\pm2,\pm3,\pm4,\pm6,\pm12,\pm\frac{1}{3},\pm\frac{2}{3},\pm\frac{4}{3}$

(4) $\pm1,\pm2,\pm3,\pm6,\pm12,\pm\frac{1}{3},\pm\frac{2}{3},\pm\frac{3}{4}$

(11) Using Descartes Rule of Signs, the possible number of positive and negative real zeros of $P(x)=6x^5-4x^2+x+4$

(1) 3 or 1 positive zeros, 3 or 1 negative zeros
(2) 2 or 0 positive zeros, 1 or 0 negative zeros
(3) 2 or 0 positive zeros, 2 or 0 negative zeros
(4) 2 or 0 positive zeros, 1 negative zero

(12) Using Descartes Rule of Signs, the possible number of positive and negative real zeros of $P(x)=6x^8-9x^7+x^6-3x+18$

(1) 4, 2 or 0 positive zeros, no negative zeros
(2) 4 or 2 positive zeros, no negative zeros
(3) 4 positive zeros, no negative zeros
(4) 4, 2 or 0 positive zeros, 1 negative zero

(13) Using Rational root theorem, the zeros of the polynomial $3x^3-x^2-9x+3$ is

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

(14) Using Rational root theorem, the zeros of the polynomial $x^4+3x^3-5x^2-9x-2$ is

(1) $1,-2,-2+\sqrt{3},-2-\sqrt{3}$ (2) $-1,3,-2+\sqrt{5},-2-\sqrt{5}$
(3) $-1,2,-2+\sqrt{3},-2-\sqrt{3}$ (4) $-1,-2,-2+\sqrt{5},-2-\sqrt{5}$

(15) Using Rational root theorem, the zeros of the polynomial $2x^4-17x^3+59x^2-83x+39$ is

(1) $1,-\frac{3}{2},2+3i,2-3i$ (2) $1,\frac{3}{2},3+2i,3-2i$
(3) $-1,\frac{3}{2},3+2i,3-2i$ (4) $-1,-\frac{3}{2},2+3i,2-3i$

(16) If $x+x^2+x^3=2+2^2+2^3$ then the roots of the equation are

(1) $2,-1-\sqrt{6}i,-1+\sqrt{6}i$ (2) $2,-\frac{3}{2}-i\frac{\sqrt{15}}{2},-\frac{3}{2}-i\frac{\sqrt{15}}{2}$

(3) $2,-\frac{3}{2}+i\frac{\sqrt{19}}{2},-\frac{3}{2}-i\frac{\sqrt{19}}{2}$ (4) $2,-1+\sqrt{6}i,-1-\sqrt{6}i$

(17) If a,b,c are the roots of $x^3-px^2+qx-r=0$, find the value of $(a+b-c)(b+c-a)(c+a-b)$:

(1) p^3-8r (2) $4pq-p^3$ (3) $4pq-p^3-8r$ (4) $4pq-8r$

(18) If $x=-1$ is a zero with multiplicity 2 of the polynomial $P(x)=x^4+x^3+x^2+kx+k-1$, then value of k is

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

(19) According to Descartes Rules of Signs, the number of possible positive and negative real zeros of the polynomial $P(x)=5x^4+x^3+3x^2-3x-1$ are

(1) one positive and three negative zeros
(2) one positive and either three or one negative zeros
(3) one positive and one negative zeros
(4) one negative and either three or one positive zeros

(20) A polynomial $P(x)$ of lowest degree and real coefficient that has zeros 0 (of multiplicity 3), $2i$, and i is

(1) $P(x)=x^7+9x^5+4x^3$ (2) $P(x)=x^7+5x^5+4x^3$

(3) $P(x)=x^7+5x^5+11x^3$ (4) $P(x)=x^5-3ix^4-2x^3$

XII STANDARD MATHEMATICS

INVERSE TRIGONOMETRIC FUNCTIONS

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

(1) The principal value of $\sin\left(\cot^{-1}\left(\cot\frac{17\pi}{3}\right)\right)$ is equal to

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

(2) The value of $\tan\left(\frac{1}{2}\sin^{-1}\frac{3}{4}\right)$ is

(1) $\frac{4+\sqrt{7}}{3}$ (2) $\frac{4-\sqrt{7}}{3}$ (3) $\frac{4+\sqrt{7}}{\sqrt{3}}$ (4) $\frac{4-\sqrt{7}}{\sqrt{3}}$

(3) The range of the function $\sin\left(\sin^{-1}x+\cos^{-1}x\right)$, $|x|\le 1$ is

(1) $[-1,1]$ (2) $(-1,1)$ (3) $\{0\}$ (4) $\{1\}$

(4) If $4\sin^{-1}x+\cos^{-1}x=\pi$, then the value of x is

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

(5) The value of $\cos^{-1}(\cos 12)-\sin^{-1}(\sin 12)$ is

(1) 0 (2) π (3) $8\pi-24$ (4) $9\pi+24$

(6) If $\theta=\sin^{-1}x+\cos^{-1}x-\tan^{-1}x$, $x\ge 0$, then the smallest interval in which θ lies is, given by

(1) $\frac{\pi}{4}\le\theta\le\frac{\pi}{2}$ (2) $0\le\theta\le\frac{\pi}{4}$ (3) $\frac{\pi}{2}\le\theta\le\frac{3\pi}{4}$ (4) $-\frac{\pi}{4}\le\theta\le 0$

(7) If $\cos^{-1}x=\tan^{-1}x$, then $\sin\left(\cos^{-1}x\right)$ is

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

(8) $\tan^{-1}\left(\frac{\cos x}{1+\sin x}\right)=$

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

(9) If $\cos^{-1}p+\cos^{-1}q+\cos^{-1}r=\pi$, then $p^2+q^2+r^2+2pqr=$

(1) 0 (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{3}$ (4) $\frac{\pi}{6}$

(10)If $x^2+y^2+z^2=r^2$, then $\tan^{-1}\left(\frac{xy}{zr}\right)+\tan^{-1}\left(\frac{yz}{xr}\right)+\tan^{-1}\left(\frac{xz}{yr}\right)=$

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{4}$ (3) π (4) 0

(11)If $a\le\tan^{-1}x+\cot^{-1}x+\sin^{-1}x\le b$, then the values of a and b is

(1) $a=0,\ b=\frac{\pi}{4}$ (2) $a=\frac{\pi}{4},\ b=\pi$ (3) $a=0,\ b=\pi$ (4) $a=\frac{\pi}{2},\ b=\pi$

(12)If $\cos^{-1}x+\cos^{-1}y+\cos^{-1}z=3\pi$, then $x^{1001}+y^{1002}+z^{1003}-3$ is equal to

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

(13)If $A=\tan^{-1}x,\ x\in\mathbb{R}$, then the value of $\sin 2A$ is

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

(14)If $0\le x<\infty$, then $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ equals

(1) $2\tan^{-1}x$ (2) $-2\tan^{-1}x$ (3) $\pi-2\tan^{-1}x$ (4) $\pi+2\tan^{-1}x$

(15)If $\sin^{-1}\left(\frac{2x}{1+x^2}\right)+\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)=4\tan^{-1}x$, then

(1) $x\in[1,\infty)\cup(-\infty,-1)$ (2) $x\in[-1,1]$ (3) $x\in[1,\infty)$ (4) $x\in(-\infty,-1)$

(16)If $\sec^{-1}x=\operatorname{cosec}^{-1}y$, then $\cos^{-1}\frac{1}{x}+\cos^{-1}\frac{1}{y}$ is

(1) 0 (2) $\frac{\pi}{4}$ (3) $\frac{\pi}{2}$ (4) π

(17)The equation $\sin^{-1}x-\cos^{-1}x=\cos^{-1}\frac{\sqrt{3}}{2}$ has

(1) no solution (2) unique solution

(3) infinite number of solutions (4) finite number of solutions.

(18)The complete set of solutions $\sin^{-1}(\sin 5)>x^2-4x$ is

(1) $|x-2|<\sqrt{9-2\pi}$ (2) $|x-2|>\sqrt{9-2\pi}$

(3) $|x|<\sqrt{9-2\pi}$ (4) $|x|>\sqrt{9-2\pi}$

(19) The value of $\tan^{-1}(\tan(-6))$ is

(1) $\pi-6$ (2) $2\pi-6$ (3) $\pi+6$ (4) $2\pi+6$

(29) if x satisfies the in equation $x^2-x-2>0$. then a value exists for

(1) $\sin^{-1}x$ (2) $\sec^{-1}x$ (3) $\cos^{-1}x$ (4) none of these

XII STANDARD MATHEMATICS

TWO DIMENSIONAL ANALYTICAL GEOMETRY-II

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

(1) The vertices of the elipse $\frac{(x-1)^2}{9}+\frac{(y-2)^2}{18}=1$ are

(1) $(3,4)$ and $(-3,4)$ (2) $(4,3)$ and $(-4,3)$

(3) $(5,2)$ and $(-3,2)$ (4) $(1,6)$ and $(1,-2)$

(2) The line PP^1 is a focal chord of the parabola $y^2=8x$ and if the coordinates of P are $(18,12)$ then the coordinates of P' is

(1) $\left(\frac{2}{9},\frac{-4}{3}\right)$ (2) $\left(\frac{-2}{9},\frac{-4}{3}\right)$ (3) $\left(\frac{-2}{9},\frac{-4}{3}\right)$ (4) $\frac{2}{3},\frac{-4}{9}$

(3) The equations $4y^2-50x=25x^2+16y+109$ represents

(1) a parabola (2) an ellipse (3) a circle (4) a hyperbola

(4) The ellipse $x^2+4y^2=4$ is inscribed in a rectangle aligned with coordinate axes which inturn inscribed in another ellipse through the point $(4,0)$. Then the equation of the ellipse is

(1) $x^2+16y^2=16$ (2) $x^2+12y^2=16$ (3) $4x^2+48y^2=48$ (4) $4x^2+64y^2=48$

(5) The eccentricity of an ellipse, with its centre at the origin is $\frac{1}{2}$. If one of the directrices is $x=4$, then the equation of the ellipse is

(1) $x^2+4y^2=1$ (2) $3x^2+4y^2=12$ (3) $4x^2+3y^2$ (4) $4x^2+3y^2=1$

(6) The locus of a point $P(\alpha,\beta)$ moving under the condition that the line $y=\alpha x+\beta$ is a tangent to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is

(1) an ellipse (2) a circle (3) a parabola (4) a hyperbola

(7) For the hyperbola $\frac{x^2}{\cos^2\alpha}-\frac{y^2}{\sin^2\alpha}=1$. Which of the following remains constant when α reverses

.

(1) eccentricity (2) directrix

(3) abseissae of vertices (4) abseissae of coci

(8) A focus of an ellipse is at the origin. The directrix is the line $x=4$ and the eccentricity is $\frac{1}{2}$. Then the length of the semi-major axis is

(1) $\frac{8}{3}$ (2) $\frac{2}{3}$ (3) $\frac{4}{3}$ (4) $\frac{5}{3}$

(9)The radius of the auxiliary circle of the conic $9x^2+16y^2=144$ is

(1) $\sqrt{7}$ (2) 4 (3) 3 (4) 5

(10)Find the equation of the circle whose diameter is the chord $x+y=1$ of the circle $x^2+y^2=4$.

(1) $x^2+y^2-x-y-3=0$ (2) $x^2+y^2+x+y-3=0$

(3) $x^2+y^2+x-y-3=0$ (4) $x^2+y^2-x+y-3=0$

(11)If $x+y=k$ is normal to $y^2=12x$, then k is

(1) 3 (2) 9 (3) -9 (4) -3

(12)The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ and having its centre at $(0,3)$ is

(1) 3 (2) 4 (3) 5 (4) $\sqrt{7}$

(13)The locus of the point of intersection of two perpendicular tangents to the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$

(1) $x^2+y^2=9$ (2) $x^2+y^2=16$ (3) $x^2+y^2=25$ (4) $x^2+y^2=4$

(14)The number of tangents that can be drawn from the point $(4,3)$ to the hyperbola $\frac{x^2}{4}-\frac{y^2}{3}=1$ is

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

(15)If the line $y=3x+\lambda$ and touch the hyperbola $9x^2-5y^2=45$, then the value of λ is

(1) ±3 (2) ±2 (3) ±6 (4) $\pm\sqrt{5}$

XII STANDARD MATHEMATICS

APPLICATIONS OF VECTOR ALGEBRA

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

(1)If $\vec{a}$ is a vector perpendicular to both $\vec{b}$ and $\vec{c}$, then

(1) $\vec{a}+\vec{b}+\vec{c}=\vec{0}$ (2) $\vec{a}\cdot(\vec{b}\times\vec{c})=0$

(3) $\vec{a}\times(\vec{b}\times\vec{c})=\vec{0}$ (4) $\vec{a}\times(\vec{b}+\vec{c})=\vec{0}$

(2)If $\vec{a},\vec{b},\vec{c}$ are any three vectors such that $(\vec{a}+\vec{b})\cdot\vec{c}=(\vec{a}-\vec{b})\cdot\vec{c}$, then $(\vec{a}\times\vec{b})\times\vec{c}$ is

(1) $\vec{0}$ (2) $\vec{a}$ (3) $\vec{b}$ (4) $\vec{c}$

(3)If $\vec{a}=\hat{i}+\hat{j}+\hat{k}$, $\vec{b}=-\hat{i}+2\hat{j}-4\hat{k}$ and $\vec{c}=2\hat{i}+3\hat{j}-\hat{k}$, then $(\vec{a}\times\vec{b})\cdot(\vec{a}\times\vec{c})$ is equal to

(1) -36 (2) 64 (3) -64 (4) 36

(4)The vector $\vec{a}\times(\vec{b}\times\vec{c})$ is coplanar with the vectors

(1) $\vec{a},\vec{c}$ (2) $\vec{a},\vec{b}$ (3) $\vec{b},\vec{c}$ (4) $\vec{a},\vec{b},\vec{c}$

(5)A particle is acted on by a force of magnitude 5 units in the direction $2\hat{i}-2\hat{j}+\hat{k}$ and is displaced from $(2,3,4)$ to $(6,4,8)$, then the work done by the force is

(1) $\frac{50}{7}$ (2) $\frac{50}{3}$ (3) $\frac{25}{3}$ (4) $\frac{25}{7}$

(6)The torque of the force $\vec{F}=3\hat{i}+2\hat{j}-4\hat{k}$ about the point $(2,-1,3)$ acting through a point $(1,-1,2)$ is

(1) $2\hat{i}-7\hat{j}-2\hat{k}$ (2) $2\hat{i}+7\hat{j}-2\hat{k}$

(3) $-2\hat{i}-\hat{j}+2\hat{k}$ (4) $-2\hat{i}-7\hat{j}+2\hat{k}$

(7)A vector perpendicular to $2\hat{i}+\hat{j}+\hat{k}$ and coplanar with $\hat{i}+2\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+2\hat{k}$ is

(1) $5(\hat{j}-\hat{k})$ (2) $5(\hat{j}+\hat{k})$ (3) $\hat{i}+7\hat{j}-\hat{k}$ (4) $\hat{i}+7\hat{j}+\hat{k}$

(8)If the straight line $\frac{x-3}{4}=\frac{y-4}{7}=\frac{z+3}{-13}$ lies in the plane $5x-y+z=p$, then the value of p is

(1) 2 (2) -3 (3) 8 (4) 9

(9)If the lines $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-k}{2}=z$ intersect, then the value of k is

(1) $\frac{9}{2}$ (2) $-\frac{2}{9}$ (3) $\frac{3}{2}$ (4) $-\frac{2}{3}$

(10)The equation of plane through the intersection of the planes $x+2y+3z-4=0$ and $4x+3y+2z+1=0$, and passing through the origin is

(1) $7x+4y+z=0$ (2) $17x+14y+11z=0$

(3) $7x+y+4z=0$ (4) $17x+14y+z=0$

(11)If the planes $\vec{r}\cdot(3\hat{i}-2\hat{j}+2\hat{k})=17$ and $\vec{r}\cdot(4\hat{i}+3\hat{j}-m\hat{k})=25$ are perpendicular, then the value of m is

(1) 3 (2) -3 (3) 9 (4) -9

(12)The non parametric form of the vector equation of the plane passing through $(3,4,5)$ and parallel to the plane $x+2y+4z=5$ is

(1) $\vec{r}\cdot(\vec{i}+2\hat{j}+4\hat{k})=24$ (2) $\vec{r}\cdot(\vec{i}+2\hat{j}+4\hat{k})=31$

(3) $\vec{r}\cdot(\vec{i}+2\hat{j}+4\hat{k})=42$ (4) $\vec{r}\cdot(\vec{i}+2\hat{j}+4\hat{k})=13$

(13) The equation of the straight line passing through $(4,-4,7)$ and parallel to z – axis is

(1) $\frac{x-4}{1}=\frac{y+4}{1}=\frac{z-7}{0}$ (2) $\frac{x-4}{0}=\frac{y+4}{1}=\frac{z-7}{1}$

(3) $\frac{x-4}{1}=\frac{y+4}{0}=\frac{z-7}{0}$ (4) $\frac{x-4}{0}=\frac{y+4}{0}=\frac{z-7}{1}$

(14) The angle between the planes $\vec{r}\cdot(2\hat{i}-\hat{j}+\hat{k})=16$ and $\vec{r}\cdot(\hat{i}+\hat{j}+2\hat{k})=19$ is

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

(15) The direction cosines of the line $x=y=z$ are

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

(16)The point of intersection of the line $\frac{x-1}{1}=\frac{y+3}{3}=\frac{z-2}{2}$ with the plane $3x-2y+z=11$ is

(1) $(1,-3,2)$ (2) $(-1,3,2)$ (3) $(0,6,0)$ (4) $(0,-6,0)$

(17) The coordinates of ∇ABC , where A,B,C are the points of intersection of the plane $6x+3y+2z=36$ with the coordinate axes, is

(1) $(2,4,6)$ (2) $(4,6,2)$ (3) $(6,4,2)$ (4) $(6,2,4)$

(18) Distance of the point $(2,3,4)$ from the plane $3x-6y+2z+11=0$ is

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

(19) If the line $\vec{r}=(a_1\hat{i}+a_2\hat{j}+a_3\hat{k})+t(l\hat{i}+m\hat{j}+n\hat{k})$ is parallel to the plane $\vec{r}\cdot(a\vec{i}+b\vec{j}+c\vec{k})=d$, then

(1) $\frac{a}{l}+\frac{b}{m}+\frac{c}{n}=0$ (2) $\frac{a}{l}=\frac{b}{m}=\frac{c}{n}$

(3) $al+bm+cn=0$ (4) $ax_1+by_1+cz_1=d$

(20) The angle between the straight lines $\vec{r}=(\hat{i}+2\hat{j}+3\hat{k})+s(2\hat{i}+5\hat{j}+4\hat{k})$ and $\vec{r}=(\hat{i}-2\hat{j}+3\hat{k})+t(\hat{i}+2\hat{j}-3\hat{k})$ is

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

(21) The equation of the straight line passing through $(4,5,6)$ and perpendicular to the plane $\vec{r}\cdot(\hat{i}+3\hat{j}-5\hat{k})=10$ is

(1) $\vec{r}=(4\hat{i}+5\hat{j}+6\hat{k})+t(\hat{i}+3\hat{j}-5\hat{k})$ (2) $\vec{r}=(\hat{i}+3\hat{j}-5\hat{k})+t(4\hat{i}+5\hat{j}+6\hat{k})$

(3) $\vec{r}=(4\hat{i}+5\hat{j}+6\hat{k})+t(\hat{i}-3\hat{j}+5\hat{k})$ (4) $\vec{r}=(\hat{i}-3\hat{j}+5\hat{k})+t(4\hat{i}+5\hat{j}+6\hat{k})$

12 STD Chapter 7 MATHS

1. A stone is thrown vertically upwards from the top of a tower 64 ft high according to the law s = 48t – 16t^2. The greatest height attained by the stone above the ground is
   a. 100 ft b. 64 ft c. 36ft d. 32ft
2. The volume of a sphere is increasing at the rate of 1200 cm/sec. The rate of increase in its surface area when the radius is 10cm is
   a. 120 sq.cm / sec b. 240 sq.com / sec c. 300 sq.cm / sec d. 400 sq.cm / sec
3. A man of 2m height walks at a uniform speed of 6km/hr away from a lamp post of 6m height. The rate at which the length of his shadow increases is
   a. 3 km / hr b. 2km / hr c. 3 / 2 km / hr d. 1 km / hr
4. The point on the curve $y^2 = x$ where the tangent makes an angle $\frac{\pi}{4}$ with x- axis
   a. (1,1) b. $\left(\frac{1}{4},\frac{1}{2}\right)$ c. $\left(\frac{1}{2},\frac{1}{4}\right)$ d. (4,2)
5. The curve $x^2 - xy + y^2 = 27$ has tangents parallel to x – axis at
   a. (-3,-6) and (3,-6) b. (3,6) and (-3,-6) c.(-3,6) and (-3,-6) d. (3,-6) and (-3,6)
6. The normal to a curve $y = f(x)$ is parallel to the x – axis if
   a. $\frac{dx}{dy} = 0$ b. $\frac{dy}{dx} = 0$ c. $\frac{dx}{dy} = 1$ d. $\frac{dy}{dx} = 1$
7. Let $f(x) = \sqrt{x+4}$ the values of c that satisfies the mean value theorem for the function on the interval [0,5]
   a. 2 b. 2.25 c. 2.5 d. 2.75
8. The series $\sum_{n=0}^{\infty}(-1)^n \frac{x^{2n}}{(2n)!} 4^n$ is a Maclaurin series expansion for the function
   a. Cos x b. Cos 2x c. sin x d. sin2 x
9. In which of the following intervals the function $y(x) = x^3 - 3x^2 - 9x + 5$ is always decreasing?
   a. (-1,3) b. (-3,3) c. (-4,4) d. (-2,2)
10. The function $f(x) = \frac{x}{3} + \frac{3}{x}$ decreases in the interval
    a. (-3,3) b. $(-\infty,3)$ c. $(3,\infty)$ d. (-9,9)
11. The maximum value of $\frac{\log x}{x}$ is
    a. 1 b. $\frac{2}{3}$ c. e d. $\frac{1}{e}$
12. The maximum area of a rectangle that can be inscribed in a circle of radius 2 units is
    a. 8π sq. units b. 4π sq. units c. 8 sq. units d. 4 sq. units
13. The maximum value of xy subject to $x+y$=16 is
    a. 8 b. 16 c. 32 d. 64
14. $\lim_{x \to -2} \frac{\sin \pi x}{x^2 - 4} =$
    a. $-\frac{\pi}{4}$ b. $+\frac{\pi}{4}$ c. $-\frac{\pi}{2}$ d. $+\frac{\pi}{2}$
15. For the function $y = e^x - x$ at $x = 0$ is
    a. Concave up b. concave down
    c. an inflection point d. The function is not differentiable

12 STD Chapter 8 MATHS

1. If $y=(x^2-5)^3$, $x = 1$ $dx = 0.02$ then $dy =$
   a) 21,6 b) 2,16 c) 7,6 d) 0,72
2. If $y = x+\cos x$ and $x = \frac{5}{6} dx = 0.02$ then dy is
   a) 0.1 b) 0.01 c) 0.001 d) 0.025
3. If $f(x,y) = x\ cosxy$ find f_x at $\left(2, \frac{5}{4}\right)$
   a) $\frac{\pi}{2}$ b) $\frac{-\pi}{2}$ c) $\frac{\pi}{4}$ d) $\frac{-\pi}{4}$
4. If $u = \tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$ and $f = \tan u$ then the degree of the homogenous function f is
   a) 3 b)1 c) 2 d) 0
5. If $u = \log\left(\frac{x^2+y^2}{xy}\right)$ and $e^u = f$ then the degree of f is
   a) 0 b)1 c) 2 d) 4
6. If $u = y^x$ then $\frac{\partial u}{\partial y}$ is equal to
   a) $u\log y$ b) u logx c) xy^{x-1} d) yx^{y-1}
7. If $f(x,y) = x^2y + y^2x + xy + 5$ for all $\forall x, y \in \mathbb{R}^2$ then $\frac{\partial f}{\partial x}(-1,2)$ is
   a) 2 b) 0 c) 4 d) -4
8. An harmonic function u is a defined as $u(x,y) = e^{-2x}\ sin2y$ then $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$ is
   a) u b) –u c) 0 4) e^u
9. If $w(x,y) = y^3 - 3x^2y + x^3, x, y \in R$ then the linear approximation of w at (1,-1) is
   a) 4-3x b) 4x – 3 c) 0 4) -3
10. If $x = r\cos\theta, y = r\sin\theta$ then $\frac{\partial r}{\partial y}$ is equal to
   a) $\cos\theta$ b) $\sin\theta$ c) $\tan\theta$ d) $\operatorname{cosec}\theta$
11. If $u = \frac{1}{\sqrt{x^2+y^2}}$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to
   a) $\frac{1}{2}u$ b) u c) $\frac{3}{2}u$ d) u^{-1}
12. If $u = \log\left(\frac{x^2+y^2}{xy}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to
   a) 0 b) u c) 2u d) u^{-1}
13. Given $u = e^{x^3} + y^3$ then $\frac{\partial u}{\partial y}$ is equal to a)3u b) u c) $3x^2u$ d) $3y^2u$
14. If $u = ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy$ and $\sum \frac{\partial^2 u}{\partial x^2} = 0$ then
   a) $a = 0$ b) $a+b+c=0$ c) b = 0 4) c = 0
15. Linear approximation of $tan\ x$ at $x = 0$ is a) $-x$ b) x c) 0 d) $\frac{\pi}{4}$

12 STD **Chapter 9** **MATHS**

Applications of Integration

1. If $\int_0^a 3x^2 dx = 8$, then the value of a is

a) 1 b) 3 c) 4 d) 2

2. The value of $\int_0^1 x^2 e^{x^3}$ dx is

a) $\frac{1}{3}(1-3)$ b) $\frac{1}{2}(1-e)$ c) $\frac{1}{3}(e-1)$ d) $\frac{1}{2}(e-1)$

3. If $\int_0^a \sqrt{x}\,dx = 4a \int_0^{\frac{\pi}{4}} \sin 2x\,dx$ then a is a) 3 b) 4 c) 9 d) 12

4. The value of $\int_0^{\frac{\pi}{2}} \frac{\text{Sin}8x \log(\cot x)}{Cos2x}$ dx is a) $\frac{\pi}{2}$ b) 0 c) $\frac{\pi}{8}$ d) π

5. The value of $\int_0^1 \tan^{-1}\left(\frac{2x-1}{1+x-x^2}\right)dx$ is a) 0 b) $\frac{\pi}{4}$ c) π d) $\frac{\pi}{2}$

6. The area of the region bounded by the curve $y = x^2$ and the line $y = 4$ is

a) $\frac{10}{3}$ b) $\frac{32}{3}$ c) $\frac{20}{3}$ d) $\frac{25}{3}$

7. The value of $\int_0^{\frac{\pi}{2}} \frac{\sin x}{1+\cos^2 x}dx$ is a) $\frac{\pi}{4}$ b) $\frac{\pi}{2}$ c) π d) 2π

8. $\int_0^a xf(x)dx = \frac{a}{2}\int_0^a f(x)dx$ if

a) $f(2a-x) = f(x)$ b) $f(2a-x) = -f(x)$ c) $f(a-x) = f(x)$ d) $f(a-x) = -f(x)$

9. The area of the region bounded by the line $x - y = 1$ and $x - axis$ $x = -2$ and $x = 0$ is

a) 4 b) 3 c) 5 d) 7

10. The value of $\int_0^{\frac{\pi}{4}} \cos^8 2x$ a) $\frac{35\pi}{512}$ b) $\frac{15\pi}{512}$ c) $\frac{5\pi}{512}$ d) $\frac{45\pi}{512}$

11. The value of $\int_0^{\infty} x^8\, e^{\frac{-x}{3}}\, dx$ is a) $3^9 \angle 9$ b) $3^9 \angle 8$ c) $3^8 \angle 9$ d) $3^8 \angle 8$

12. The volume of the solid generated by revolving the region bounded by the curve $y = x^3$, about y – axis and between the lines *x* = 0 and *y* = 1 is

a) $\frac{3\pi}{5}$ b) $\frac{2\pi}{5}$ c) $\frac{\pi}{5}$ d) $\frac{4\pi}{5}$

13. The volume of the solid generated when the region enclosed by $y = \sqrt{x}$, y = 2 and *x* = 0 is revolved about the *y* – axis is

a) $\frac{32\pi}{5}$ b) $\frac{22\pi}{5}$ c) $12\frac{\pi}{5}$ d) $\frac{42\pi}{5}$

14. The value of $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} x\sin x\,dx$ is a) 0 b) 2 c) 4 d) 5

15. The value of $\int_0^1 x^2 e^x dx$ is a) e -1 b) e-3 c) e-2 d) e-4

1. The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^{\frac{3}{2}} - y^{\frac{1}{2}} - 8 = 0$ is (a) 6 (b) 4 (c) 3 (d) 2

2. The solution of the differential equation $\frac{dy}{dx} + \sin^2 y = 0$ is (a) $y = \cot x + c$ (b) $x = \cot y + c$ (c) $y + \cos y = c$ (d) $x + \cos x = c$

3. $y = Ae^{mx} + Be^{-mx}$ is a solution of the differential equation (a) $\frac{dy}{dx} + my = 0$ (b) $\frac{dy}{dx} - my = 0$ (c) $\frac{d^2y}{dx^2} + m^2 y = 0$ (d) $\frac{d^2y}{dx^2} - m^2 y = 0$

4. The integrating factor of the differential equation $\frac{dy}{dx} + y\cot x = 4x + x^2 \cot x$ is (a) $\log\cos x$ (b) $\log\sin x$ (c) $\cos x$ (d) $\sin x$

5. The differential equation $y\frac{dy}{dx} + x = c$ represents the family of (a) parabolas (b) circles (c) ellipses (d) hyperbolas

6. The solution of $\frac{dy}{dx} = \left(\frac{y}{x}\right)^{\frac{1}{3}}$ is (a) $y^{\frac{2}{3}} - x^{\frac{2}{3}} = c$ (b) $y^{\frac{1}{3}} - x^{\frac{1}{3}} = c$ (c) $x^{\frac{1}{3}} + y^{\frac{1}{3}} = c$ (d) $x^{\frac{2}{3}} + y^{\frac{2}{3}} = c$

7. The integrating factor of the differential equation $(x + y + 1)\frac{dy}{dx} = 1$ is (a) e^x (b) e^{-x} (c) e^y (d) e^{-y}

8. Consider the following statements : I. The general solution of $\frac{dy}{dx} = \varphi(x) + x$ is of the form $y = y(x) + c$, where c is an arbitrary constant. II. The degree of $\frac{dy}{dx} = \varphi(x) + x$ is 1.

Which of the above is/are true? (a) only I (b) only II (c) both I and II (d) neither I nor II

9. The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + e^{\frac{dy}{dx}} = 0$ is (a) 2 (b) 1 (c) 3 (d) not defined

10. The differential equation of the family of curves $y = A(x + B)^2$, where A and B are arbitrary constants is (a) $yy'' = (y')^2$ (b) $2yy'' = (y')^2$ (c) $2yy'' = y' + y$ (d) $2yy'' = y' - y$

11. The differential equation of the family of curves $y = A\cos ax + B\sin ax$, where A and B are arbitrary constants is (a) $y'' + a^2 y = 0$ (b) $y'' - a^2 y = 0$ (c) $y'' + ay = 0$ (d) $y'' - ay = 0$

12. The order and degree of the differential equation $y = x\left(\frac{dy}{dx}\right)^2 + \left(\frac{dx}{dy}\right)^2$ are respectively (a) 1, 4 (b) 4, 1 (c) 1, 1 (d) 2, 1

13. The slope of a curve at any point is the reciprocal of twice the ordinate at the point and it passes through the point (4,3). The equation of the curve is (a) $x^2 = y - 5$ (b) $x^2 = y + 5$ (c) $y^2 = x + 5$ (d) $y^2 = x - 5$

14. The solution of the differential equation $\frac{dy}{dx} = x + y, y(0) = 0$ is (a) $y = e^x + x - 1$ (b) $y = e^x - x - 1$ (c) $y = e^{-x} + x + 1$ (d) $y = e^{-x} - x - 1$

15. The equation of the curve passing through (1, 1) and satisfying the differential equation $\frac{dy}{dx} = \frac{2y}{x}, x > 0, y > 0$ is

(a) $y = 2x$ (b) $x = 2y$ (c) $y = x^2$ (d) $y^2 = x$

12 STD CHAPTER -11 PROBABILITY THEORY MATHS

1) A random variable X has the following probability distribution

X	-2	-1	0	1
$P(X=x_i)$	$\frac{1-a}{4}$	$\frac{1+2a}{4}$	$\frac{1-2a}{4}$	$\frac{1+a}{4}$

(1)'a' can have any real value (2) $\frac{1}{4}\le a\le\frac{1}{3}$ **(3)** $-\frac{1}{2}\le a\le\frac{1}{2}$ **(4)** $-1\le a\le 1$

2) A random variable X has the following probability distribution

X	2	5	6	7
$P(X)$	$\frac{1}{10}$	x	$\frac{3}{10}$	$\frac{4}{10}$

Find the mean and variance of X. (1) 5.4, 2 **(2) 5.8,2.16 (3)5.8,** 2 **(4) none**

3) A box contains 10 tickets. 2 **of the tickets carry a price of** `.$8$ **each,** $5$ **of the tickets carry a price of** `. 4 **each, and** 3 **of the tickets carry a price of** `.2 **each. If one ticket is drawn, what is the expected value of the price? (1) 3.4 (2) 2.8 (3) 3.1 (4) 4.2**

4) When a coin is tossed thrice, the probability distribution of X when X assumes values of getting no head, one head, two heads , three heads is formed. Variance on X is (1) $\frac{3}{4}$ **(2)** $\frac{3}{2}$ **(3)** 1 **(4)** 2

5) A random variable has its range $=\{0,1,2\}$ **and the probabilities are given by** $P(X=0)=3k^2$, $P(X=1)=4k-10k^2$, $P(X=2)=5k-1$, **where k is a constant. Find k. (1) 1 (2) 2 (3) 3 (4)** $\frac{2}{7}$

6) A random variable has its range $=\{0,1,2\}$ **and the probabilities are given by** $P(X=0)=3k^2$, $P(X=1)=4k-10k^2$, $P(X=2)=5k-1$, **where k is a constant. Find** $P(0<x<3)$.

(1) $\frac{1}{9}$ **(2)** $\frac{1}{2}$ **(3)** $\frac{8}{9}$ **(4)** 1

7) A random variable X takes the values of $0,1,2$. **It's mean is 1.2. If** $P(X=0)=0.3$, **then** $P(X=1)$ **is**
(1)0.3 (2)0.5 (3)0.2 (4)1

8) If the sum of the mean and the variance of the binomial distribution for 5 trials is 1.8, find the binomial distribution.

(1) $\binom{5}{r}\left(\frac{2}{5}\right)^r\left(\frac{3}{5}\right)^{5-r}$ **(2)** $\binom{5}{r}\left(\frac{4}{5}\right)^r\left(\frac{1}{5}\right)^{5-r}$ **(3)** $\binom{5}{r}\left(\frac{2}{3}\right)^r\left(\frac{1}{3}\right)^{5-r}$ **(4)** $\binom{5}{r}\left(\frac{1}{3}\right)^r\left(\frac{2}{3}\right)^{5-r}$

9) If the mean and variance of a binomial distribution are $\frac{15}{4}$ **and** $\frac{15}{16}$. **The number of trials is**

(1)5 (2)4 (3)16 (4)20

10) The probability of a success in a Bernoulli experiment is 0.40. The experiment is repeated 50 times. The mean of the binomial distribution of the number of successes is (1)12 (2)20 (3)30 (4)35

11) If X is a random variable in which distribution given below

X	-2	-1	0	1	2	3
$P(X)$	0.1	c	0.2	$2c$	0.3	c

The value of c and variance are (1) 0.1, 2.16 (2) 0.01, 2.16 **(3) 1,**2.16 (4) **None of the these**

12) If the mean and variance of a binomial variable X are respectively $\frac{35}{6}$ **and** $\frac{35}{36}$, **then the probability of** $X>6$ **is** **(1)** $\frac{1}{2}$ **(2)** $\frac{5^7}{6^7}$ **(3)** $\frac{1}{7^6}$ **(4)** 0

13) In a binomial distribution the probability of getting success is $\frac{1}{4}$ and the standard deviation is 3. Then its mean is (1) 6 (2) 8 (3) 10 (4) 12

14) Suppose X follows a binomial distribution with parameters n and p, where $0 < p < 1$. If $\frac{P(X = r)}{P(X = n - r)}$ is independent of n for every r, then p is

(1) $\frac{1}{2}$ (2) $\frac{1}{3}$ (3) $\frac{1}{4}$ (4) $\frac{1}{8}$

12 STD **Chapter 12** **MATHS**

1. Identify the open statement

   (1) x is a real number (2) Wish you a happy Pongal

   (3) Good night to all (4) Can you bring a book?

2. Which one of the following is not a statement in logic?

   (1) 7 is a prime (2) π is irrational

   (3) 9 is an odd number (4) Social Science is interesting

3. Let $p = A$ has passed the examination $q = A$ is sad. Then the statement : "It is not true that A passes therefore A is sad" in a symbolic form is

   (1) $\neg p \rightarrow q$ (2) $\neg p \rightarrow \neg q$ (3 $\neg(p \rightarrow \neg q)$ (4) $\neg(p \rightarrow q)$

4. The converse of the statement: "If it is raining then it is cool" is

   (1) If it is cool then it is raining (2) If it is not cool then it is raining

   (3) If it is not cool then it is not raining (4) If it is not raining then it is not cool

5. Which one of the following is logically equivalent to $\neg p \vee \neg q$?

   (1) $\neg p \wedge \neg q$ (2) $\neg(p \wedge q)$ (3) $\neg(p \vee q)$ (4) $p \vee q$

6. The proposition $p \rightarrow \neg(p \wedge q)$ is a

   (1) tautology (2) contradiction (3) contingency (4) either (1) or (2)

7. Let $A = \{20, 30, 40, 50, 60\}$. Which one of the following is not true?

   (1) $x \in A$ such that $x + 30 = 80$ (2) $x \in A$ such that $x + 20 < 50$

   (3) $x \in A$ such that $x + 20 < 90$ (4) $\forall x \in A$ such that $x + 60 \geq 90$

8. Let R be the relation over the set ¥ ×¥ and be defined by $(a,b)R(c,d) \leftrightarrow a + d = b + c$. Then the relation R is

   (1) Reflective only (2) Symmetry only

   (3) Transitive only (4) an equivalence relation

9. Which one of the following define on R^2 is not an equivalence relation?

   (1) $(x, y) \in R \times R \leftrightarrow x \geq y$ (2) $(x, y) \in R \times R \leftrightarrow x = y$

   (3) $(x, y) \in R \times R \leftrightarrow x - y$ is a multiple of 3 (4) $(x, y) \in R \times R \leftrightarrow |x - y|$ is even

10. If $A = \{1, 2, 3\}$ then the number of equivalence relations containing (1,2) is

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

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HSC (Second Year)

One mark creative questions

CHAPTER I

Application of matrices and determinants

1. If $P = \begin{pmatrix} 1 & \alpha & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 4 \end{pmatrix}$ is the adjoint of a 3×3 *matrix A and* $|A| = 6$, *then* $\boldsymbol{\alpha}$ *is equal to*
   a) 21 b) 11 c) 5 d) 0
2. If A is a 3×3 non-singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then BB^T is equal to
   a) $I + B$ b) I c) B^{-1} d) $(B^{-1})^T$
3. If $A = \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}$, then $A^n =$
   a) $\begin{bmatrix} 1 & n \\ 0 & 1 \end{bmatrix}$ b) $\begin{bmatrix} n & n \\ 0 & n \end{bmatrix}$ c) $\begin{bmatrix} n & 1 \\ 0 & n \end{bmatrix}$ d) $\begin{bmatrix} 1 & 1 \\ 0 & n \end{bmatrix}$
4. If ω is a complex cube root of unity, then the determinant $\begin{vmatrix} 2 & 2\omega & -\omega^2 \\ 1 & 1 & 1 \\ 1 & -1 & 0 \end{vmatrix} =$
   a) 0 b) 1 c) -1 d) None of these
5. The number of values of k for which the linear equations $4x + ky + 2z = 0$, $Kx + 4y + z = 0$, $2x + 2y + z = 0$ Posses a non zero solution is
   a) 1 b) zero c) 3 d) 2
6. If $A = \begin{bmatrix} 2 & b & 1 \\ b & b^2+1 & b \\ 1 & b & 2 \end{bmatrix}$ where $b > 0$ then the minimum value of $\frac{\det(A)}{b}$ is
   a) $\sqrt{3}$ b) $-\sqrt{3}$ c) $-2\sqrt{3}$ d) $2\sqrt{3}$
7. If the system of equations $x + y + z = 5$, $x + 2y + 3z = 9$, $x + 3y + \propto z = \beta$, has infinitely many solutions, then $\boldsymbol{\beta} - \boldsymbol{\alpha}$ equal to
   a) 5 b) 18 c) 21 d) 8
8. Let A and B be two invertible matrices of order 3×3. If $\det(ABA^T)$=8 and $\det(AB^{-1})$=8, then $\det(BA^{-1}B^T)$ is equal to
   a) 16 b) $\frac{1}{16}$ c) $\frac{1}{4}$ d) 1
9. If a,b,c are the roots of the equation $x^3 + 2x^2 + 1 = 0$, find $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$
   a) 8 b) -8 c) 0 d) 2

[redacted] [redacted]

10. If for matrix A=$\begin{bmatrix} cos\theta & 2sin\theta \\ sin\theta & cos\theta \end{bmatrix}$ $A^{-1} = A^T$, Then the number of possible values of θ $in[0 ,2\pi]$
   a) 2 b) 3 c) 1 d) 4
11. If A is a order of matrix 3 such that $|A|$=5 and B=adj A then the value of $\left||A^{-1}|(AB)^T\right|$ is equal to
   a) 5 b) 1 c) 25 d) $\frac{1}{25}$
12. If A=$\begin{bmatrix} 1 & -3 & 2 \\ 2 & k & 5 \\ 4 & 2 & 1 \end{bmatrix}$ is a singular matrix, then the value of k is
   a) -8 b) 7 c) 5 d) 2
13. If A =$\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ and $A^2 - 4A - nI = 0$, then the value of n is
   a) 2 b) -3 c) -1 d) 0
14. If E(θ)=$\begin{bmatrix} cos\theta & sin\theta \\ -sin\theta & cos\theta \end{bmatrix}$, then the value of E($\alpha$).$E(\beta)$ is
   a) E$(\alpha + 2\beta)$ b) E$(\alpha - \beta)$ c) E$(\alpha + \beta)$ d) None of these
15. If A=$\begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 1 \\ 0 & 0 & 2 \end{bmatrix}$, then the value of $|adj(adj\ A)|$ is
   a) 14 b) 16 c) 15 d) 12
16. If A=$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 3 & 1 & 2 \end{bmatrix}$ then the value of adj (adj A) nis
   a) 16A b) $-17A$ c) 15A d) -18A
17. If A=$\begin{bmatrix} p & q \\ -q & p \end{bmatrix}, B = \begin{bmatrix} r & s \\ -s & r \end{bmatrix}$ $then$
   a) AB=BA b) AB$\neq BA$ c) AB=$-BA$ d) None of these
18. If A= $\begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ then value of A^{-n} is
   a) $\begin{bmatrix} -1 & 0 \\ n & 1 \end{bmatrix}$ b) $\begin{bmatrix} 0 & -1 \\ 2 & n \end{bmatrix}$ c) $\begin{bmatrix} 1 & 0 \\ -n & 1 \end{bmatrix}$ d) None of these
19. If Δ= $\begin{vmatrix} a & b & c \\ x & y & z \\ p & q & r \end{vmatrix}$,then the value of $\begin{bmatrix} ka & kb & kc \\ kx & ky & kz \\ kp & kq & kr \end{bmatrix}$ is
   a) $k^2\Delta$ b) $k^3\Delta$ c) kΔ d) $k^4\Delta$
20. If 1,ω, ω^2 are the cube roots of unity, then $\Delta = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{vmatrix}$ is equal to
   a) ω^2 b) 0 c) 1 d) ω
21. If $A^2 - A + I = 0$, then the inverse of A is
   a) A+I b) A c) A$-I$ d) I $-$ A
22. If A and B are square matrices of size $n \times n$ such that $A^2 - B^2 = (A - B)(A + B)$, then which of the following will be always true?
   a) A=B ***b)*** AB = BA c) either of A or B is a zero matrix
   d) Either of A or B is identity matrix

23. If the system of equations $x - ky - z = 0, kx - y - z = 0, x + y - z = 0$ has a non-zero solution, then the possible values of k are
   a) -1,2 b) 1,2 c) 0,1 d) -1,1

[redacted] [redacted]

24. The number of values of k for which the system of equations $(k+y)x+8y=4k; kx+(k+3)y=3k-1$ has infinitely many solutions is
    a) 0 b) 1 c) 2 d) infinite
25. If the system of equations $x+ay=0, az+y=0$ *and* $ax+z=0$ has infinite solutions, then the value of a is
    a) -1 b) 1 c) 0 d) no real value
26. If K $\begin{bmatrix}-1 & 2 & 2\\ 2 & -1 & 2\\ 2 & 2 & -1\end{bmatrix}$ is an orthogonal matrix then the value of **K** is
    a) $\pm\frac{1}{2}$ b) $\pm\frac{1}{3}$ c) ± 2 d) ± 3
27. If the system of linear equations $x+2ay+az=0; x+3by+bz=0; x+4cy+cz=0$; has a non zero solution, then a, b , c
    a) Satisfy $a+2b+3c=0$ c) are in G.P
    b) Are in A.P d) are in H.P
28. Let A=$\begin{pmatrix}5 & 5\alpha & \alpha\\ 0 & \alpha & 5\alpha\\ 0 & 0 & 5\end{pmatrix}$. If $|A^2|$=25,then $|\boldsymbol{\alpha}|$equals
    a) 1/5 b) 5 c) 5^2 d) 1
29. Let a, b, c be any real numbers. Suppose that there are real numbers x, y, z not all zero such that $x=cy+bz, y=az+cx,$ *and* $z=bx+ay$. Then $a^2+b^2+c^2+2abc$ is equal to
    a) 2 b) -1 c) 0 d) 1
30. A = $\begin{bmatrix}2 & 1\\ 5 & 3\end{bmatrix}$, B = adj A and C =2A then $\frac{|adj\,B|}{|C|}$ =
    a) $\frac{1}{3}$ b) $\frac{1}{9}$ c) $\frac{1}{4}$ d) 1
31. Let A be a 3 × 3 matrix and B its adjoint matrix If $|B|=16$, *then* $|\boldsymbol{A}|$ =
    a) ± 2 b) ± 4 c) ± 8 d) ± 12
32. If A^T is the transpose of a square matrix A, then
    a) $|A|\neq|A^T|$ ***b)*** $|A|=|A^T|$ c) $|A|+|A^T|=0$ d) $|A|-|A^T|=0$
33. If A is a square matrix of order 2, then $|adj\ A|$ =
    a) $|A|^2$ b) $|A|^3$ ***c)*** $|A|$ d) $|A^{-1}|$
34. If $|adj\ (adj\ A)|=|A|^4$, *then* the order of the square matrix A is
    a) 3 b) 4 c) 2 d) 5
35. The system of linear equations $x+y+z=2,\ 2x+y-z=3,\ 3x+2y+kz=4$ has a unique solution if
    a) $-1<k<1$ b) $-2<k<2$ c) $k\neq 0$ d) $k\neq 1$
36. If $f(\alpha)=\begin{bmatrix}\cos\alpha & \sin\alpha\\ -\sin\alpha & \cos\alpha\end{bmatrix}$ and if α,β,γ are angle of a triangle, then $f(\alpha).f(\beta).f(\gamma)$ equal to.
    a) I_2 b) $-I_2$ c) 0 d) None of these
37. Let A=$\begin{bmatrix}1 & -1 & 1\\ 2 & 1 & -3\\ 1 & 1 & 1\end{bmatrix}$ and 10B = $\begin{bmatrix}4 & 2 & 2\\ -5 & 0 & \alpha\\ 1 & -2 & 3\end{bmatrix}$ If B is the inverse of matrix A, then $\boldsymbol{\alpha}$ is
    a) 5 b) -1 c) 2 d) -2

38. Let A= $\begin{bmatrix} 0 & 2q & r \\ p & q & -r \\ p & -q & r \end{bmatrix}$ if $AA^T = I_3$ then $|\boldsymbol{p}|$ is

a) $\frac{1}{\sqrt{3}}$ b) $\frac{1}{\sqrt{2}}$ c) $\frac{1}{\sqrt{5}}$ d) $\frac{1}{\sqrt{6}}$

39. Let P = $\begin{bmatrix} 1 & 0 & 0 \\ 3 & 1 & 0 \\ 9 & 3 & 1 \end{bmatrix}$ and Q = $[q_{ij}]$ be two 3 × 3 matrix such that $Q - P^5 = I_3$. Then $\frac{q_{21}+q_{31}}{q_{32}}$ is equal to

a) 10 b) 135 c) 9 d) 15

40. A=$[a_{ij}]_{m\times n}$ is a square matrix if

a) $m < n$ b) $m > n$ c) m = n d) *None of these*

41. If A=$\begin{bmatrix} cos\alpha & -sin\alpha \\ sin\alpha & cos\alpha \end{bmatrix}$,then A+A'= I , If the value of '$\boldsymbol{\alpha}$' is

a) $\frac{\pi}{6}$ b) $\frac{\pi}{3}$ c) π d) $3\frac{\pi}{2}$

42. If the matrix A is both symmetric and skew symmetric, then

a) A is a diagonal matrix b) A is a zero matrix

b) A is a square matrix d) None of these.

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

a) A b) $I - A$ c) I d) 3A

44. If A=$\begin{bmatrix} \alpha & \beta \\ \alpha & -\alpha \end{bmatrix}$is such that $A^2 = I$ ther

a) $1 + \alpha^2 + \beta\alpha = 0$ b) $1 - \alpha^2 + \beta\alpha = 0$

c) $1 - \alpha^2 - \beta\alpha = 0$ d) $1 + \alpha^2 - \beta\alpha = 0$

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

a) AB = BA b) AB = BA = 0 c) AB = 0,BA = I d) AB = BA = I

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HSC (Second Year)

One mark creative questions

CHAPTER 2

Complex Numbers

1. If **n** is an odd integer then find the value of $(1+i)^{6n}+(1-i)^{6n}$ is

   a) 0 b) 2 c) -2 d) None of these

2. If $\frac{2z_1}{2z_2}$ is a purely imaginary number, then $\left|\frac{z_1-z_2}{z_1+z_2}\right|$ =

   a) $\frac{3}{2}$ b) 1 c) $\frac{2}{3}$ d) $\frac{4}{9}$

3. $z\epsilon C, |z|=1$ and argument θ then $\arg\left(\frac{1+z}{1+\bar{z}}\right)$

   a) $-\theta$ b) $\frac{\pi}{2}-\theta$ c) θ d) $\pi-\theta$

4. If z=$\frac{cos\theta+isin\,\theta}{cos\theta-isin\theta}$, $\frac{\pi}{4}<\theta<\frac{\pi}{2}$ then arg (z)=

   a) 2θ b) $2\theta-\pi$ c) $\pi+2\theta$ d) None

5. For all complex numbers z_1, z_2 satisfying $|z_1|=12$ and $|z_2-3-4i|$=5, the minimum value of $|z_1-z_2|$ is

   a) 1 b) 4 c) 2 d) 5

6. If A,B,C are angle of a triangle then find the value of $(\cos A+isin\,A)(\cos B+isin\,B)(\cos C+isin\,C)$

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

7. If $\arg(z)<0$, then $\arg(-z)-arg(z)$. equal to

   a) π b) $-\pi$ c) $\frac{-\pi}{2}$ d) $\frac{\pi}{2}$

8. If $|z|=1$ and $z\neq\pm1$ then all the values of $\frac{z}{1-z^2}$ lie on

   a) A lie not passing through the origin b) $|z|=2$

   c) the x axis d) the $y-axis$

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9. Let $z = \cos\theta + i\sin\theta$ then the value of $\sum_{m=1}^{15} Im(Z^{2m-1})$ at $\theta = 2^o$ is

a) $\frac{1}{\sin 2^0}$ b) $\frac{1}{3\sin 2^0}$ c) $\frac{1}{2\sin 2^0}$ d) $\frac{1}{4\sin 2^0}$

10. Sum of series $i^2 + i^4 + i^6 + \dots\dots\dots\dots (2n+1)$ is

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

11. Value of $\frac{i^{592}+i^{590}+i^{588}+i^{586}+i^{584}}{i^{582}+i^{580}+i^{578}+i^{576}+i^{574}} - 1$ is

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

12. If z is a complex number such that $z^2 = (\bar{z})^2$, then

a) Z is purely real

b) Z is purely imaginary

c) Z is either purely real or purely imaginary

d) None of these

13. If $z = x + iy$ and $\left|\frac{z-5i}{z+5i}\right| = 1$ then z lies on

a) x –axis b) y-axis c) line y = 5 d) None of these

14. Modulus of z = $\frac{(1+i\sqrt{3})(\cos\theta+i\sin\theta)}{2(1-i)(\cos\theta-i\sin\theta)}$ is

a) $\frac{1}{\sqrt{3}}$ b) $-\frac{1}{\sqrt{2}}$ c) $\frac{1}{\sqrt{2}}$ d) 1

15. If $z_1 = 3 + i$ and $z_2 = i - 1$, then

a) $|z_1 + z_2| > |z_1| + |z_2|$

b) $|z_1 + z_2| < |z_1| - |z_2|$

c) $|z_1 + z_2| \le |z_1| + |z_2|$

d) $|z_1 + z_2| < |z_1| + |z_2|$

16. Let z is any complex number such that $|z| = 4$ and arg $(z) = \frac{5\pi}{6}$, then value of z is

a) $-2\sqrt{3} - 2i$ b) $2\sqrt{3} - i$ c) $\sqrt{2} + 3i$ d) $-2\sqrt{3} + 2i$

17. If $\sqrt{3}$ +i = $(a+ib)(c+id)$, then $\tan^{-1}\left(\frac{b}{a}\right) + \tan^{-1}\left(\frac{d}{c}\right)$ has the value

a) $\frac{\pi}{3} + 2n\pi, n \in Z$ b) $n\pi + \frac{\pi}{6}, n \in Z$ c) $n\pi - \frac{\pi}{3}, n \in Z$ d) $2n\pi - \frac{\pi}{3}, n \in Z$

18. If z = $\frac{1}{i}$ then arg $(\bar{z})$ is

a) $\frac{\pi}{3}$ b) $\frac{\pi}{6}$ c) $\frac{\pi}{2}$ d) $\frac{2\pi}{3}$

19. If z = $\frac{3-i}{2+i} + \frac{3+i}{2-i}$ then value of arg (zi) is

a) 0 b) $\frac{\pi}{6}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$

20. If $\frac{1}{x} + x = 2\cos\theta$, then value of $x^n + \frac{1}{x^n}$ is

a) $2\sin\theta$ b) $2\sin n\theta$ c) $2\cos n\theta$ d) $n\sin\theta$

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21. Find the value of i^i

a) $e^{-\pi/2}$ b) $e^{\pi/2}$ c) $e^{\pi/4}$ d) none of these

22. If x = a , y = b$\omega, z = c\omega^2$, where ω is a complex cube root of unity, then the value of $\frac{x}{a} + \frac{y}{b} + \frac{z}{c}$ is

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

23. Value of $\frac{a+b\omega+c\omega^2}{b+c\omega+a\omega^2} + \frac{a+b\omega+c\omega^2}{c+a\omega+b\omega^2}$ is

a) 2 b) -1 c) 1 d) 3

24. If $\left(\frac{1+i}{1-i}\right)^x$ = 1 then

a) x =2n+1, where n is any positive integer

b) x = 4n , where n is any positive integer

c) x = 2n , where n is any positive integer

d) x = 4n+1,where n is any positive integer

25. Let z and w be complex numbers such that $\bar{z} + i\bar{w} = 0$ and $arg\ zw = \pi$. Then arg z equals

a) $\frac{5\pi}{4}$ b) $\frac{\pi}{2}$ c) $\frac{3\pi}{4}$ d) $\frac{\pi}{4}$

26. If z = $x - i\,y$ and $z^{\frac{1}{3}} = p + iq$, then $\left(\frac{x}{p} + \frac{y}{q}\right)/(p^2 + q^2)$ is equal to

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

27. If $z^2 + z + 1 = 0$, where z is complex number, then the value of $\left(z + \frac{1}{z}\right)^2 + \left(z^2 + \frac{1}{z^2}\right)^2 + \left(z^3 + \frac{1}{z^3}\right)^2 + \ldots\ldots\ldots + \left(z^6 + \frac{1}{z^6}\right)^2$ is

a) 18 b) 54 c) 6 d) 12

28. If $|z + 6| \leq 3$, then the maximum value of $|z + 1|$ is

a) 6 b) 0 c) 4 d) 10

29. If $\omega(\neq 1)$ be a cube root of unity and $(1 + \omega^2)^n$ =$(1 + \omega^4)^n$, then the last positive value of n is

a) 2 b) 3 c) 5 d) 6

30. $(1 + i)^8 + (1 - i)^8$ equal to

a) 2^8 b) 2^5 c) $2^4\ cos\frac{\pi}{4}$ d) $2^8 cos\frac{\pi}{8}$

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31. If $\frac{c+i}{c-i} = a + ib$, where a,b,c, are real, then $a^2 + b^2$ is equal to:
  a) 7 b) 1 c) c^2 d) $-c^2$
32. The smallest positive integer n for which $(1+i)^{2n} = (1-i)^{2n}$ is
  a) 1 b) 2 c) 3 d) 4
33. If $\omega = \frac{-1+\sqrt{3i}}{2}$ then $(3 + \omega + 3\omega^2)^4$ is
  a) 16 b) -16 c) 16ω d) $16\omega^2$
34. The fourth root of $\frac{1}{2}$ +i$\frac{\sqrt{3}}{2}$ is
  a) $cis\,\frac{x}{12}$ b) $cis\,\frac{\pi}{2}$ c) $cis\,\frac{\pi}{6}$ d) $cis\,\frac{\pi}{3}$
35. If $1, \omega, \omega^2$ are the roots of unity, then $(1 - 2\omega + \omega^2)^6$ is equal to:
  a) 729 b) 246 c) 243 d) 81
36. The locus represented by $|z-1| = |z+i|$ is
  a) a circle of radius 1
  b) an ellipse with foci at (1,0) as diameter.
  c) a straight line through the origin
  d) a circle on the line joining (1,0), (0,1) as diameter.
37. The modulus and amplitude of $\frac{1+2i}{1-(1-i)^2}$
  a) $\sqrt{2}$ and $\frac{\pi}{6}$ b) 1 and 0 c) 1 and $\frac{\pi}{3}$ d) 1 and $\frac{\pi}{4}$
38. If z = $(\lambda + 3) + i\sqrt{5 - \lambda^2}$ then the colours of z is a
  a) Circle b) sphere c) straight line d) Non of these
39. $A + iB$ form of $\frac{(\cos x + i\sin x)(\cos y + i\sin y)}{(\cot u + i)(1 + i\tan v)}$ is equal to:
  a) Sin u cos v $[\cos(x+y-u-v) + i\sin(x+y-u-v)]$
  b) Sin u cos v$[\cos(x+y+u+v) + i\,sin(x+y+u+v)]$
  c) Sin u cos v$[cos(x+y+u+v) - i\sin(x+y-u+v)]$
  d) None of these
40. $\left(\frac{1}{1-2i} + \frac{3}{1+i}\right)\left(\frac{3+4i}{2-4i}\right)$ is equal to:
  a) $\frac{1}{2} + \frac{9}{2}i$ b) $\frac{1}{2} - \frac{9}{2}i$ c) $\frac{1}{4} - \frac{9}{4}i$ d) $\frac{1}{4} + \frac{9}{4}i$
41. The complex number $\left(\frac{1+2i}{1-i}\right)$ lies in:
  a) I quadrant b) II quadrant c) III quadrant d) IV quadrant
42. Amplitude of $\frac{1+\sqrt{3}i}{\sqrt{3}+1}$ is :
  a) $\frac{\pi}{6}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$
43. If $z = x + iy$, $z^{1/3} = a - ib$, then $\frac{x}{a} - \frac{y}{b} = k(a^2 - b^2)$ where k is equal to
  a) 1 b) 2 c) 3 d) 4

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44. If z_1, z_2 and z_3 are complex numbers such that $|z_1| = |z_2| = |z_3| = \left|\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3}\right| = 1$, then $|z_1 + z_2 + z_3|$ is

a) equal to 1 b) less than 1 c) greater than 3 d) equal to 3

45. If z = $re^{i\theta}$, then the value of $\left|e^{iz}\right|$ is

a) $e^{r\cos\theta}$ b) $e^{-r\cos\theta}$ c) $e^{r\sin\theta}$ d) $e^{-r\sin\theta}$

46. Value of $\frac{(\cos\theta + i\sin\theta)^4}{(\cos\theta - i\sin\theta)^3}$ is

a) Cos $5\theta + i\sin 5\theta$ b) $\cos 7\theta + i\sin 7\theta$ c) $\cos 4\theta + i\sin 4\theta$ d) $\cos\theta + i\, sin\,\theta$

47. If cos$\alpha + cos\beta + cos\gamma = 0 = sin\alpha + sin\beta + sin\gamma$, then value of sin $3\alpha + sin3\beta + sin3\gamma$ is

a) $-3\sin(\alpha + \beta + \gamma)$ b) $2\cos(\alpha + \beta + \gamma)$ c) $2\sin(\alpha + \beta + \gamma +)$ d) $3\sin(\alpha + \beta + \gamma)$

48. z and ω are two non-zero complex numbers such that $|z| = |\omega|$ and arg z + Arg $\omega = \pi$ then z equals

a) $\overline{\omega}$ b) $-\overline{\omega}$ c) ω d) $-\omega$

49. If $|z - 4| < |z - 2|$, its solution is given by

a) $\mathrm{Re}(z) > 0$ b) $\mathrm{Re}(z) < 0$ c) $Re(z) > 3$ d) $Re(z) > 2$

50. If $\omega = \frac{z}{z - \frac{1}{3}i}$ and $|\omega|$=1,then z lies on

a) An ellipse b) a circle c) a straight line d) a parabola

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H SC (Second Year)

One mark creative questions

CHAPTER 3

Theory of Equations

1. If one root is square of the other root of the equation $x^2 + px + q = 0$ then relation between p and q is
   a) $\mathbf{p^3 - q(3p-1) + q^2 = 0}$ c) $p^3 + q(3p-1) + q^2 = 0$
   c) $p^2 - q(3p+1) + q^2 = 0$ d) $p^3 + q(3p+1) + p^2 = 0$
2. If $\frac{1}{3-4i}$ is a root of $ax^2 + bx + c = 0$, a,b,c $\in R, a \neq 0$, then
   a) $\mathbf{b + 6c = 0}$ b) b = 6c c) a+25c = 0 d) $b^2 = bc$
3. If $1 - p$ is a root of the quadratic equation $x^2 + px + 1 - p = 0$ then its roots are
   a) 0,1 b) -1,1 **c) 0, -1** d) -2,1
4. If α, β are the roots of $(x-a)(x-b) + c = 0, c \neq 0$, then roots of $(\alpha\beta - c)x^2 + (\alpha + \beta)x + 1 = 0$ are
   a) $\frac{1}{a}, \frac{1}{b}$ **b) $\frac{-1}{a}, \frac{-1}{b}$** c) $\frac{1}{a}, \frac{-1}{b}$ d) $\frac{-1}{a}, \frac{1}{b}$
5. If α, β are roots $x^2 + px + q = 0$, then value of $\alpha^3 + \beta^3$ is
   a) $3pq + p^3$ **b) $3pq - p^3$** c) $3pq$ d) $p^3 - 3pa$
6. Sum of the roots of the equation $4^x - 3(2^{x+3}) + 128 = 0$
   a) 5 b) 6 **c) 7** d) 8
7. If $p, q \in R$ and $2 + \sqrt{3}i$ a root of $x^2 + px + q = 0$, then
   a) $p = -2, q = \sqrt{3}$ **b) $p = -4, q = 7$** c) $p = 3, q = 2$ d) $p = -4, q = 2$
8. If $4^x - 3^{x-\frac{1}{2}} = 3^{x+\frac{1}{2}} - 2^{2x-1}$ then value of x is equal to
   a) $\frac{5}{2}$ b) 2 **c) $\frac{3}{2}$** d) 1
9. If the product of the roots of the equation $x^2 - 5kx + 2e^{4lnk} - 1 = 0$ is 31, then sum of the root is
   a) -10 b) 5 c) -8 **d) 10**
10. The number of real solution of the equation $x^2 - 3|x| + 2 = 0$ is
    a) **4** b) 1 c) 3 d) 2
11. Let two numbers have arithmetic mean 9 and geometric mean 4. Then these numbers are roots of the quadratic equation.
    a) $x^2 + 18x - 16 = 0$ **b) $x^2 - 18x + 16 = 0$**
    c) $x^2 + 18x + 16 = 0$ c) $x^2 - 18x - 16 = 0$

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12. If one root of the equation $x^2 + px + 12 = 0$ is 4 while equation $x^2 + px + q = 0$ has equal roots, then the value of q is

a) 3 b) 12 **c) $\frac{49}{4}$** d) 4

13. If the difference between the roots of $x^2 + ax + 1 = 0$ is less then $\sqrt{5}$, then set of possible values of 'a' lie in the interval

a) **$(-3, 3)$** b) $(-3, \alpha)$ c) $(3, \alpha)$ d) $(-\alpha, -3)$

14. If α *and* β are the roots of the equation $x^2 + px + \frac{3}{4}p = 0$ such that $|\alpha - \beta| = \sqrt{10}$, the p belongs to the set.

a) $\{2, -5\}$ b) $\{-3, 2\}$ **c) $\{-2, 5\}$** d) $\{-3, 5\}$

15. Let α *and* β be the roots of the equation $px^2 + qx + r = 0$ $p \neq 0$. If p, q, r are in A.P and $\frac{1}{\alpha} + \frac{1}{\beta} = 4$, then value of $|\alpha - \beta|$ is.

a) $\frac{1}{9}\sqrt{61}$ b) $\frac{2}{9}\sqrt{17}$ c) $\frac{1}{9}\sqrt{32}$ **d) $\frac{2}{9}\sqrt{13}$**

16. If α *and* β are the roots of $x^2 - 4\sqrt{2}kx + 2e^{4lnk} - 1 = 0$ for some k, and $\alpha^2 + \beta^2 = 66$, then $\alpha^3 + \beta^3$ is equal to

a) $248\sqrt{2}$ **b) $280\sqrt{2}$** c) $-32\sqrt{2}$ d) $-280\sqrt{2}$

17. Let α *and* β be the roots of equation $x^2 - 6x - 2 = 0$. If $an = \alpha^n - \beta^n, for\ n \geq 1$, then the value of $\frac{a_{10} - 2a_8}{2a_9}$ is equal to

a) 6 b) -6 **c) 3** d) -3

18. For the equation $3x^2 + px + 3 = 0$ $p > 0$, If one of the root is square of the other, then p is equal to

a) $\frac{1}{3}$ b) 1 **c) 3** d) $\frac{2}{3}$

19. The roots of the given equation $(p - q)x^2 + (q - r)x + r - p = 0$ are

a) $\frac{p-q}{r-p}, 1$ b) $\frac{q-r}{p-q}, 1$ **c) $\frac{r-p}{p-q}, 1$** d) None of these

20. If α, β are the roots of $ax^2 + bx + c = 0$, then $\alpha\beta^2 + \alpha^2\beta + \alpha\beta$ equal

a) **$\frac{c(a-b)}{a^2}$** b) 0 c) $\frac{-bc}{a^2}$ d) abc

21. If 1,1α are the roots of $x^3 - 6x^2 + 9x - 4 = 0$, then α is equal to

a) 1 b)2 c) 3 **d) 4**

22. If α, β, γ are roots of the equations $x^3 - 10x^2 + 6x - 8 = 0$ then $\alpha^2 + \beta^2 + \gamma^2$ is

a) 26 b) 42 c) 10 **d) 88**

23. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3$ and $\beta^2 = 5\beta - 3$ then the equation having $\frac{\alpha}{\beta}$ *and* $\frac{\beta}{\alpha}$ as its roots is

a) **$3x^2 - 19x + 3 = 0$** b) $3x^2 + 19x - 3 = 0$

c) $3x^2 - 19x - 3 = 0$ d) $x^2 - 5x + 3 = 0$

24. Difference between the corresponding roots of $x^2 + ax + b = 0$ and $x^2 + bx + a = 0$ is same and $a \neq b$, then

a) **$a + b + 4 = 0$** b) $a + b - 4 = 0$ c) $a - b - 4 = 0$ d) $a - b + 4 = 0$

25. The value of 'a' for which the sum of the squares of the roots of the equation $x^2-(a-2)x-a-1=0$ assume the least value is
    a) **1** b) 0 c) 3 d) 2
26. If roots of the equation $x^2-bx+c=0$ be two consecutive integers, then b^2-4c equals
    a) -2 b) 3 c) 2 **d) 1**
27. If the roots of the quadratic equation $x^2+px+q=0$ are tan 30° and tan 15° respectively then the value of $2+q-p$ is
    a) 2 **b) 3** c) 0 d) 1
28. If α,β are roots of $ax^2+bx+c=0$ then roots of $a^3x^2+abc\,x+c^3=0$
    a) $\alpha\beta,\alpha+\beta$ **b) $\alpha^2\beta,\alpha\beta^2$** c) $\alpha\beta,\alpha^2\beta^2$ d) α^3,β^3
29. The sum of all the real roots of the equation $|x-2|^2+|x-2|-2=0$
    a) 7 **b) 4** c) 1 d) None of these
30. The value of 'a' for which one root of the quadratic equation $(a^2-5a+3)x^2+(3a-1)x+2=0$ is twice as large as the other is
    a) $\frac{-2}{3}$ b) $\frac{1}{3}$ c) $\frac{-1}{3}$ **d) $\frac{2}{3}$**
31. In a triangle PQR $\angle R=\frac{\pi}{2}$. If $\tan\left(\frac{P}{2}\right)$ and $\tan\left(\frac{Q}{2}\right)$ are the roots of $ax^2+bx+c=0, a\neq 0$ then
    a) $b=c$ b) b = a + c c) a = b + c **d) c = a + b**
32. If p and q are non-zero real number such that $\alpha^3+\beta^3=-p$ and $\alpha\beta=q$, then a quadratic equation whose roots are $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$ is
    a) $px^2-qx+p^2=0$ **b) $qx^2+px+q^2=0$**
    b) $px^2+qx+p^2=0$ d) $qx^2-px+q^2=0$
33. Let x,y,z be positive real numbers such that $x+y+z=12$ and $x^3y^4z^5=(0.1)(600)^3$. Then $x^3+y^3+z^3$ is equal to
    a) 342 **b) 216** c) 258 d) 270
34. If tan 25° and tan 20° are roots of the quadratic equation $x^2+2px+q=0$ then $2p-q$ is equal to
    a) -2 **b) -1** c) 0 d) 1
35. If sum of the roots of the equation $(a+1)x^2+(2a+3)x+(3a+4)=0$ is -3, then the product of the root is
    a) 1 **b) 4** c) 2 d) -2

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HSC (Second Year)

One mark creative questions

CHAPTER 4

Inverse Trigonometric Functions

1. If $cos^{-1}\left(\frac{1}{x}\right) = \theta$, then tan$\theta$ is equal to
   a) $\frac{1}{\sqrt{x^2-1}}$ b) $\sqrt{x^2+1}$ c) $\sqrt{1-x^2}$ d) $\sqrt{x^2-1}$
2. The value of $1 + cot^2(sin^{-1}x)$is
   a) $\frac{1}{2x}$ b) x^2 c) $\frac{1}{x^2}$ d) $\frac{2}{x}$
3. cos $(\tan^{-1}x)$ is equal to
   a) $\sqrt{1+x^2}$ b) $\frac{1}{\sqrt{1+x^2}}$ c) $1+x^2$ d) None
4. The value of $\tan\left(sec^{-1}\sqrt{1+x^2}\right) =$
   a) $\frac{1}{x}$ b) x   c) $\frac{1}{\sqrt{1+x^2}}$ d) $\frac{x}{\sqrt{1+x^2}}$
5. The value of $sec^{-1}\left(sec(-30)\right)$ is
   a) -60° b) -30° c) 30° d) 150°
6. $tan^{-1}\frac{1}{\sqrt{x^2-1}}$ is equal to
   a) $\frac{\pi}{2} + cosec^{-1}x$ b) $\frac{\pi}{2} + sec^{-1}x$ c) $cosec^{-1}x$ d) $sec^{-1}x$
7. $sec^2(tan^{-1}2) + cosec^2(cot^{-1}3) =$
   a) 5   b) 13   c) 15   d) 6
8. If $\sin\left(sin^{-1}\frac{1}{5} + cos^{-1}x\right)$=1 then x is equal to
   a) 1   b) 0   c) $\frac{4}{5}$ d) $\frac{1}{5}$
9. If $sin^{-1}x = \theta + \beta$ and $sin^{-1}y = \theta - \beta$ then $1 + xy =$
   a) $sin^2\theta + sin^2\beta$ b) $sin^2\theta + cos^2\beta$ c) $cos^2\theta + cos^2\beta$ d) $cos^2\theta + sin^2\beta$
10. The value of $\left[\sin\left(tan^{-1}\frac{3}{4}\right)\right]^2 =$
    a) $\frac{3}{5}$ b) $\frac{5}{3}$ c) $\frac{9}{25}$ d) $\frac{25}{9}$
11. The value of x which satisfies the equation $tan^{-1}x = sin^{-1}\left(\frac{3}{\sqrt{10}}\right)$ is
    a) 3   b) -3 c) $\frac{1}{3}$ d) $\frac{-1}{3}$

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12. If $\sin\left(cot^{-1}(x+1)\right) = cos(tan^{-1}x)$ then x is

a) $\frac{-1}{2}$ b) $\frac{1}{2}$ c) 0 d) $\frac{9}{4}$

13. The value of $cos\left(2cos^{-1}\frac{1}{5} + sin^{-1}\frac{1}{5}\right) =$

a) $\frac{2\sqrt{6}}{5}$ b) $\frac{-2\sqrt{6}}{5}$ c) $\frac{1}{5}$ d) $\frac{-1}{5}$

14. If $sin^{-1}x + sin^{-1}y = \frac{2\pi}{3}$, ther $cos^{-1}x + cos^{-1}y =$

a) $\frac{2\pi}{3}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{6}$ d) π

15. If $cos^{-1}x + cos^{-1}y + cos^{-1}z = 3\pi$, then $xy + yz + zx =$

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

16. If $tan^{-1}x + tan^{-1}y + tan^{-1}z = \pi$ then $\frac{1}{xy} + \frac{1}{yz} + \frac{1}{zx} =$

a) 0 b) 1 c) $\frac{1}{xyz}$ d) xyz

17. The value of $sin\left(2tan^{-1}\left(\frac{1}{3}\right)\right) + \cos\left(tan^{-1}2\sqrt{2}\right) =$

a) $\frac{16}{15}$ b) $\frac{14}{15}$ c) $\frac{12}{15}$ d) $\frac{11}{15}$

18. The value of $sin\left(3sin^{-1}\frac{1}{5}\right) =$

a) $\frac{71}{125}$ b) $\frac{74}{125}$ c) $\frac{3}{5}$ d) $\frac{1}{2}$

19. The principal value of $tan^{-1}\left(cot\frac{35}{4}\right) =$

a) $\frac{-3\pi}{4}$ b) $\frac{3\pi}{4}$ c) $\frac{-\pi}{4}$ d) $\frac{\pi}{4}$

20. If $f(x)$=$2tan^{-1}x + sin^{-1}\left(\frac{2x}{1+x^2}\right), x > 1$ Then $f(5)$ is equal to

a) $\frac{\pi}{2}$ b) $tan^{-1}\left(\frac{65}{156}\right)$ c) $4tan^{-1}5$ d) π

21. The value of $Cot\left[\sum_1^{19}\cot^{-1}\left(1+\sum_{p=1}^{n}2p\right)\right]$

a) $\frac{19}{20}$ b) $\frac{20}{19}$ c) $\frac{19}{21}$ d) $\frac{21}{19}$

22. The value of $\tan\left(coa^{-1}\frac{4}{5} + tan^{-1}\frac{2}{3}\right)$ is

a) $\frac{6}{17}$ b) $\frac{17}{6}$ c) $\frac{16}{7}$ d) None of these

23. Find the value of $\cos tan^{-1}\left(sin(cot^{-1}x)\right)$ is

a) $\sqrt{\frac{x^2+1}{x^2+2}}$ b) $\sqrt{\frac{x^2+2}{x^2+1}}$ c) $\frac{x}{\sqrt{x^2+2}}$ d) $\frac{x}{x^2+1}$

24. If x, y and z are in A.P and $tan^{-1}x, tan^{-1}y, tan^{-1}z$ are also in A.P then

a) x=y=z b) $2x = 3y = 6z$ c) $6x = 3y = 2z$ d) $6x = 4y = 3z$

25. If $sin^{-1}x - cos^{-1}x = \frac{\pi}{6}$, then value of x is

a) $\frac{\sqrt{3}}{2}$ b) $\frac{1}{\sqrt{2}}$ c) $\sqrt{3}$ d) 1

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26. If $tan^{-1}2$ and $tan^{-1}3$ be two angles of a triangle, then value of third angle is

a) $\frac{\pi}{3}$ b) $\frac{2\pi}{3}$ c) $\frac{\pi}{6}$ d) $\frac{\pi}{4}$

27. The value of tan $\left(2tan^{-1}\frac{1}{5} - \frac{\pi}{4}\right)$ is

a) $\frac{5}{18}$ b) $-\frac{3}{2}$ c) $-\frac{7}{17}$ d) $\frac{3}{8}$

28. The value of sin $(cot^{-1}x)$ is

a) $1 + x^2$ b) $(1 + x^2)^{-1/2}$ c) $(x - 1)^2$ d) $(1 - x)^2$

29. The value of cos $\left(\frac{1}{2}cos^{-1}\frac{1}{8}\right)$ is

a) $\frac{3}{4}$ b) $\frac{2}{3}$ c) $\frac{4}{3}$ d) $-\frac{3}{4}$

30. If $sin^{-1}a + sin^{-1}b + sin^{-1}c = \pi$, then value of $a\sqrt{1 - a^2}$ + b$\sqrt{1 - b^2}$ + c$\sqrt{1 - c^2}$ is

a) $\frac{3}{2}$abc b) $(abc)^2$ c) 2abc d) $a + b - c$

31. If $cos^{-1}\frac{x}{2} + cos^{-1}\frac{y}{3} = \theta$, then value of $9x^2 - 12xycos\theta + 4y^2$ is

a) $-36sin^2\theta$ b) $36cos^2\theta$ c) $36sin\theta.cos\theta$ d) $36sin^2\theta$

32. The number of solutions of the equation $tan^{-1}(x - 1) + tan^{-1}x + tan^{-1}(x + 1) = tan^{-1}3x$ is

a) 3 b) 2 c) 4 d) 1

33. Principal value of $cot^{-1}\left(\frac{1}{\sqrt{3}}\right)$ is

a) $\frac{3\pi}{2}$ b) $\frac{2\pi}{3}$ c) $\frac{\pi}{6}$ d) $\frac{\pi}{3}$

34. The trigonometric equation $sin^{-1}x = 2sin^{-1}a$ has a solution for

a) $|a| \geq \frac{1}{\sqrt{2}}$ b) $\frac{1}{2} < |a| < \frac{1}{\sqrt{2}}$ c) all real values of a d) $|a| \leq 1/\sqrt{2}$

35. If $cos^{-1}x - cos^{-1}\frac{y}{2} = \alpha$, then $4x^2 - 4xycos\alpha + y^2$ is equal to

a) $2\sin 2\alpha$ b) 4 c) $4sin^2\alpha$ d) $-4sin^2\alpha$

36. If $sin^{-1}\left(\frac{x}{5}\right) + cosec^{-1}\left(\frac{5}{4}\right) = \frac{\pi}{2}$, then the values of x is

a) 4 b) 5 c) 1 d) 3.

37. The value of $cot\left(cosec^{-1}\frac{5}{3} + tan^{-1}\frac{2}{3}\right)$ is

a) $\frac{6}{17}$ b) $\frac{3}{17}$ c) $\frac{4}{17}$ d) $\frac{5}{17}$

38. The value of $tan^{-1}\frac{1}{2} + tan^{-1}\frac{1}{3}$ is:

a) 0 b) $\frac{\pi}{3}$ c) $\frac{\pi}{6}$ d) $\frac{\pi}{4}$

39. If $sin^{-1}\frac{2a}{1+a^2} + sin^{-1}\frac{2b}{1+b^2} = 2tan^{-1}x$, then x is equal to

a) $\frac{a-b}{1+ab}$ b) $\frac{b}{1+ab}$ c) $\frac{b}{1-ab}$ d) $\frac{a+b}{1-ab}$

40. If 4 $sin^{-1}x + cos^{-1}x = \pi$, then x is equal to

a) 0 b) $\frac{1}{2}$ c) $-\frac{1}{2}$ d) 1

41. If $tan^{-1}(2x) + tan^{-1}(3x) = \frac{\pi}{4}$ tan x is equal to

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

42. The principal value of $sin^{-1}\left(sin\frac{5\pi}{3}\right)$ is

a) $-\frac{5\pi}{3}$ b) $\frac{5\pi}{3}$ c) $-\frac{\pi}{3}$ d) $\frac{4\pi}{3}$

43. If $tan^{-1}x + tan^{-1}y = \frac{\pi}{4}$ then

a) $x + y + xy = 1$ b) $x + y - xy = 1$

c) $x + y + xy + 1 = 0$ d) $x + y - xy + 1 = 0$

44. The value of $sin^{-1}\left(\frac{1}{\sqrt{5}}\right) + cot^{-1}(3)$ is

a) $\frac{\pi}{6}$ b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$

45. $tan^{-1}\left(\frac{1}{11}\right) + tan^{-1}\left(\frac{2}{12}\right)$ is equal to

$a)\ tan^{-1}\left(\frac{33}{131}\right)$ b) $tan^{-1}\left(\frac{1}{2}\right)$ c) $tan^{-1}\left(\frac{132}{33}\right)$ d) None of these

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XII STANDARD MATHEMATICS

TWO DIMENSIONAL ANALYTICAL GEOMETRY-II

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

(1)The vertices of the ellipse $\frac{(x-1)^2}{9}+\frac{(y-2)^2}{18}=1$ are

(1) $(3,4)$ and $(-3,4)$ (2) $(4,3)$ and $(-4,3)$
(3) $(5,2)$ and $(-3,2)$ (4) $(1,6)$ and $(1,-2)$

(2)The line PP^1 is a focal chord of the parabola $y^2=8x$ and if the coordinates of P are $(18,12)$ then the coordinates of P' is

(1) $\left(\frac{2}{9},\frac{-4}{3}\right)$ (2) $\left(\frac{-2}{9},\frac{-4}{3}\right)$ (3) $\left(\frac{-2}{9},\frac{-4}{3}\right)$ (4) $\frac{2}{3},\frac{-4}{9}$

(3)The equations $4y^2-50x=25x^2+16y+109$ represents

(1) a parabola (2) an ellipse (3) a circle (4) a hyperbola

(4)The ellipse $x^2+4y^2=4$ is inscribed in a rectangle aligned with coordinate axes which inturn inscribed in another ellipse through the point $(4,0)$. Then the equation of the ellipse is

(1) $x^2+16y^2=16$ (2) $x^2+12y^2=16$ (3) $4x^2+48y^2=48$ (4) $4x^2+64y^2=48$

(5)The eccentricity of an ellipse, with its centre at the origin is $\frac{1}{2}$. If one of the directrices is $x=4$, then the equation of the ellipse is

(1) $x^2+4y^2=1$ (2) $3x^2+4y^2=12$ (3) $4x^2+3y^2$ (4) $4x^2+3y^2=1$

(6)The locus of a point $P(\alpha,\beta)$ moving under the condition that the line $y=\alpha x+\beta$ is a tangent to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is

(1) an ellipse (2) a circle (3) a parabola (4) a hyperbola

(7)For the hyperbola $\frac{x^2}{\cos^2\alpha}-\frac{y^2}{\sin^2\alpha}=1$. Which of the following remains constant when α reverses .

(1) eccentricity (2) directrix
(3) abseissae of vertices (4) abseissae of coci

(8)A focus of an ellipse is at the origin. The directrix is the line $x=4$ and the eccentricity is $\frac{1}{2}$. Then the length of the semi-major axis is

(1) $\frac{8}{3}$ (2) $\frac{2}{3}$ (3) $\frac{4}{3}$ (4) $\frac{5}{3}$

(9)The radius of the auxiliary circle of the conic $9x^2+16y^2=144$ is

(1) $\sqrt{7}$ (2) 4 (3) 3 (4) 5

(10)Find the equation of the circle whose diameter is the chord $x+y=1$ of the circle $x^2+y^2=4$.

(1) $x^2+y^2-x-y-3=0$ (2) $x^2+y^2+x+y-3=0$

(3) $x^2+y^2+x-y-3=0$ (4) $x^2+y^2-x+y-3=0$

(11)If $x+y=k$ is normal to $y^2=12x$, then k is

(1) 3 (2) 9 (3) -9 (4) -3

(12)The radius of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ and having its centre at $(0,3)$ is

(1) 3 (2) 4 (3) 5 (4) $\sqrt{7}$

(13)The locus of the point of intersection of two perpendicular tangents to the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$

(1) $x^2+y^2=9$ (2) $x^2+y^2=16$ (3) $x^2+y^2=25$ (4) $x^2+y^2=4$

(14)The number of tangents that can be drawn from the point $(4,3)$ to the hyperbola $\frac{x^2}{4}-\frac{y^2}{3}=1$ is

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

(15)If the line $y=3x+\lambda$ and touch the hyperbola $9x^2-5y^2=45$, then the value of λ is

(1) ± 3 (2) ± 2 (3) ± 6 (4) $\pm\sqrt{5}$

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HSC (Second Year)
One mark creative questions
CHAPTER 7
Application of Differential Calculus

1. $f(x)=xe^{x(1-x)}$ then $f(x)$ is
   a) **Increasing in $\left[{}^{-1}/_{2},1\right]$**
   b) decreasing in R
   c) increasing in R
   d) decreasing in $\left[{}^{-1}/_{2},1\right]$
2. Let $f(x)=\int e^{x}(x-1)(x-2)dx$ then f decreases in the interval
   a) $(-\infty,-2)$ b) $(-2,-1)$ **c) $(1,2)$** d) $(2,\infty)$
3. The function $f(x)=\frac{log(\pi+x)}{log(e+x)}$ is
   a) increasing on $(0,\infty)$
   b) **decreasing on $(0,\infty)$**
   c) increasing on $\left(0,\frac{\pi}{e}\right)$, decreasing on $\left(\frac{\pi}{e},\infty\right)$
   d) decreasing on $\left(0,\frac{\pi}{e}\right)$, increasing on $\left(\frac{\pi}{e},\infty\right)$
4. Let M and m be respectively the absolute minimum value of the function $f(x)=2x^3-9x^2+12x+5$ in the interval [0,3], The $M-m$ is equal to.
   a) 5 b) 1 c) 4 d) **9**
5. If 20 m of wire is available for fencing off a flower sector then the maximum area $(in\ sqm)$ of the flower bed is
   a) 12.5 b) 10 **c) 25** d) 30
6. The normal of the curve $y(x-2)(x-3)=x+6$ at the point where the curve intersects the y axis passes through the point
   a) $\left(\frac{-1}{2},\frac{-1}{2}\right)$ **b) $\left(\frac{1}{2},\frac{1}{2}\right)$** c) $\left(\frac{1}{2},\frac{-1}{3}\right)$ d) $\left(\frac{1}{2},\frac{1}{3}\right)$
7. If the line $ax+by+c=0$ is a normal to the curve $xy=1$, then
   a) $a>0\ \ b>0$ **b) $a>0, b<0$** c) $a<0, b>0$ d) $a<0\ \ b<0$
8. If the curves $y^2=6x$, $9x^2+by^2=16$ intersect each other at right angles, then the value of **b** is.
   a) $\frac{9}{2}$ b) 6 c) $\frac{7}{2}$ d) 4
9. The tangent line at (2,4) to the curve $y=x^3-3x+2$ meets the x axis at
   a) (2,0) b) $\left(\frac{7}{2},0\right)$ c) $\left(\frac{11}{9},0\right)$ **d) $\left(\frac{14}{9},0\right)$**

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10. The slop of the tangent to the curve $x = t^2 + 3t - 8$, $y = 2t^2 - 2t - 5$ at the point $(2, -1)$ is
   a) $\frac{2}{3}$ **b) $\frac{6}{7}$** c) $\frac{4}{5}$ d) $\frac{3}{2}$
11. the interval in which $y = \frac{1}{4x^3-9x^2+6x}$ is increasing is
   a) $(-\infty, \infty)$ b) $\left(0, \frac{1}{2}\right)$ **c) $\left(\frac{1}{2}, 1\right)$** d) $(1, \infty)$
12. Let $y = x - log(1 + x)$the minimum value of **y** is
   a) 1 **b) 0** c) -1 d) $\frac{1}{2}$
13. A point on the curve $y = x^3 - 3x + 5$ at which the tangent line is parallel to $y = -2x$ is
   a) $(1,3)$ b) $(0,5)$ **c) $\left(\frac{1}{\sqrt{3}}, 5 - \frac{8\sqrt{3}}{9}\right)$** d) $\left(\frac{1}{\sqrt{2}}, 0\right)$
14. The greatest value of $y = \sin 2x - x$ on $\left[\frac{-\pi}{2}, \frac{\pi}{2}\right]$ is
   a) $\frac{\pi}{2}$ b) 1 c) 2 d) $\frac{-\pi}{2}$
15. The point of infection of $y = x^3 - 5x^2 + 3x - 5$ is
   a) $\frac{1}{2}$ b) $\frac{3}{4}$ c) $\frac{7}{4}$ **d) $\frac{5}{3}$**
16. A spherical balloon is expending if the radius is increasing at the rate of **5** inch per minute the rate at which the volume increases ($in\ cubic\ inches\ per\ minutes$) when the radius is **10** inch is
   a) 100π b) 1000π **c) 2000π** d) 500π
17. An object is moving in the clockwise direction around the unit circle $x^2 + y^2 = 1$, As it passes through the point $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$ its y-co ordinate is decreasing at the rate of 3 units per second. The rate at which the x-co ordinate changes at this point is ($in\ units\ per\ second$)
   a) 2 **b) $3\sqrt{3}$** c) $\sqrt{3}$ d) $2\sqrt{3}$
18. Tangent of the angle at which the curve $y = a^x$ and $y = b^x$ $(a \neq b > 0)$ intersect is given by
   a) $\frac{\log ab}{1+\log ab}$ **b) $\frac{\log \frac{a}{b}}{1+(\log a)(\log b)}$** c) $\frac{\log ab}{1+\log a \log b}$ d) None of these
19. If the tangent to the curve $x^3 - y^2 = 0$ at $(m^2, -m^3)$ is parallel to $y = -\frac{1}{m}x - 2m^3$, then the value of m^2 is
   a) $\frac{1}{3}$ b) $\frac{1}{6}$ **c) $\frac{2}{3}$** d) $\frac{-2}{3}$
20. The equation of the Horizontal tangent to the graph of the function $y = e^x + e^{-x}$ is
   a) $y = -2$ b) $y = -1$ **c) $y = 2$** d) None
21. Let $f(x) = (x - a)^m (x - b)^n$, where m, $n \in I$ and $m, n > 1$, then
   a) $(a, 0)(b, 0)$ are the only critical points of f
   b) There are m+n critical point of f
   c) There are exactly three critical points of f
   d) None of these

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22. If $f(x) = x(x-2)(x-4), 1 \le x \le 4$ then a number satisfying the conclution of the mean value theorem is

a) **1** b) 2 c) $\frac{5}{2}$ d) $\frac{7}{2}$

23. Let x and y be two real numbers such that $x > 0$ and $xy = 1$. The minimum value of $x + y$ is

a) 1 b) $\frac{1}{2}$ **c) 2** d) $\frac{1}{4}$

24. The equation of the tangent to the curve $y = (2x-1)e^{2(1-x)}$ at the point of its maximum is

a) $\mathbf{y = 1}$ b) $x = 1$ c) $x + y = 1$ d) $x - y = 1$

25. If the function $f(x) = x^2 + \frac{\alpha}{x}$ has a local minimum at $x = 2$ then the value of α is

a) 8 b) 18 **c) 16** d) None of these

26. 51. If $f(x) = \log x$ satisfies Lagrange's theorem on $[1, e]$ there value of $c \in (1, e)$such that the tangent at c is parallel to line joining $(1, f(1))$ and $(e, f(e))$ is

a) $e\frac{-3}{2}$ b) $\frac{1+e}{2}$ **c)** $\mathbf{e - 1}$ d) $e\frac{-1}{2}$

27. Equation of normal to $x = 2e^t$, $y = e^{-t}$ $at\ t = 0$ is

a) $x + y - 4 = 0$ b) $x + 2y - 4 = 0$ **c)** $\mathbf{2x - y - 3 = 0}$ d) $x - 2y - 3 = 0$

28. A points moves according $s = \frac{2}{9}\sin\frac{\pi}{2}t + s_{o,}$ the acceleration at the end of first second is

a) $\frac{-\pi}{18}$ **b)** $\frac{-\pi^2}{18}$ c) $\frac{\pi}{18}$ d) $\frac{\pi^2}{18}$

29. Let $f(x) = 2x^2 - \log x$, then

a) f increases on $(0, \infty)$

c) **f increases on** $\left(\frac{1}{2}, \infty\right)$

b) f decreases on $\left(\frac{1}{2}, \infty\right)$

d) f decreases on $(0,1)$

30. Let $f(x) = \frac{3}{4}x^4 - x^3 - 9x^2 + 7$, then the number of critical points in $[-1,4]$is

a) 4 b) 3 **c) 2** d) 1

31. The value of $k > 0$ for which the curves $\frac{x^2}{k^2} + \frac{y^2}{4} = 1$ and $y^3 = 16x$ cut each other orthogonally is

a) 1 **b)** $\frac{2\sqrt{3}}{3}$ c) $3\sqrt{3}$ d) $5\sqrt{5}$

32. The last value of $g(t) = 8t - t^4$ on $[-2,1]$ is

a) -16 b) -20 **c)** $\mathbf{-32}$ d) 7

33. The normal to the circle $x^2 + y^2 - 2x - 2y = 0$ passing through $(2,2)$ is

a) $\mathbf{x = y}$ b) $2x + y - 6 = 0$ c) $x + 2y - 6 = 0$ d) $x + y - 4 = 0$

34. Let $f(x) = 6x^{\frac{4}{3}} - 3x^{\frac{1}{3}}$ defined on $[-1,1]$ then

a) Maximum value of f is 7

c) **Maximum value of f is 9**

b) Maximum value of f is 5

d) Minimum value of f is $\frac{-3}{2}$

35. Let f be differentiable for all x. If $f(1) = -2$ and $f^1(x) \ge 2$ for $x \in [1,6]$ then

a) $f(6) < 5$ b) $f(6) = 5$ **c)** $\mathbf{f(6) \ge 8}$ d) $f(6) < 8$

36. The function $f(x) = \frac{x}{2} + \frac{2}{x}$ has a local minimum at

a) $x = 1$ **b)** $\mathbf{x = 2}$ c) $x = -2$ d) $x = 0$

37. A value of c for which the conclusion of rear value theorem holds for the function $f(x) = \log x$ on the interval [1,3] is

a) $2\log_3 e$ b) $\frac{1}{2}\log 3$ c) $2\log_3 c$ d) $\log 3$

38. The function on $f(x) = tan^{-1}(\sin x + \cos x)$ is an increasing function is

a) $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$ **b) $\left(\frac{-\pi}{2}, \frac{\pi}{4}\right)$** c) $\left(0, \frac{\pi}{2}\right)$ d) $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$

39. If the surface area of a sphere of radius **r** is increasing uniformly at the rate of $\mathbf{8cm^2/s}$ then the rate of change of its volume is

a) Constant b) proportional to $\sqrt{r}$ c) proportional to r^2 **d) proportional to r**

40. The maximum area of a right angled triangle with hypotenuse **h** is

a) $\frac{h^2}{2\sqrt{2}}$ b) $\frac{h^2}{2}$ c) $\frac{h^2}{\sqrt{2}}$ **d) $\frac{h^2}{4}$**

41. If $x = -1$ and $x = 2$ are extreme points of $f(x) = \alpha \log|x| + \beta x^2 + x$, then

a) $\alpha = -6, \beta = \frac{1}{2}$ b) $\alpha = -6, \beta = \frac{-1}{2}$ **c) $\alpha = 2\ \beta = \frac{-1}{2}$** d) $\alpha = 2, \beta = \frac{1}{2}$

42. If the volume of a spherical ball is increasing at the rate of $4\pi\ ^{cc}/_{sec}$, then the rate of increase of its radius (in $^{cm}/_{sec}$) when the volume is $288\pi\ cc$ is

a) $\frac{1}{9}$ b) $\frac{1}{6}$ **c) $\frac{1}{36}$** d) $\frac{1}{24}$

43. If Rolle's theorem holds for the function $f(x) = 2x^3 + ax^2 + bx$ in the interval $[-1,1]$ for the point c = $\frac{1}{2}$ then the value of $2a + b$ is

a) 1 **b) -1** c) 2 d) -2

44. The slop of the normal to curve $y = x^3 - 4x^2\ at\ (2, -1)$ is

a) $\frac{1}{4}$ b) $\frac{1}{2}$ c) 4 d) -4

45. The value of **c** for which the conclusion of Lagrange's rear value theorem holds for the function $f(x) = \sqrt{25 - x^2}$ on the interval [1,5] is

a) $\sqrt{3}$ b) $\sqrt{5}$ **c) $\sqrt{15}$** d) 2

46. A particle is constrained to move along the curve $y = \sqrt{x}$ starting at the origin at time t=0 The point on the curve where the abscissa and the ordinate are changing at the same rate is

a) $\left(\frac{1}{2}, \frac{1}{\sqrt{2}}\right)$ b) $\left(\frac{1}{8}, \frac{2}{2\sqrt{2}}\right)$ **c) $\left(\frac{1}{4}, \frac{1}{2}\right)$** d) (1,1)

47. Let f be a differentiable function defined on R such that $f(0) = -3$ if $f'(x) \leq 5$ for all x then

a) $f(2) > 7$ **b) $f(2) \leq 7$** c) $f(2) > 8$ d) $f(2) = 8$

48. The function $f(x) = xe^{-x}$ has

a) Neither maximum nor minimum at $x = 1$ **c) A maximum at $x = 1$**
b) A minimum at $x = 1$ d) A maximum at $x = -1$

49. Each side of a square is increasing at the uniform rate of $^{1m}/_{sec}$. If after sometime the area of the square is increasing at the rate of 8 $^{m^2}/_{sec}$, then the area of square at the time in sq meters is

a) 4 b) 9 **c) 16** d) 25

50. The rate of change of the volume of a sphere with respect to its surface area when the radius is 2 units is

a) 4 b) 3 c) 2 **d) 1**

[redacted] [redacted]

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APPLICATIONS OF MATRICES AND DETERMINANTS

12th Standard EM

Reg.No. :

MATHS - A

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
PG ASST IN MATHS
GBHSS-PATTUKKOTTAI
THANJAVUR DIST
9443407917

Time : 00:30:00 Hrs

Total Mark : 25

Answer All the questions

25 x 1 = 25

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

(a) 17 (b) 14 (c) 19 (d) 21

2) If A^TA^{-1} is symmetric, then A^2 =

(a) A^{-1} (b) $(A^T)^2$ (c) A^T (d) $(A^{-1})^2$

3) If $0 \le \theta \le \pi$ 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

(a) $\frac{2\pi}{3}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{4}$

4) 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

(a) $\lambda = 7, \mu \neq -5$ (b) $\lambda = 7, \mu = 5$ (c) $\lambda \neq 7, \mu \neq -5$ (d) $\lambda = 7, \mu = -5$

5) 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

(a) 15 (b) 12 (c) 14 (d) 11

6) If A = $\begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, then 9I - A =

(a) A^{-1} (b) $\frac{A^{-1}}{2}$ (c) $3A^{-1}$ (d) $2A^{-1}$

7) 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

(a) $\frac{-4}{5}$ (b) $\frac{-3}{5}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

8) If A = $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ and A(adj A) = $\begin{bmatrix} k & 0 \\ 0 & k \end{bmatrix}$ then adj (AB) is

(a) 0 (b) sin θ (c) cos θ (d) 1

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

(a) $e^{(\Delta_2/\Delta_1)}, e^{(\Delta_3/\Delta_1)}$ (b) $\log(\Delta_1/\Delta_3), \log(\Delta_2/\Delta_3)$ (c) $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$ (d) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

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} =

(a) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

11) 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

(a) 0 (b) -2 (c) -3 (d) -1

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

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

13) If |adj(adj A)| = $|A|^9$, then the order of the square matrix A is

(a) 3 (b) 4 (c) 2 (d) 5

14) If adj A = $\begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and adj B = $\begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ then adj (AB) is

(a) $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$ (b) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$ (c) $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$ (d) $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

15) If A is a 3 × 3 non-singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then BB^T =

(a) A (b) B (c) I (d) B^T

16) If A = $\begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then |adj (AB)| =

(a) -40 (b) -80 (c) -60 (d) -20

17) 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(λA) = λ^n adj(A).

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

(a) Only (i) (b) (ii) and (iii) (c) (iii) and (iv) (d) (i), (ii) and (iv)

18) If A is a non-singular matrix such that $A^{-1} = \begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$, then $(A^T)^{-1}$ =

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

19) If ρ(A) = ρ([A | B]), then the system AX = B of linear equations is

(a) consistent and has a unique solution (b) consistent (c) consistent and has infinitely many solution (d) inconsistent

20) If A $\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} 6 & 0 \\ 0 & 6 \end{bmatrix}$, then A =

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

21) 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

(a) 2 (b) 4 (c) 3 (d) 1

22) If A, B and C are invertible matrices of some order, then which one of the following is not true?

(a) adj A = $|A|A^{-1}$ (b) adj(AB) = (adj A)(adj B) (c) det A^{-1} = $(\det A)^{-1}$ (d) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

23) If A = $\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, B = adj A and C = 3A, then $\frac{|adjB|}{|C|}$ =

(a) $\frac{1}{3}$ (b) $\frac{1}{9}$ (c) $\frac{1}{4}$ (d) 1

24) If A = $\begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}$ and AB = I, then B =

(a) $\left(\cos^2\frac{\theta}{2}\right) A$ (b) $\left(\cos^2\frac{\theta}{2}\right) A^T$ (c) $\left(\cos^2\theta\right) I$ (d) $(\text{Sin}^2\frac{\theta}{2})$A

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

(a) 1 (b) 2 (c) 4 (d) 3

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PATTUKKOTTAI PALANIAPPAN MATHS

APPLICATIONS OF MATRICES AND DETERMINANTS

12th Standard EM

MATHS - A

Reg.No. : | | | | | |

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,

PG ASST IN MATHS

GBHSS-PATTUKKOTTAI

THANJAVUR DIST

9443407917

Time : 00:30:00 Hrs

Total Mark : 25

A - Answer Key

Answer All the questions

25 x 1 = 25

1) (c) 19
2) (b) $(A^T)^2$
3) (d) $\frac{\pi}{4}$
4) (d) $\lambda = 7, \mu = -5$
5) (d) 11
6) (d) $2A^{-1}$
7) (a) $\frac{-4}{5}$
8) (d) 1
9) (d) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$
10) (a) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$
11) (d) -1
12) (a) $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$
13) (b) 4
14) (b) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$
15) (c) I
16) (b) -80
17) (d) (i), (ii) and (iv)
18) (d) $\begin{bmatrix} 5 & -2 \\ 3 & -1 \end{bmatrix}$
19) (b) consistent
20) (c) $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$
21) (d) 1
22) (b) adj(AB) = (adj A)(adj B)
23) (b) $\frac{1}{9}$
24) (b) $\left(\cos^2 \frac{\theta}{2}\right) A^T$
25) (a) 1

PATTUKKOTTAI PALANIAPPAN MATHS

COMPLEX NUMBERS

Date : 23-Aug-19

12th Standard

Reg.No. :

Maths

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
PG ASST IN MATHS
GBHSS-PATTUKKOTTAI
THANJAVUR DIST
9443407917

Time : 00:30:00 Hrs

Total Marks : 25

Answer All the questions

25 x 1 = 25

1) $i^n+i^{n+1}+i^{n+2}+i^{n+3}$ is

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

2) The value of $\sum_{i=1}^{13}\left(i^n+i^{n-1}\right)$ is

(a) 1+ i (b) i (c) 1 (d) 0

3) The area of the triangle formed by the complex numbers z,iz, and z+iz in the Argand's diagram is

(a) $\frac{1}{2}|z|^2$ (b) $|z|^2$ (c) $\frac{3}{2}|z|^2$ (d) $2|z|^2$

4) The conjugate of a complex number is $\frac{1}{i-2}$/Then the complex number is

(a) $\frac{1}{i+2}$ (b) $\frac{-1}{i+2}$ (c) $\frac{-1}{i-2}$ (d) $\frac{1}{i-2}$

5) If $z=\frac{\left(\sqrt{3}+i\right)^3(3i+4)^2}{(8+6i)^2}$, then |z| is equal to

(a) 0 (b) 1 (c) 2 (d) 3

6) If z is a non zero complex number, such that $2iz^2=\bar{z}$ then |z| is

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 3

7) If |z-2+i|≤2, then the greatest value of |z| is

(a) $\sqrt{3}-2$ (b) $\sqrt{3}+2$ (c) $\sqrt{5}-2$ (d) $\sqrt{5}+2$

8) If $\left|z-\frac{3}{z}\right|=2$ then the least value |z| is

(a) 1 (b) 2 (c) 3 (d) 5

9) If |z|=1, then the value of $\frac{1+z}{1+\bar{z}}$ is

(a) z (b) $\bar{z}$ (c) $\frac{1}{z}$ (d) 1

10) The solution of the equation |z|-z=1+2i is

(a) $\frac{3}{2}-2i$ (b) $-\frac{3}{2}+2i$ (c) $2-\frac{3}{2}i$ (d) $2+\frac{3}{2}i$

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

(a) 1 (b) 2 (c) 3 (d) 4

12) If z is a complex number such that $z\epsilon C/R$ and $z+\frac{1}{z}\epsilon R$ then|z| is

(a) 0 (b) 1 (c) 2 (d) 3

13) z_1, z_2 and z_3 are complex number such that $z_1+z_2+z_3=0$ and $|z_1|=|z_2|=|z_3|=1$ then $z_1^2+z_2^2+z_3^3$ is

(a) 3 (b) 2 (c) 1 (d) 0

14) If $\frac{z-1}{z+1}$ is purely imaginary, then |z| is

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 3

15) If z=x+iy is a complex number such that |z+2|=|z−2|, then the locus of z is

(a) real axis (b) imaginary axis (c) ellipse (d) circle

16) The principal argument of $\frac{3}{-1+i}$

(a) $\frac{-5\pi}{6}$ (b) $\frac{-2\pi}{3}$ (c) $\frac{-3\pi}{4}$ (d) $\frac{-\pi}{2}$

17) The principal argument of $(\sin 40°+i \cos 40°)^5$ is

(a) −110° (b) −70° (c) 70° (d) 110°

18) If (1+i)(1+2i)(1+3i)...(1+ni)=x+iy, then $2\cdot 5\cdot 10\ldots\left(1+n^2\right)$ is

(a) 1 (b) i (c) x^2+y^2 (d) $1+n^2$

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

(a) (1,0) (b) (−1,1) (c) (0,1) (d) (1,1)

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

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{2}$

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

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

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

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

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

(a) 1 (b) -1 (c) $\sqrt{3i}$ (d) $-\sqrt{3i}$

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

(a) $cis\frac{2\pi}{3}$ (b) $cis\frac{4\pi}{3}$ (c) $-cis\frac{2\pi}{3}$ (d) $-cis\frac{4\pi}{3}$

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

(a) 1 (b) 2 (c) 3 (d) 4

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PATTUKKOTTAI PALANIAPPAN MATHS
COMPLEX NUMBERS
12th Standard

Date : 23-Aug-19

Maths

Reg.No. :

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
PG ASST IN MATHS
GBHSS-PATTUKKOTTAI
THANJAVUR DIST
9443407917

Time : 00:30:00 Hrs

Total Marks : 25

Answer All the questions 25 x 1 = 25

1) (a) 0
2) (a) 1+ i
3) (a) $\frac{1}{2}|z|^2$
4) (b) $\frac{-1}{i+2}$
5) (c) 2
6) (a) $\frac{1}{2}$
7) (d) $\sqrt{5}+2$
8) (a) 1
9) (a) z
10) (a) $\frac{3}{2}-2i$
11) (b) 2
12) (b) 1
13) (d) 0
14) (b) 1
15) (b) imaginary axis
16) (c) $\frac{-3\pi}{4}$
17) (a) −110°
18) (c) x^2+y^2
19) (d) (1,1)
20) (d) $\frac{\pi}{2}$
21) (b) -1
22) (c) 1
23) (d) $-\sqrt{3i}$
24) (a) $cis\frac{2\pi}{3}$

25) (a) 1

PATTUKKOTTAI PALANIAPPAN MATHS

THEORY OF EQUATIONS

12th Standard EM

Reg.No. :

MATHS - A

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,

PG ASST IN MATHS

GBHSS-PATTUKKOTTAI

THANJAVUR DIST

9443407917

Time : 00:30:00 Hrs

Total Mark : 25

Answer All the questions

25 x 1 = 25

1) If x^{2} - hx - 21 = 0 and x^2 - 3hx + 35 = 0 (h > 0) have a common root, then h = ___________

(a) 0 (b) 1 (c) 4 (d) 3

2) Ifj(x) = 0 has n roots, thenf'(x) = 0 has __________ roots

(a) n (b) n -1 (c) n+1 (d) (n-r)

3) If the root of the equation x^3 +bx^2+cx-1=0 form an Increasing G.P, then

(a) one of the roots is 2 (b) one of the rots is 1 (c) one of the rots is -1 (d) one of the rots is -2

4) The equation $\sqrt{x+1}-\sqrt{x-1}=\sqrt{4x-1}$ has

(a) no solution (b) one solution (c) two solution (d) more than one solution

5) If p(x) = ax^2 + bx + c and Q(x) = -ax^2 + dx + c where $ac \neq 0$ then p(x). Q(x) = 0 has at least _______ real roots.

(a) no (b) 1 (c) 2 (d) infinite

6) If the equation ax2+ bx+c=0(a > 0) has two roots ∝ and β such that ∝< - 2 and β > 2, then

(a) b2-4ac=0 (b) b^2 - 4ac < 0 (c) b^2 - 4ac > 0 (d) b^2 - 4ac≥0

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

(a) 2 (b) 4 (c) 1 (d) ∞

8) A polynomial equation in x of degree n always has

(a) n distinct roots (b) n real roots (c) n imaginary roots (d) at most one root

9) If ∝, β, ɣ are the roots of the equation x^3-3x+11=0, then ∝+β+ɣ is __________.

(a) 0 (b) 3 (c) -11 (d) -3

10) If α,β and γ are the roots of x^3+px^2+qx+r, then $\Sigma\frac{1}{\alpha}$ is

(a) -$\frac{q}{r}$ (b) $\frac{p}{r}$ (c) $\frac{q}{r}$ (d) -$\frac{q}{p}$

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

(a) a≥0 (b) a > 0 (c) a< 0 (d) a≤0

12) If a, b, c ∈ Q and p +√q (p,q ∈ Q) is an irrational root of ax^2+bx+c=0 then the other root is

(a) -p+√q (b) p-iq (c) p-√q (d) -p-√q

13) The quadratic equation whose roots are ∝ and β is

(a) (x - ∝)(x -β) =0 (b) (x - ∝)(x + β) =0 (c) ∝+β=$\frac{b}{a}$ (d) ∝.β=$\frac{-c}{a}$

14) If ∝, β,ɣ are the roots of 9x3-7x+6=0, then ∝ β ɣ is __________

(a) $\frac{-7}{9}$ (b) $\frac{7}{9}$ (c) 0 (d) $\frac{-2}{3}$

15) If ax^2 + bx + c = 0, a, b, c E R has no real zeros, and if a + b + c < 0, then __________

(a) c > 0 (b) c< 0 (c) c=0 (d) c≥0

16) For real x, the equation $\left|\frac{x}{x-1}\right| + |x| = \frac{x^2}{|x-1|}$ has

(a) one solution (b) two solution (c) at least two solution (d) no solution

17) Let a > 0, b > 0, c > 0. h n both th root of th quatlon ax^2+b+C= 0 are

(a) real and negative (b) real and positive (c) rational numb rs (d) none

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

(a) |k|≤6 (b) k=0 (c) |k| > 6 (d) |k|≥6

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

(a) -1 (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) 5

20) If x is real and $\frac{x^2-x+1}{x^2+x+1}$ then

(a) $\frac{1}{3}$ ≤k≤ (b) k≥5 (c) k≤0 (d) none

21) If f and g are polynomials of degrees m and n respectively, and if h(x) =(f 0 g)(x), then the degree of h is

(a) mn (b) m+n (c) m^n (d) n^m

22) The polynomial x^3+2x+3 has

(a) one negative and two real roots (b) one positive and two imaginary roots (c) three real roots (d) no solution

23) If $(2+\sqrt{3})x^2$-2x+1+$(2-\sqrt{3})x^2$-2x-1=$\frac{2}{2-\sqrt{3}}$ then x=

(a) 0,2 (b) 0,1 (c) 0,3 (d) 0, √3

24) A zero of x^3 + 64 is

(a) 0 (b) 4 (c) 4i (d) -4

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

(a) 0 (b) n (c) < n (d) r

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PATTUKKOTTAI PALANIAPPAN MATHS

THEORY OF EQUATIONS

12th Standard EM

Reg.No. :

MATHS - A

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
PG ASST IN MATHS
GBHSS-PATTUKKOTTAI
THANJAVUR DIST
9443407917

Time : 00:30:00 Hrs

Total Mark : 25

A - Answer Key

Answer All the questions 25 x 1 = 25

1) (c) 4
2) (b) n -1
3) (b) one of the rots is 1
4) (a) no solution
5) (c) 2
6) (c) b^2 - 4ac >0
7) (a) 2
8) (a) n distinct roots
9) (a) 0
10) (a) $-\frac{q}{r}$
11) (c) a<0
12) (c) p-√q
13) (a) (x - ∝)(x -β) =0
14) (d) $\frac{-2}{3}$
15) (b) c<0
16) (c) at least two solution
17) (b) real and positive
18) (d) |k|≥6
19) (b) $\frac{5}{4}$
20) (a) $\frac{1}{3}$ ≤k≤
21) (a) mn
22) (a) one negative and two real roots
23) (a) 0,2
24) (d) -4
25) (b) n

PATTUKKOTTAI PALANIAPPAN MATHS

INVERSE TRIGONAMETRIC FUNCTIONS

12th Standard EM

Reg.No. :

Maths - A

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
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9443407917

Time : 00:30:00 Hrs

Total Mark : 25

Answer All the questions

25 x 1 = 25

25 x 1 = 25

1) $sin^{-1}\frac{3}{5}-cos^{-1}\frac{12}{13}+sec^{-1}\frac{5}{3}-cosec^{1-}\frac{13}{2}$is equal to
(a) 2π (b) π (c) 0 (d) tan$^{-1}\frac{12}{65}$

2) If $sin^{-1}x-cos^{-1}x=\frac{\pi}{6}$ then
(a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{-1}{2}$ (d) none of these

3) sin^{-1}(cos x)= $\frac{\pi}{2}-x$ is valid for
(a) $-\pi\le x\le 0$ (b) $0\pi\le x\le 0$ (c) $-\frac{\pi}{2}\le x\le\frac{\pi}{2}$ (d) $-\frac{\pi}{4}\le x\le\frac{3\pi}{4}$

4) If $\alpha=tan^{-1}\left(tan\frac{5\pi}{4}\right)$ and $\beta=tan^{-1}\left(-tan\frac{2\pi}{3}\right)$ then
(a) $4\alpha=3\beta$ (b) $3\alpha=4\beta$ (c) $\alpha-\beta=\frac{7\pi}{12}$ (d) none

5) The equation tan^{-1}x-cot^{-1}x=tan$^{-1}\left(\frac{1}{\sqrt{3}}\right)$ has
(a) no solution (b) unique solution (c) two solutions (d) infinite number of solutions

6) If cot−1x=$\frac{2\pi}{5}$ for some x∈R, the value of tan^{-1} x is
(a) $\frac{-\pi}{10}$ (b) $\frac{\pi}{5}$ (c) $\frac{\pi}{10}$ (d) $-\frac{\pi}{5}$

7) sin(tan^{-1}x), |x|< 1 ia equal to
(a) $\frac{x}{\sqrt{1-x^2}}$ (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{1}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$

8) If sin^{-1} x+cot^{-1}($\frac{1}{2}$) $=\frac{\pi}{2}$, then x is equal to
(a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{5}}$ (c) $\frac{2}{\sqrt{5}}$ (d) $\frac{\sqrt{3}}{2}$

9) The number of solutions of the equation $tan^{-1}2x+tan^{-1}3x=\frac{\pi}{4}$
(a) 2 (b) 3 (c) 1 (d) none

10) If cot^{-1} 2 and cot^{-1} 3 are two angles of a triangle, then the third angle is
(a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{3}$

11) $sin^{-1}\left(tan\frac{\pi}{4}\right)-sin^{-1}\left(\sqrt{\frac{3}{x}}\right)=\frac{\pi}{6}$.Then x is a root of the equation
(a) x^2−x−6=0 (b) x^2−x−12=0 (c) x^2+x−12=0 (d) x^2+x−6=0

12) The domain of the function defined by f(x)=sin$^{-1}\sqrt{x-1}$ is
(a) [1,2] (b) [-1,1] (c) [0,1] (d) [-1,0]

13) If $cot^{-1}\left(\sqrt{sin\alpha}\right)+tan^{-1}\left(\sqrt{sin\alpha}\right)=u$, then cos2u is equal to
(a) tan$^2\alpha$ (b) 0 (c) -1 (d) tan2α

14) If x=$\frac{1}{5}$, the valur of cos (cos^{-1}x+2sin^{-1}x) is
(a) $-\sqrt{\frac{24}{25}}$ (b) $\sqrt{\frac{24}{25}}$ (c) $\frac{1}{5}$ (d) -$\frac{1}{5}$

15) The value of sin^{-1} (cos x),0≤ $x\le\pi$ is
(a) $\pi-x$ (b) $x-\frac{\pi}{2}$ (c) $\frac{\pi}{2}-x$ (d) $\pi-x$

16) The number of real solutions of the equation $\sqrt{1+cos2x}=2sin^{-1}(sinx)$, $-\pi<x<\pi$ is
(a) 0 (b) 1 (c) 2 (d) infinte

17) $tan^{-1}\left(\frac{1}{4}\right)+tan^{-1}\left(\frac{2}{11}\right)$ =

(a) 0 (b) $\frac{1}{2}$ (c) -1 (d) none

18) If sin^{-1} $\frac{x}{5}+cosec^{-1}\frac{5}{4}=\frac{\pi}{2}$, then the value of x is

(a) 4 (b) 5 (c) 2 (d) 3

19) 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

(a) 0 (b) 1 (c) 2 (d) 3

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

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) π

21) If sin‾1x = 2sin$^{-1}\alpha$ has a solution, then

(a) $|\alpha|\leq\frac{1}{\sqrt{2}}$ (b) $|\alpha|\geq\frac{1}{\sqrt{2}}$ (c) $|\alpha|<\frac{1}{\sqrt{2}}$ (d) $|\alpha|>\frac{1}{\sqrt{2}}$

22) If the function f(x)sin^{-1}(x^2-3), then x belongs to

(a) [-1,1] (b) [$\sqrt{2}$,2] (c) $\left[-2,-\sqrt{2}\right]\cup\left[\sqrt{2},2\right]$ (d) $\left[-2,-\sqrt{2}\right]\cap\left[\sqrt{2},2\right]$

23) $tan^{-1}\left(\frac{1}{4}\right)+tan^{-1}\left(\frac{2}{3}\right)$is equal to

(a) $\frac{1}{2}cos^{-1}\left(\frac{3}{5}\right)$ (b) $\frac{1}{2}sin^{-1}\left(\frac{3}{5}\right)$ (c) $\frac{1}{2}tan^{-1}\left(\frac{3}{5}\right)$ (d) $tan^{-1}\left(\frac{1}{2}\right)$

24) sin^{-1}(2cos^{2}x-1)+cos^{-1}(1-2sin^{2}x)=

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

25) If |x|≤1, then 2tan^{-1} x-sin^{-1} $\frac{2x}{1+x^2}$ is equal to

(a) tan^{-1}x (b) sin^{-1}x (c) 0 (d) π

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PATTUKKOTTAI PALANIAPPAN MATHS

INVERSE TRIGONOMETRIC FUNCTIONS

12th Standard EM

Maths - A

Reg.No. :

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
PG ASST IN MATHS
GBHSS-PATTUKKOTTAI
THANJAVUR DIST
9443407917

Time : 00:30:00 Hrs

Total Mark : 25

A - Answer Key

Answer All the questions

25 x 1 = 25

25 x 1 = 25

1) (c) 0
2) (b) $\frac{\sqrt{3}}{2}$
3) (b) $0\pi \leq x \leq 0$
4) (a) $4\alpha = 3\beta$
5) (b) unique solution
6) (c) $\frac{\pi}{10}$
7) (d) $\frac{x}{\sqrt{1+x^2}}$
8) (b) $\frac{1}{\sqrt{5}}$
9) (a) 2
10) (b) $\frac{3\pi}{4}$
11) (b) $x^2-x-12=0$
12) (a) [1,2]
13) (c) -1
14) (d) -$\frac{1}{5}$
15) (c) $\frac{\pi}{2} - x$
16) (a) 0
17) (a) 0
18) (d) 3
19) (a) 0
20) (b) $\frac{\pi}{3}$
21) (a) $|\alpha| \leq \frac{1}{\sqrt{2}}$
22) (c) $\left[-2,-\sqrt{2}\right] \cup \left[\sqrt{2},2\right]$
23) (d) $tan^{-1}\left(\frac{1}{2}\right)$
24) (a) $\frac{\pi}{2}$
25) (c) 0

PATTUKKOTTAI PALANIAPPAN MATHS

TWO DIMENSINONAL ANALYTICAL GEOMENTRY

12th Standard EM

Reg.No. :

MATHS - A

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
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Time : 00:30:00 Hrs

Total Mark : 25

Answer All the questions

25 x 1 = 25

1) If x+y=k is a normal to the parabola y^2 =12x, then the value of k is

(a) 3 (b) -1 (c) 1 (d) 9

2) The length of the diameter of the circle which touches the x -axis at the point (1,0) and passes through the point (2,3) .

(a) $\frac{6}{5}$ (b) $\frac{5}{3}$ (c) $\frac{10}{5}$ (d) $\frac{3}{5}$

3) The centre of the circle inscribed in a square formed by the lines $x^2-8x-12=0$ and $y^2-14y+45 = 0$ is

(a) (4,7) (b) (7,4) (c) (9,4) (d) (4,9)

4) The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ and $\frac{x^2}{a^2}-\frac{y^2}{b^2}=-1$

(a) $4(a^2+b^2)$ (b) $2(a^2+b^2)$ (c) a^2+b^2 (d) $\frac{1}{2}(a^2+b^2)$

5) The equation of the normal to the circle $x^2+y^2-2x-2y+1=0$ which is parallel to the line 2x+4y=3 is

(a) x+2y=3 (b) x+2y+3= 0 (c) 2x+4y+3=0 (d) x−2y+3= 0

6) Consider an ellipse whose centre is of the origin and its major axis is along x-axis. If its eccentrcity is $\frac{3}{5}$ and the distance between its foci is 6, then the area of the quadrilateral inscribed in the ellipse with diagonals as major and minor axis of the ellipse is

(a) 8 (b) 32 (c) 80 (d) 40

7) An ellipse hasOB as semi minor axes, F and F′ its foci and the angle FBF′ is a right angle. Then the eccentricity of the ellipse is

(a) $\frac{1}{\sqrt{2}}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{\sqrt{3}}$

8) The locus of a point whose distance from (-2,0) is $\frac{2}{3}$ times its distance from the line x = $\frac{-9}{2}$ is

(a) a parabola (b) a hyperbola (c) an ellipse (d) a circle

9) The ellipse E1$\frac{x^2}{9}+\frac{y^2}{4}=1$ is inscribed in a rectangle R whose sides are parallel to the coordinate axes. Another ellipse E2 passing through the point(0,4) circumscribes the rectangle R . The eccentricity of the ellipse is

(a) $\frac{\sqrt{2}}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

10) The circle x^2+y^2=4x+8y+5intersects the line3x−4y=m at two distinct points if

(a) 15< m < 65 (b) 35< m < 85 (c) −85< m < −35 (d) −35< m < 15

11) If the two tangents drawn from a point P to the parabolay2 = 4xare at right angles then the locus of P is

(a) 2x+1=0 (b) x = −1 (c) 2x−1=0 (d) x =1

12) If the coordinates at one end of a diameter of the circle $x^2+y^2-8x-4y+c=0$ are (11,2), the coordinates of the other end are

(a) (-5,2) (b) (2,-5) (c) (5,-2) (d) (-2,5)

13) The radius of the circle passing through the point(6,2) two of whose diameter arex+y=6 and x+2y=4 is

(a) 10 (b) $2\sqrt{5}$ (c) 6 (d) 4

14) The eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half the distance between the foci is

(a) $\frac{4}{3}$ (b) $\frac{4}{\sqrt{3}}$ (c) $\frac{2}{\sqrt{3}}$ (d) $\frac{3}{2}$

15) Let C be the circle with centre at(1,1) and radius =1. If T is the circle centered at(0, y) passing through the origin and touching the circleC externally, then the radius of T is equal to

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{\sqrt{3}}{\sqrt{2}}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

16) If P(x, y) be any point on $16x^2+25y^2=400$ with foci F1 (3,0) and F2 (-3,0) then PF_1 PF_2 + is

(a) 8 (b) 6 (c) 10 (d) 12

17) Tangents are drawn to the hyperbola $\frac{x^2}{9}+\frac{y^2}{4}=1$ 1parallel to the straight line2x−y=1. One of the points of contact of tangents on the hyperbola is

(a) $\frac{9}{2\sqrt{2}}, \frac{-1}{\sqrt{2}}$ (b) $\frac{-9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}$ (c) $\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}$ (d) $(3\sqrt{3}, -2\sqrt{2})$

18) If the normals of the parabola $y^2 = 4x$ drawn at the end points of its latus rectum are tangents to the circle $(x-3)^2+(y+2)^2=r^2$, then the value of r^2 is

(a) 2 (b) 3 (c) 1 (d) 4

19) The equation of the circle passing through(1,5) and (4,1) and touching y -axis is $x^2+y^2-5x-6y+9+(4x+3y-19)=0$ whereλ is equal to

(a) $0, -\frac{40}{9}$ (b) 0 (c) $\frac{40}{9}$ (d) $\frac{-40}{9}$

20) The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ 1having centre at (0,3) is

(a) $x^2+y^2-6y-7=0$ (b) $x^2+y^2-6y+7=0$ (c) $x^2+y^2-6y-5=0$ (d) $x^2+y^2-6y+5=0$

21) Area of the greatest rectangle inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1.$ is

(a) 2ab (b) ab (c) $\sqrt{ab}$ (d) $\frac{a}{b}$

22) The values of m for which the line y=mx+ $2\sqrt{5}$ touches the hyperbola $16x^2-9y^2=144$ are the roots of $x^2-(a+b)x-4=0$, then the value of (a+b) is

(a) 2 (b) 4 (c) 0 (d) -2

23) The radius of the circle$3x^2+by^2+4bx-6by+b^2=0$ is

(a) 1 (b) 3 (c) $\sqrt{10}$ (d) $\sqrt{11}$

24) The eccentricity of the ellipse $(x-3)^2+(y-4)^2=\frac{y^2}{9}$ is

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{3\sqrt{2}}$ (d) $\frac{1}{\sqrt{3}}$

25) The circle passing through(1,-2) and touching the axis of x at (3,0) passing through the point

(a) (-5,2) (b) (2,-5) (c) (5,-2) (d) (-2,5)

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PATTUKKOTTAI PALANIAPPAN MATHS

TWO DIMENSINONAL ANALYTICAL GEOMENTRY

12th Standard EM

Reg.No. :

MATHS - A

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
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9443407917

Time : 00:30:00 Hrs

Total Mark : 25

A - Answer Key

Answer All the questions 25 x 1 = 25

1) (d) 9
2) (c) $\frac{10}{5}$
3) (a) (4,7)
4) (b) $2(a^2+b^2)$
5) (a) x+2y=3
6) (d) 40
7) (a) $\frac{1}{\sqrt{2}}$
8) (c) an ellipse
9) (c) $\frac{1}{2}$
10) (d) −35<m <15
11) (b) x = −1
12) (b) (2,-5)
13) (b) $2\sqrt{5}$
14) (c) $\frac{2}{\sqrt{3}}$
15) (d) $\frac{1}{4}$
16) (c) 10
17) (c) $\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}$
18) (a) 2
19) (a) $0, -\frac{40}{9}$
20) (a) $x^2+y^2-6y-7=0$
21) (a) 2ab
22) (c) 0
23) (c) $\sqrt{10}$
24) (b) $\frac{1}{3}$
25) (c) (5,-2)

PATTUKKOTTAI PALANIAPPAN MATHS

APPLICATIONS OF VECTOR ALGEBRA

12th Standard

MATHS

Reg.No. :

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
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Time : 00:30:00 Hrs | Total Marks : 25

Answer All the questions 25 x 1 = 25

1) If $\vec{a}=2\hat{i}+3\hat{j}-\hat{k},\vec{b}=\hat{i}+2\hat{j}+5\hat{k},\vec{c}=3\hat{i}+5\hat{j}-\hat{k}$ then a vector perpendicular to $\vec{a}$ and lies in the plane containing $\vec{b}$ and $\vec{c}$ is

(a) $-17\hat{i}+21\hat{j}-97\hat{k}$ (b) $17\hat{i}+21\hat{j}-123\hat{k}$ (c) $-17\hat{i}-21\hat{j}+197\hat{k}$ (d) $-17\hat{i}-21\hat{j}-197\hat{k}$

2) If $\vec{a}$ and $\vec{b}$ are unit vectors such that $[\vec{a},\vec{b},\vec{a}\times\vec{b}]=\frac{\pi}{4}$, then the angle between $\vec{a}$ and $\vec{b}$ is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

3) Distance from the origin to the plane 3x - 6y + 2z 7 = 0 is

(a) 0 (b) 1 (c) 2 (d) 3

4) If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $[\vec{a},\vec{c},\vec{b}]$ is equal to

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

5) The vector equation $\vec{r}=(\hat{i}-2\hat{j}-\hat{k})+t(6\hat{i}-\hat{k})$ represents a straight line passing through the points

(a) (0,6,1)– and (1,2,1) (b) (0,6,-1) and (1,4,2) (c) (1,-2,-1) and (1,4,-2) (d) (1,-2,-1) and (0,-6,1)

6) If the planes $\vec{r}=(2\hat{i}-\lambda\hat{j}+\hat{k})=3$ and $\vec{r}=(4+\hat{j}-\mu\hat{k})=5$ are parallel, then the value of λ and μ are

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

7) The coordinates of the point where the line $\vec{r}=(6\hat{i}-\hat{j}-3\hat{k})+t(\hat{i}+4\hat{j})$ meets the plane $\vec{r}=(\hat{i}+\hat{j}-\hat{k})$ = 3 are

(a) (2,1,0) (b) (7,1,7) (c) (1,2,6) (d) (5,1,1)

8) If $\vec{a},\vec{b},\vec{c}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$ and is parallel to $\vec{c}$ then $\vec{a}\times(\vec{b}\times\vec{c})$ is equal to

(a) $\vec{a}$ (b) $\vec{b}$ (c) $\vec{c}$ (d) $\vec{0}$

9) The volume of the parallelepiped with its edges represented by the vectors $\hat{i}+\hat{j},\hat{i}+2\hat{j},\hat{i}+\hat{j}+\pi\hat{k}$ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) π (d) $\frac{\pi}{4}$

10) If the distance of the point (1,1,1) from the origin is half of its distance from the plane x + y + z + k =0, then the values of k are

(a) ±3 (b) ±6 (c) -3, 9 (d) 3, 9

11) If a vector $\vec{\alpha}$ lies in the plane of $\vec{\beta}$ and $\vec{\gamma}$, then

(a) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]$ = 1 (b) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]$= -1 (c) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]$= 0 (d) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]$= 2

12) $\vec{a}.\vec{b}=\vec{b}.\vec{c}=\vec{c}.\vec{a}=0$, then the value of $[\vec{a},\vec{b},\vec{c}]$ is

(a) $|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ (b) $\frac{1}{3}|\vec{a}|\,|\vec{b}|\,|\vec{c}|$ (c) 1 (d) -1

13) If the volume of the parallelepiped with $\vec{a}\times\vec{b},\vec{b}\times\vec{c},\vec{c}\times\vec{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c}),(\vec{b}\times\vec{c})\times(\vec{c}\times\vec{a})$ and $(\vec{c}\times\vec{a})\times(\vec{a}\times\vec{b})$ as coterminous edges is,

(a) 8 cubic units (b) 512 cubic units (c) 64 cubic units (d) 24 cubic units

14) The angle between the line $\vec{r}=(\hat{i}+2\hat{j}-3\hat{k})+t(2\hat{i}+\hat{j}-2\hat{k})$ and the plane $\vec{r}.(\hat{i}+\hat{j})+4=0$ is

(a) 0° (b) 30° (c) 45° (d) 90°

15) If the direction cosines of a line are $\frac{1}{c},\frac{1}{c},\frac{1}{c}$, then

(a) $c = \pm 3$ (b) $c = \pm\sqrt{3}$ (c) c > 0 (d) 0 < c < 1

16) If $\vec{a} = \hat{i} + \hat{j} + \hat{k}, \vec{b} = \hat{i} + \hat{j}, \vec{c} = \hat{i}$ and $(\vec{a} \times \vec{b}) \times \vec{c} = \lambda\vec{a} + \mu\vec{b}$ then the value of $\lambda + \mu$ is

(a) 0 (b) 1 (c) 6 (d) 3

17) If $[\vec{a}, \vec{b}, \vec{c}] = 1$, $\frac{\vec{a}.(\vec{b}\times\vec{c})}{(\vec{c}\times\vec{a}).\vec{b}} + \frac{\vec{b}.(\vec{c}\times\vec{a})}{(\vec{a}\times\vec{b}).\vec{c}} + \frac{\vec{c}.(\vec{a}\times\vec{b})}{(\vec{c}\times\vec{b}).\vec{a}}$ is

(a) 1 (b) -1 (c) 2 (d) 3

18) Consider the vectors $\vec{a}, \vec{b}, \vec{c}, \vec{c}$ such that $(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d}) = \vec{0}$ Let P_1 and P_2 be the planes determined by the pairs of vectors $\vec{a}, \vec{b}$ and $\vec{c}, \vec{d}$ respectively. Then the angle between P_1 and P_2 is

(a) 0° (b) 45° (c) 60° (d) 90°

19) The distance between the planes x + 2y + 3z + 7 = 0 and 2x + 4y + 6z + 7 = 0

(a) $\frac{\sqrt{7}}{2\sqrt{2}}$ (b) $\frac{7}{2}$ (c) $\frac{\sqrt{7}}{2}$ (d) $\frac{7}{2\sqrt{2}}$

20) If $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \times \vec{b}) \times \vec{c}$ where $\vec{a}, \vec{b}, \vec{c}$ are any three vectors such that $\vec{a}, \vec{b} \neq 0$ and $\vec{a}.\vec{b} \neq 0$ then $\vec{a}$ and $\vec{c}$ are

(a) perpendicular (b) parallel (c) inclined at an angle $\frac{\pi}{3}$ (d) inclined at an angle $\frac{\pi}{6}$

21) If $\vec{a}, \vec{b}, \vec{c}$ are three non-coplanar vectors such that $\vec{a} \times (\vec{b} \times \vec{c}) = \frac{\vec{b}+\vec{c}}{\sqrt{2}}$, then the angle between

(a) $\frac{\pi}{2}$ (b) $\frac{3\pi}{6}$ (c) $\frac{\pi}{4}$ (d) π

22) If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar, non-zero vectors such that $[\vec{a}, \vec{b}, \vec{c}] = 3$, then $\{[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}]\}^2$ is equal to

(a) 81 (b) 9 (c) 27 (d) 18

23) The angle between the lines $\frac{x-2}{3} = \frac{y+1}{-2}$, z=2 and $\frac{x-1}{1} = \frac{2y+3}{3} = \frac{z+5}{2}$

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

24) If the line $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{x+2}{2}$ lies in the plane x + 3y + - αz + β = 0, then (α, β) is

(a) (-5, 5) (b) (-6, 7) (c) (5, 5) (d) (6, -7)

25) If the length of the perpendicular from the origin to the plane 2x + 3y + λz =1, λ > 0 is $\frac{1}{5}$ then the value of λ is

(a) $2\sqrt{3}$ (b) $3\sqrt{2}$ (c) 0 (d) 1

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PATTUKKOTTAI PALANIAPPAN MATHS

APPLICATIONS OF VECTOR ALGEBRA

12th Standard EM

MATHS - A

Reg.No. :

P.A.PALANIAPPAN,MSc.,MPhil.,BEd.,
PG ASST IN MATHS
GBHSS-PATTUKKOTTAI
THANJAVUR DIST
9443407917

Time : 00:30:00 Hrs

Total Mark : 25

A - Answer Key

Answer All the questions 25 x 1 = 25

1) (d) $-17\hat{i}-21\hat{j}-197\hat{k}$
2) (a) $\frac{\pi}{6}$
3) (b) 1
4) (d) 0
5) (c) (1,-2,-1) and (1,4,-2)
6) (c) $-\frac{1}{2},-2$
7) (d) (5,1,1)
8) (b) $\vec{b}$
9) (c) π
10) (d) 3, 9
11) (c) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]=0$
12) (a) $|\vec{a}|\left|\vec{b}\right||\vec{c}|$
13) (c) 64 cubic units
14) (c) 45°
15) (b) $c=\pm\sqrt{3}$
16) (a) 0
17) (c) 2
18) (a) 0°
19) (a) $\frac{\sqrt{7}}{2\sqrt{2}}$
20) (b) parallel
21) (b) $\frac{3\pi}{6}$
22) (a) 81
23) (d) $\frac{\pi}{2}$
24) (b) (-6, 7)
25) (a) $2\sqrt{3}$

TAMIL NADU +2 MATHEMATICS

MCQ TEST 1

12th Standard

Date : 05-Dec-19

MATHEMATICS

Reg.No. : | | | | | | |

MULTIPLE CHOICE QUESTIONS
CHOOSE THE CORRECT ANSWER

Exam Time : 00:25:00 Hrs   Total Marks : 40

40 x 1 = 40

1) If A = $\begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, then 9I - A =

(a) A^{-1} (b) $\frac{A^{-1}}{2}$ (c) $3A^{-1}$ (d) $2A^{-1}$

2) If A, B and C are invertible matrices of some order, then which one of the following is not true?

(a) adj A = $|A|A^{-1}$ (b) adj(AB) = (adj A)(adj B) (c) det A^{-1} = $(\det A)^{-1}$ (d) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

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

(a) 17 (b) 14 (c) 19 (d) 21

4) $i^n+i^{n+1}+i^{n+2}+i^{n+3}$ is

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

5) The area of the triangle formed by the complex numbers z,iz, and z+iz in the Argand's diagram is

(a) $\frac{1}{2}|z|^2$ (b) $|z|^2$ (c) $\frac{3}{2}|z|^2$ (d) $2|z|^2$

6) 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

(a) 1 (b) 2 (c) 3 (d) 4

7) A zero of x^3 + 64 is

(a) 0 (b) 4 (c) 4i (d) -4

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

(a) -1 (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) 5

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

(a) 0 (b) n (c) < n (d) r

10) $sin^{-1}\frac{3}{5} - cos^{-1}\frac{12}{13} + sec^{-1}\frac{5}{3} - cosec^{1-}\frac{13}{2}$ is equal to

(a) 2π (b) π (c) 0 (d) $\tan^{-1}\frac{12}{65}$

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

(a) $-\pi \le x \le 0$ (b) $0\pi \le x \le 0$ (c) $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$ (d) $-\frac{\pi}{4} \le x \le \frac{3\pi}{4}$

12) $\sin(\tan^{-1}x)$, $|x| < 1$ ia equal to

(a) $\frac{x}{\sqrt{1-x^2}}$ (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{1}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$

13) The eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half the distance between the foci is

(a) $\frac{4}{3}$ (b) $\frac{4}{\sqrt{3}}$ (c) $\frac{2}{\sqrt{3}}$ (d) $\frac{3}{2}$

14) Let C be the circle with centre at(1,1) and radius =1. If T is the circle centered at(0, y) passing through the origin and touching the circleC externally, then the radius of T is equal to

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{\sqrt{3}}{\sqrt{2}}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

15) The eccentricity of the ellipse $(x-3)^2 + (y-4)^2 = \frac{y^2}{9}$ is

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{3\sqrt{2}}$ (d) $\frac{1}{\sqrt{3}}$

16) The values of m for which the line y=mx+ $2\sqrt{5}$ touches the hyperbola $16x^2-9y^2=144$ are the roots of $x^2-(a+b)x-4=0$, then the value of (a+b) is

(a) 2 (b) 4 (c) 0 (d) -2

17) $\vec{a}.\vec{b} = \vec{b}.\vec{c} = \vec{c}.\vec{a} = 0$, then the value of $[\vec{a}, \vec{b}, \vec{c}]$ is

(a) $|\vec{a}|\left|\vec{b}\right||\vec{c}|$ (b) $\frac{1}{3}|\vec{a}|\left|\vec{b}\right||\vec{c}|$ (c) 1 (d) -1

18) If $\vec{a}$ and $\vec{b}$ are unit vectors such that $[\vec{a}, \vec{b}, \vec{a}\times\vec{b}] = \frac{\pi}{4}$, then the angle between $\vec{a}$ and $\vec{b}$ is

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

19) If the volume of the parallelepiped with $\vec{a}\times\vec{b}, \vec{b}\times\vec{c}, \vec{c}\times\vec{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c}), (\vec{b}\times\vec{c})\times(\vec{c}\times\vec{a})$ and $(\vec{c}\times\vec{a})\times(\vec{a}\times\vec{b})$as coterminous edges is,

(a) 8 cubic units (b) 512 cubic units (c) 64 cubic units (d) 24 cubic units

20) The vector equation $\vec{r} = (\hat{i} - 2\hat{j} - \hat{k}) + t(6\hat{i} - \hat{k})$ represents a straight line passing through the points

(a) (0,6,1)– and (1,2,1) (b) (0,6,-1) and (1,4,2) (c) (1,-2,-1) and (1,4,-2) (d) (1,-2,-1) and (0,-6,1)

21) A stone is thrown up vertically. The height it reaches at time t seconds is given by x = 80t -16t^2. The stone reaches the maximum height in time t seconds is given by

(a) 2 (b) 2.5 (c) 3 (d) 3.5

22) Find the point on the curve 6y = .x^3 + 2 at which y-coordinate changes 8 times as fast as x-coordinate is

(a) (4,11) (b) (4,-11) (c) (-4,11) (d) (-4,-11)

23) The value of the limit $\lim\limits_{x\to 0}\left(\cot x - \frac{1}{x}\right)$

(a) 0 (b) 1 (c) 2 (d) ∞

24) The number given by the Mean value theorem for the function $\frac{1}{x}$,x∈[1,9] is

(a) 2 (b) 2.5 (c) 3 (d) 3.5

25) The percentage error of fifth root of 31 is approximately how many times the percentage error in 31?

(a) $\frac{1}{31}$ (b) $\frac{1}{5}$ (c) 5 (d) 31

26) The change in the surface area S = 6x^2 of a cube when the edge length varies from x_o to x_o+ dx is

(a) 12 x_o+dx (b) 12x_o dx (c) 6x_o dx (d) 6x_o+ dx

27) If u(x, y) = x^2+ 3xy + y - 2019, then $\frac{\partial u}{\partial x}_{(4,\,-5)}$ is equal to

(a) -4 (b) -3 (c) -7 (d) 13

28) The value of $\int_{-4}^{4}\left[\tan^{-1}\left(\frac{x^2}{x^4+1}\right) + \tan^{-1}\left(\frac{x^4+1}{x^2}\right)\right]dx$ is

(a) π (b) 2π (c) 3π (d) 4π

29) If $\int_a^a \frac{1}{4+x^2}dx = \frac{\pi}{8}$then a is

(a) 4 (b) 1 (c) 3 (d) 2

30) The value of $\int_0^{\frac{2}{3}} \frac{dx}{\sqrt{4-9x^2}}$ is

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

31) The general solution of the differential equation $\frac{dy}{dx} = \frac{y}{x}$ is

(a) xy = k (b) y = k log x (c) y = kx (d) log y = kx

32) The solution of $\frac{dy}{dx}$+p(x)y=0 is

(a) $y = ce^{\int pdx}$ (b) $y = ce^{-\int pdx}$ (c) $x = ce^{-\int pdx}$ (d) $xce^{\int pdx}$

33) If the solution of the differential equation $\frac{dy}{dx} = \frac{ax+3}{2y+f}$represents a circle, then the value of a is

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

34) The slope at any point of a curve y = f (x) is given by $\frac{dy}{dx} = 3x^2$ and it passes through (-1,1). Then the equation of the curve is

(a) y=x^3+2 (b) y=3x^2+4 (c) y=3x^4+4 (d) y=3x^2+5

35) Which of the following is a discrete random variable?

I. The number of cars crossing a particular signal in a day

II.The number of customers in a queue-to buy train tickets at a moment.

III.The time taken to complete a telephone call.

(a) I and II (b) II only (c) III only (d) II and III

36) If f(x) = is a probability density function of a random variable, then the value of a is

(a) 1 (b) 2 (c) 3 (d) 4

37) A computer salesperson knows from his past experience that he seUs computers to one in every twenty customers who enter the showroom. What is the probability that he will seU a computer to exactly two of the next three customers?

(a) $\frac{57}{20^3}$ (b) $\frac{57}{20^2}$ (c) $\frac{19^3}{20^3}$ (d) $\frac{57}{20}$

38) Subtraction is not a binary operation in

(a) R (b) Z (c) N (d) Q

39)

p	q	(p ∧ q) ⟶ ¬q
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is correct for the truth value of (p ∧ q)⟶ ¬p p?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
F	T	T	T

(c)

(a)	(b)	(c)	(d)
F	F	T	T

(d)

(a)	(b)	(c)	(d)
T	T	T	F

40) Determine the truth value of each of the following statements:

(a) 4+2=5 and 6+3=9

(b) 3+2=5 and 6+1=7

(c) 4+5=9 and1+2= 4

(d) 3+2=5 and 4+7=11

(a)

(a)	(b)	(c)	(d)
F	T	T	T

(b)

(a)	(b)	(c)	(d)
T	F	T	F

(c)

(a)	(b)	(c)	(d)
T	T	F	F

(d)

(a)	(b)	(c)	(d)
F	F	T	T

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TAMIL NADU +2 MATHEMATICS

MCQ TEST 2

12th Standard

Date : 05-Dec-19

MATHEMATICS

Reg.No. :

MULTIPLE CHOICE QUESTIONS
CHOOSE THE CORRECT ANSWER

Exam Time : 00:25:00 Hrs

Total Marks : 40

40 x 1 = 40

1) If |adj(adj A)| = $|A|^9$, then the order of the square matrix A is

(a) 3 (b) 4 (c) 2 (d) 5

2) 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

(a) 15 (b) 12 (c) 14 (d) 11

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

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

4) The area of the triangle formed by the complex numbers z,iz, and z+iz in the Argand's diagram is

(a) $\frac{1}{2}|z|^2$ (b) $|z|^2$ (c) $\frac{3}{2}|z|^2$ (d) $2|z|^2$

5) If z is a non zero complex number, such that $2iz^2=\bar{z}$ then |z| is

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 3

6) 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

(a) 1 (b) 2 (c) 3 (d) 4

7) If f and g are polynomials of degrees m and n respectively, and if h(x) =(f 0 g)(x), then the degree of h is

(a) mn (b) m+n (c) m^n (d) n^m

8) If α,β and γ are the roots of x^3+px^2+qx+r, then $\Sigma\frac{1}{\alpha}$ is

(a) $-\frac{q}{r}$ (b) $\frac{p}{r}$ (c) $\frac{q}{r}$ (d) $-\frac{q}{p}$

9) The number of real numbers in [0,2π] satisfying $\sin^4x-2\sin^2x+1$ is

(a) 2 (b) 4 (c) 1 (d) ∞

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

(a) $\pi - x$ (b) $x-\frac{\pi}{2}$ (c) $\frac{\pi}{2}-x$ (d) $\pi - x$

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

(a) $\frac{-\pi}{10}$ (b) $\frac{\pi}{5}$ (c) $\frac{\pi}{10}$ (d) $-\frac{\pi}{5}$

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

(a) [-1,1] (b) $[\sqrt{2},2]$ (c) $\left[-2,-\sqrt{2}\right]\cup\left[\sqrt{2},2\right]$ (d) $\left[-2,-\sqrt{2}\right]\cap\left[\sqrt{2},2\right]$

13) The radius of the circle$3x^2+by^2+4bx-6by+b^2=0$ is

(a) 1 (b) 3 (c) $\sqrt{10}$ (d) $\sqrt{11}$

14) The centre of the circle inscribed in a square formed by the lines $x^2-8x-12=0$ and $y^2-14y+45 = 0$ is

(a) (4,7) (b) (7,4) (c) (9,4) (d) (4,9)

15) The equation of the normal to the circle $x^2+y^2-2x-2y+1=0$ which is parallel to the line $2x+4y=3$ is

(a) $x+2y=3$ (b) $x+2y+3=0$ (c) $2x+4y+3=0$ (d) $x-2y+3=0$

16) The locus of a point whose distance from (-2,0) is $\frac{2}{3}$ times its distance from the line $x = \frac{-9}{2}$ is

(a) a parabola (b) a hyperbola (c) an ellipse (d) a circle

17) If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $[\vec{a}, \vec{c}, \vec{b}]$ is equal to

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

18) If $\vec{a}, \vec{b}, \vec{c}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$ and is parallel to $\vec{c}$ then $\vec{a} \times (\vec{b} \times \vec{c})$ is equal to

(a) $\vec{a}$ (b) $\vec{b}$ (c) $\vec{c}$ (d) $\vec{0}$

19) The volume of the parallelepiped with its edges represented by the vectors $\hat{i}+\hat{j}, \hat{i}+2\hat{j}, \hat{i}+\hat{j}+\pi\hat{k}$ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) π (d) $\frac{\pi}{4}$

20) If the volume of the parallelepiped with $\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $(\vec{a} \times \vec{b}) \times (\vec{b} \times \vec{c}), (\vec{b} \times \vec{c}) \times (\vec{c} \times \vec{a})$ and $(\vec{c} \times \vec{a}) \times (\vec{a} \times \vec{b})$as coterminous edges is,

(a) 8 cubic units (b) 512 cubic units (c) 64 cubic units (d) 24 cubic units

21) The abscissa of the point on the curve $f(x) = \sqrt{8-2x}$ at which the slope of the tangent is -0.25 ?

(a) -8 (b) -4 (c) -2 (d) 0

22) The slope of the line normal to the curve f(x) = 2cos 4x at $x = \frac{\pi}{12}$

(a) $-4\sqrt{3}$ (b) -4 (c) $\frac{\sqrt{3}}{12}$ (d) $4\sqrt{3}$

23) Angle between $y^2 = x$ and.$x^2= y$ at the origin is

(a) $tan^{-1}\frac{3}{4}$ (b) $tan^{-1}\left(\frac{4}{3}\right)$ (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{4}$

24) The maximum slope of the tangent to the curve y = t:r sin x, x ∈ [0, 2π] is at

(a) $x = \frac{\pi}{4}$ (b) $x = \frac{\pi}{2}$ (c) $x = \pi$ (d) $x = \frac{3\pi}{2}$

25) If w (x, y) = xy, x > 0, then $\frac{\partial w}{\partial x}$ is equal to

(a) $x^y \log x$ (b) y log x (c) yx^{y-1} (d) x log y

26) If f (x, y) = e^{xy} then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to

(a) xye^{xy} (b) $(1+xy)e^{xy}$ (c) $(1+y)e^{xy}$ (d) $(1+x)e^{xy}$

27) If (x,y, z) = xy +yz +zx, then $f_x - f_z$ is equal to

(a) z - x (b) y - z (c) x - z (d) y - x

28) The value of $\frac{(n+2)}{(n)} = 90$ then n is

(a) 10 (b) 5 (c) 8 (d) 9

29) The value of $\int_0^{\pi} sin^4 x dx$ is

(a) $\frac{3\pi}{10}$ (b) $\frac{3\pi}{8}$ (c) $\frac{3\pi}{4}$ (d) $\frac{3\pi}{2}$

30) The value of $\int_{-1}^{2} |x| dx$

(a) $\frac{1}{2}$ (b) $\frac{3}{2}$ (c) $\frac{5}{2}$ (d) $\frac{7}{2}$

31) The order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{1/3} + x^{1/4} = 0$are respectively

(a) 2, 3 (b) 3, 3 (c) 2, 6 (d) 2, 4

32) If sin x is the integrating factor of the linear differential equation $\frac{dy}{dx} + Pt = Q$, Then P is

(a) log sin x (b) cos x (c) tan x (d) cot x

33) The number of arbitrary constants in the general solutions of order n and n +1are respectively

(a) n-1,n (b) n,n+1 (c) n+1,n+2 (d) n+1,n

34) The number of arbitrary constants in the particular solution of a differential equation of third order is

(a) 3 (b) 2 (c) 1 (d) 0

35) Consider a game where the player tosses a sixsided fair die. H the face that comes up is 6, the player wins Rs.36, otherwise he loses Rs. k^2 , where k is the face that comes up k = {I, 2,3,4, 5}.
The expected amount to win at this game in Rs is

(a) $\frac{19}{6}$ (b) $-\frac{19}{6}$ (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

36) On a multiple-choice exam with 3 possible destructives for each of the 5 questions, the probability that a student will get 4 or more correct answers just by guessing is

(a) $\frac{11}{243}$ (b) $\frac{3}{8}$ (c) $\frac{1}{243}$ (d) $\frac{5}{243}$

37) A computer salesperson knows from his past experience that he seUs computers to one in every twenty customers who enter the showroom. What is the probability that he will seU a computer to exactly two of the next three customers?

(a) $\frac{57}{20^3}$ (b) $\frac{57}{20^2}$ (c) $\frac{19^3}{20^3}$ (d) $\frac{57}{20}$

38) Which one of the following is a binary operation on N?

(a) Subtraction (b) Multiplication (c) Division (d) All the above

39) Which one of the following is incorrect? For any two propositions p and q, we have

(a) ¬ (p∨q) ≡ ¬ p ∧ ¬q (b) ¬ (p∧ q)≡¬p ∨ ¬q (c) ¬ (p ∨ q)≡¬p∨¬q (d) ¬(¬p)≡ p

40)

p	q	(p ∧ q) ⟶ ¬q
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is correct for the truth value of (p ∧ q)⟶ ¬p p?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
F	T	T	T

(c)

(a)	(b)	(c)	(d)
F	F	T	T

(d)

(a)	(b)	(c)	(d)
T	T	T	F

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TAMIL NADU +2 MATHEMATICS

MCQ TEST 3

12th Standard

Date : 05-Dec-19

MATHEMATICS

Reg.No. :

MULTIPLE CHOICE QUESTIONS
CHOOSE THE CORRECT ANSWER

Exam Time : 00:25:00 Hrs

Total Marks : 40

40 x 1 = 40

1) If A = $\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, B = adj A and C = 3A, then $\frac{|adjB|}{|C|}$ =

(a) $\frac{1}{3}$ (b) $\frac{1}{9}$ (c) $\frac{1}{4}$ (d) 1

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

(a) $\left(\cos^2\frac{\theta}{2}\right)A$ (b) $\left(\cos^2\frac{\theta}{2}\right)A^T$ (c) $\left(\cos^2\theta\right)I$ (d) $(\mathrm{Sin}^2\frac{\theta}{2})A$

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

(a) $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$ (b) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$ (c) $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$ (d) $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

4) The conjugate of a complex number is $\frac{1}{i-2}$/Then the complex number is

(a) $\frac{1}{i+2}$ (b) $\frac{-1}{i+2}$ (c) $\frac{-1}{i-2}$ (d) $\frac{1}{i-2}$

5) If $\frac{z-1}{z+1}$ is purely imaginary, then |z| is

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 3

6) The principal argument of $\frac{3}{-1+i}$

(a) $\frac{-5\pi}{6}$ (b) $\frac{-2\pi}{3}$ (c) $\frac{-3\pi}{4}$ (d) $\frac{-\pi}{2}$

7) A zero of x^3 + 64 is

(a) 0 (b) 4 (c) 4i (d) -4

8) A polynomial equation in x of degree n always has

(a) n distinct roots (b) n real roots (c) n imaginary roots (d) at most one root

9) If α,β and γ are the roots of x^3+px^2+qx+r, then $\Sigma\frac{1}{\alpha}$ is

(a) $-\frac{q}{r}$ (b) $\frac{p}{r}$ (c) $\frac{q}{r}$ (d) $-\frac{q}{p}$

10) 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

(a) 0 (b) 1 (c) 2 (d) 3

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

(a) $\frac{-\pi}{10}$ (b) $\frac{\pi}{5}$ (c) $\frac{\pi}{10}$ (d) $-\frac{\pi}{5}$

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

(a) no solution (b) unique solution (c) two solutions (d) infinite number of solutions

13) The circle $x^2+y^2=4x+8y+5$ intersects the line $3x-4y=m$ at two distinct points if

(a) $15< m < 65$ (b) $35< m < 85$ (c) $-85< m < -35$ (d) $-35< m < 15$

14) The centre of the circle inscribed in a square formed by the lines $x^2-8x-12=0$ and $y^2-14y+45 = 0$ is

(a) (4,7) (b) (7,4) (c) (9,4) (d) (4,9)

15) Tangents are drawn to the hyperbola $\frac{x^2}{9}+\frac{y^2}{4}=1$ 1parallel to the straight line $2x-y=1$. One of the points of contact of tangents on the hyperbola is

(a) $\frac{9}{2\sqrt{2}}, \frac{-1}{\sqrt{2}}$ (b) $\frac{-9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}$ (c) $\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}$ (d) $\left(3\sqrt{3}, -2\sqrt{2}\right)$

16) The values of m for which the line $y=mx+2\sqrt{5}$ touches the hyperbola $16x^2-9y^2=144$ are the roots of $x^2-(a+b)x-4=0$, then the value of (a+b) is

(a) 2 (b) 4 (c) 0 (d) -2

17) If a vector $\vec{\alpha}$ lies in the plane of $\vec{\beta}$ and $\vec{\gamma}$, then

(a) $[\vec{\alpha},\vec{\beta},\vec{\gamma}] = 1$ (b) $[\vec{\alpha},\vec{\beta},\vec{\gamma}] = -1$ (c) $[\vec{\alpha},\vec{\beta},\vec{\gamma}] = 0$ (d) $[\vec{\alpha},\vec{\beta},\vec{\gamma}] = 2$

18) The volume of the parallelepiped with its edges represented by the vectors $\hat{i}+\hat{j}, \hat{i}+2\hat{j}, \hat{i}+\hat{j}+\pi\hat{k}$ is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) π (d) $\frac{\pi}{4}$

19) The angle between the lines $\frac{x-2}{3}=\frac{y+1}{-2}$, z=2 and $\frac{x-1}{1}=\frac{2y+3}{3}=\frac{z+5}{2}$

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{2}$

20) If the line $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{x+2}{2}$ lies in the plane x + 3y + - αz + β = 0, then (α, β) is

(a) (-5, 5) (b) (-6, 7) (c) (5, 5) (d) (6, -7)

21) The position of a particle moving along a horizontal line of any time t is given by set) = $3t^2$ -2t- 8. The time at which the particle is at rest is

(a) t= 0 (b) $t=\frac{1}{3}$ (c) t =1 (d) t = 3

22) The slope of the line normal to the curve f(x) = 2cos 4x at $x=\frac{\pi}{12}$

(a) $-4\sqrt{3}$ (b) -4 (c) $\frac{\sqrt{3}}{12}$ (d) $4\sqrt{3}$

23) The maximum value of the function $x^2 e^{-2x}$,

(a) $\frac{1}{e}$ (b) $\frac{1}{2e}$ (c) $\frac{1}{e^2}$ (d) $\frac{4}{e^4}$

24) The point of inflection of the curve y = $(x - 1)^3$ is

(a) (0,0) (b) (0,1) (c) (1,0) (d) (1,1)

25) A circular template has a radius of 10 cm. The measurement of radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this template is

(a) 0.2% (b) 0.4% (c) 0.04% (d) 0.08%

26) If u (x, y) = e^{x2+y2}, then $\frac{\partial u}{\partial x}$ is equal to

(a) e^{x2+y2} (b) 2xu (c) x^2u (d) y^2u

27) If v (x, y) = log (ex + ev), then $\frac{\partial v}{\partial x}+\frac{\partial v}{\partial y}$ is equal to

(a) $e^x + e^y$ (c) 2 (d) 1

(b) $\frac{1}{e^x+e^y}$

28) The value of $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}}\left(\frac{2x^7-3x^5+7x^3-x+1}{cos^2x}\right)dx$ is

(a) 4 (b) 3 (c) 2 (d) 0

29) If $\int_a^a\frac{1}{4+x^2}dx = \frac{\pi}{8}$ then a is

(a) 4 (b) 1 (c) 3 (d) 2

30) The value of $\int_{-1}^{2}|x|dx$

(a) $\frac{1}{2}$ (b) $\frac{3}{2}$ (c) $\frac{5}{2}$ (d) $\frac{7}{2}$

31) The differential equation of the family of curves $y = Ae^x + Be^{-x}$, where A and B are arbitrary constants is

(a) $\frac{d^2y}{dx^2}+y=0$ (b) $\frac{d^2y}{dx^2}-y=0$ (c) $\frac{dy}{dx}+y=0$ (d) $\frac{dy}{dx}-y=0$

32) The solution of the differential equation $\frac{dy}{dx} = 2xy$is

(a) $y = Ce^{x^2}$ (b) $y= 2x^2 +C$ (c) $y = Ce^{-x^2} +C$ (d) $y = x^2 +C$

33) The solution of $\frac{dy}{dx} = 2^{y-x}$is

(a) $2^x+2^y=C$ (b) $2^x-2^y=C$ (c) $\frac{1}{2^x}-\frac{1}{2^y}=C$ (d) x+y=C

34) The number of arbitrary constants in the general solutions of order n and n +1are respectively

(a) n-1,n (b) n,n+1 (c) n+1,n+2 (d) n+1,n

35) A pair of dice numbered 1, 2, 3, 4, 5, 6 of a six-sided die and 1, 2, 3, 4 of a four-sided die is roUed and the sum is determined. Let the random variable X denote this sum. Then the number of elements in the inverse image of 7 is

(a) 1 (b) 2 (c) 3 (d) 4

36) If the function $f(x) = \frac{1}{12}$ for. a < x < b, represents a probability density function of a continuous random variable X, then which of the followingcannot be the value of a and b?

(a) 0 and 12 (b) 5 and 17 (c) 7 and 19 (d) 16 and 24

37) Let X have a Bernoulli distribution with mean 0.4, then the variance of (2X - 3) is

(a) 0.24 (b) 0.48 (c) 0.6 (d) 0.96

38) Which one of the following statements has truth value F?

(a) Chennai is in India or $\sqrt{2}$ is an integer (b) Chennai is in India or $\sqrt{2}$ is an irrational number (c) Chennai is in China or $\sqrt{2}$ is an integer (d) Chennai is in China or $\sqrt{2}$ is an irrational number

39) Which one of the following is incorrect? For any two propositions p and q, we have

(a) $\neg(p\vee q) \equiv \neg p \wedge \neg q$ (b) $\neg(p\wedge q)\equiv\neg p \vee \neg q$ (c) $\neg(p \vee q)\equiv\neg p\vee\neg q$ (d) $\neg(\neg p)\equiv p$

40) Which one of the following is not true?

(a) Negation of a negation of a statement is the statement itself (b) If the last column of the truth table contains only T then it is a tautology. (c) If the last column of its truth table contains only F then it is a contradiction (d) If p and q are any two statements then $p\leftrightarrow q$ is a tautology.

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TAMIL NADU +2 MATHEMATICS

MCQ TEST 4

12th Standard

Date : 05-Dec-19

MATHEMATICS

Reg.No. : | | | | | | |

MULTIPLE CHOICE QUESTIONS
CHOOSE THE CORRECT ANSWER

Exam Time : 00:25:00 Hrs

Total Marks : 40

40 x 1 = 40

1) 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

(a) 15 (b) 12 (c) 14 (d) 11

2) If A, B and C are invertible matrices of some order, then which one of the following is not true?

(a) adj A = $|A|A^{-1}$ (b) adj(AB) = (adj A)(adj B) (c) det A^{-1} = $(\det A)^{-1}$ (d) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

3) If A = $\begin{bmatrix} 1 & \tan\frac{\theta}{2} \\ -\tan\frac{\theta}{2} & 1 \end{bmatrix}$ and AB = I , then B =

(a) $\left(\cos^2\frac{\theta}{2}\right)A$ (b) $\left(\cos^2\frac{\theta}{2}\right)A^T$ (c) $\left(\cos^2\theta\right)I$ (d) $(\sin^2\frac{\theta}{2})A$

4) If |z|=1, then the value of $\frac{1+z}{1+\bar{z}}$ is

(a) z (b) $\bar{z}$ (c) $\frac{1}{z}$ (d) 1

5) If z=x+iy is a complex number such that |z+2|=|z−2|, then the locus of z is

(a) real axis (b) imaginary axis (c) ellipse (d) circle

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

(a) (1,0) (b) (−1,1) (c) (0,1) (d) (1,1)

7) If f and g are polynomials of degrees m and n respectively, and if h(x) =(f 0 g)(x), then the degree of h is

(a) mn (b) m+n (c) m^n (d) n^m

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

(a) -1 (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) 5

9) The number of real numbers in [0,2π] satisfying $\sin^4x-2\sin^2x+1$ is

(a) 2 (b) 4 (c) 1 (d) ∞

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

(a) $-\sqrt{\frac{24}{25}}$ (b) $\sqrt{\frac{24}{25}}$ (c) $\frac{1}{5}$ (d) $-\frac{1}{5}$

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

(a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{3}$

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

(a) $x^2-x-6=0$ (b) $x^2-x-12=0$ (c) $x^2+x-12=0$ (d) $x^2+x-6=0$

13) The equation of the normal to the circle $x^2+y^2-2x-2y+1=0$ which is parallel to the line 2x+4y=3 is

(a) x+2y=3 (b) x+2y+3= 0 (c) 2x+4y+3=0 (d) x−2y+3= 0

14) The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$

(a) $4(a^2+b^2)$ (b) $2(a^2+b^2)$ (c) $a^2 + b^2$ (d) $\frac{1}{2}(a^2+b^2)$

15) Area of the greatest rectangle inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. is

(a) 2ab (b) ab (c) $\sqrt{ab}$ (d) $\frac{a}{b}$

16) The values of m for which the line $y=mx+ 2\sqrt{5}$ touches the hyperbola $16x^2-9y^2=144$ are the roots of $x^2-(a+b)x-4=0$, then the value of (a+b) is

(a) 2 (b) 4 (c) 0 (d) -2

17) If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar, non-zero vectors such that $[\vec{a}, \vec{b}, \vec{c}] = 3$, then $\{[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}]\}^2$ is equal to

(a) 81 (b) 9 (c) 27 (d) 18

18) Distance from the origin to the plane 3x - 6y + 2z 7 = 0 is

(a) 0 (b) 1 (c) 2 (d) 3

19) The distance between the planes x + 2y + 3z + 7 = 0 and 2x + 4y + 6z + 7 = 0

(a) $\frac{\sqrt{7}}{2\sqrt{2}}$ (b) $\frac{7}{2}$ (c) $\frac{\sqrt{7}}{2}$ (d) $\frac{7}{2\sqrt{2}}$

20) If the distance of the point (1,1,1) from the origin is half of its distance from the plane x + y + z + k =0, then the values of k are

(a) ±3 (b) ±6 (c) -3, 9 (d) 3, 9

21) The abscissa of the point on the curve $f(x) = \sqrt{8-2x}$ at which the slope of the tangent is -0.25 ?

(a) -8 (b) -4 (c) -2 (d) 0

22) The value of the limit $lim_{x\to 0}\left(cotx - \frac{1}{x}\right)$

(a) 0 (b) 1 (c) 2 (d) ∞

23) One of the closest points on the curve $x^2 - y^2 = 4$ to the point (6, 0) is

(a) (2,0) (b) $(\sqrt{5}, 1)$ (c) $(3, \sqrt{5})$ (d) $(\sqrt{13}, -\sqrt{3})$

24) The maximum value of the product of two positive numbers, when their sum' of the squares is 200, is

(a) 100 (b) $25\sqrt{7}$ (c) 28 (d) $24\sqrt{14}$

25) If v (x, y) = log (ex + ev), then $\frac{\partial v}{\partial x} + \frac{\partial v}{\partial y}$ is equal to

(a) $e^x + e^y$ (b) $\frac{1}{e^x+e^y}$ (c) 2 (d) 1

26) If f (x, y) = e^{xy} then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to

(a) xye^{xy} (b) $(1 +xy)e^{xy}$ (c) $(1 +y)e^{xy}$ (d) $(1 + x)e^{xy}$

27) The change in the surface area $S = 6x^2$ of a cube when the edge length varies from x_o to $x_o+ dx$ is

(a) $12 x_o+dx$ (b) $12x_o\, dx$ (c) $6x_o\, dx$ (d) $6x_o+ dx$

28) If $f(x) = \int_0^x t\, cos\, t\, dt,\ then\ \frac{dx}{dx}$

(a) cos x-x sin x (b) sin x+x cos x (c) x cos x (d) x sin x

29) The value of $\frac{(n+2)}{(n)} = 90$ then n is

(a) 10 (b) 5 (c) 8 (d) 9

30) The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} sin^2xcosxdx$ is

(a) $\frac{3}{2}$ (b) $\frac{1}{2}$ (c) 0 (d) $\frac{2}{3}$

31) The general solution of the differential equation $\frac{dy}{dx} = \frac{y}{x}$ is

(a) xy = k (b) y = k log x (c) y = kx (d) log y = kx

32) The solution of the differential equation $\frac{dy}{dx} + \frac{1}{\sqrt{1-x^2}} = 0$

(a) $y + \sin^{-1} x = c$ (b) $x + \sin^{-1} y = 0$ (c) $y^2 + 2\sin^{-1} x = c$ (d) $x^2 + 2\sin^{-1} y = c$

33) The solution of the differential equation $\frac{dy}{dx} = \frac{y}{x} + \frac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

(a) $x\phi\left(\frac{y}{x}\right) = k$ (b) $\phi\left(\frac{y}{x}\right) = kx$ (c) $y\phi\left(\frac{y}{x}\right) = k$ (d) $\phi\left(\frac{y}{x}\right) = ky$

34) Integrating factor of the differential equation $\frac{dy}{dx} = \frac{x+y+1}{x+1}$ is

(a) $\frac{1}{x+1}$ (b) x+1 (c) $\frac{1}{\sqrt{x+1}}$ (d) $\sqrt{x+1}$

35) Consider a game where the player tosses a sixsided fair die. H the face that comes up is 6, the player wins Rs.36, otherwise he loses Rs. k^2 , where k is the face that comes up k = {I, 2,3,4, 5}. The expected amount to win at this game in Rs is

(a) $\frac{19}{6}$ (b) $-\frac{19}{6}$ (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

36) If P{X = 0} = 1- P{X = I}. IfE[X) = 3Var(X), then P{X = 0}.

(a) $\frac{2}{3}$ (b) $\frac{2}{5}$ (c) $\frac{1}{5}$ (d) $\frac{1}{3}$

37) A computer salesperson knows from his past experience that he seUs computers to one in every twenty customers who enter the showroom. What is the probability that he will seU a computer to exactly two of the next three customers?

(a) $\frac{57}{20^3}$ (b) $\frac{57}{20^2}$ (c) $\frac{19^3}{20^3}$ (d) $\frac{57}{20}$

38) If a*b=$\sqrt{a^2+b^2}$ on the real numbers then * is

(a) commutative but not associative (b) associative but not commutative (c) both commutative and associative (d) neither commutative nor associative

39) In the last column of the truth table for ¬(p ∨ ¬q) the number of final outcomes of the truth value 'F' are

(a) 1 (b) 2 (c) 3 (d) 4

40)

p	q	(p ∧ q) ⟶ ¬q
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is correct for the truth value of (p ∧ q)⟶ ¬p p?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
F	T	T	T

(c)

(a)	(b)	(c)	(d)
F	F	T	T

(d)

(a)	(b)	(c)	(d)
T	T	T	F

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TAMIL NADU +2 MATHEMATICS

MCQ TEST 5

12th Standard

Date : 05-Dec-19

MATHEMATICS

Reg.No. :

MULTIPLE CHOICE QUESTIONS
CHOOSE THE CORRECT ANSWER

Exam Time : 00:25:00 Hrs | Total Marks : 40

40 x 1 = 40

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

(a) 1 (b) 2 (c) 4 (d) 3

2) If ρ(A) = ρ([A | B]), then the system AX = B of linear equations is

(a) consistent and has a unique solution (b) consistent (c) consistent and has infinitely many solution (d) inconsistent

3) 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

(a) 2 (b) 4 (c) 3 (d) 1

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

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{2}$

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

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

6) The product of all four values of $\left(cos\frac{\pi}{3}+isin\frac{\pi}{3}\right)^{\frac{3}{4}}$ is

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

7) If α,β and γ are the roots of x^3+px^2+qx+r, then $\Sigma\frac{1}{\alpha}$ is

(a) $-\frac{q}{r}$ (b) $\frac{p}{r}$ (c) $\frac{q}{r}$ (d) $-\frac{q}{p}$

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

(a) -1 (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) 5

9) The number of real numbers in [0,2π] satisfying $\sin^4x-2\sin^2x+1$ is

(a) 2 (b) 4 (c) 1 (d) ∞

10) $sin^{-1}\frac{3}{5}-cos^{-1}\frac{12}{13}+sec^{-1}\frac{5}{3}-cosec^{1-}\frac{13}{2}$ is equal to

(a) 2π (b) π (c) 0 (d) $\tan^{-1}\frac{12}{65}$

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

(a) [1,2] (b) [-1,1] (c) [0,1] (d) [-1,0]

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

(a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{5}}$ (c) $\frac{2}{\sqrt{5}}$ (d) $\frac{\sqrt{3}}{2}$

13) The radius of the circle $3x^2+by^2+4bx-6by+b^2=0$ is

(a) 1 (b) 3 (c) $\sqrt{10}$ (d) $\sqrt{11}$

14) Tangents are drawn to the hyperbola $\frac{x^2}{9}+\frac{y^2}{4}=1$ 1parallel to the straight line2x−y=1. One of the points of contact of tangents on the hyperbola is

(a) $\frac{9}{2\sqrt{2}},\frac{-1}{\sqrt{2}}$ (b) $\frac{-9}{2\sqrt{2}},\frac{1}{\sqrt{2}}$ (c) $\frac{9}{2\sqrt{2}},\frac{1}{\sqrt{2}}$ (d) $\left(3\sqrt{3},-2\sqrt{2}\right)$

15) The values of m for which the line y=mx+ $2\sqrt{5}$ touches the hyperbola $16x^2-9y^2=144$ are the roots of $x^2-(a+b)x-4=0$, then the value of (a+b) is

(a) 2 (b) 4 (c) 0 (d) -2

16) If the coordinates at one end of a diameter of the circle $x^2+y^2-8x-4y+c=0$ are (11,2) , the coordinates of the other end are

(a) (-5,2) (b) (2,-5) (c) (5,-2) (d) (-2,5)

17) If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $[\vec{a},\vec{c},\vec{b}]$ is equal to

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

18) If $\vec{a},\vec{b},\vec{c}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$ and is parallel to $\vec{c}$ then $\vec{a}\times(\vec{b}\times\vec{c})$ is equal to

(a) $\vec{a}$ (b) $\vec{b}$ (c) $\vec{c}$ (d) $\vec{0}$

19) Distance from the origin to the plane 3x - 6y + 2z 7 = 0 is

(a) 0 (b) 1 (c) 2 (d) 3

20) If the direction cosines of a line are $\frac{1}{c},\frac{1}{c},\frac{1}{c}$, then

(a) $c=\pm 3$ (b) $c=\pm\sqrt{3}$ (c) c > 0 (d) 0 < c < 1

21) A balloon rises straight up at 10 m/s. An observer is 40 m away from the spot where the balloon left the ground. Find the rate of change of the balloon's angle of elevation in radian per second when the balloon is 30 metres above the ground.

(a) $\frac{3}{25}$ radians/sec (b) $\frac{4}{25}$ radians/sec (c) $\frac{1}{5}$ radians/sec (d) $\frac{1}{3}$ radians/sec

22) The position of a particle moving along a horizontal line of any time t is given by set) = $3t^2$ -2t- 8. The time at which the particle is at rest is

(a) t= 0 (b) $t=\frac{1}{3}$ (c) t =1 (d) t = 3

23) The abscissa of the point on the curve $f(x)=\sqrt{8-2x}$ at which the slope of the tangent is -0.25 ?

(a) -8 (b) -4 (c) -2 (d) 0

24) The tangent to the curve y^2 - xy + 9 = 0 is vertical when

(a) y = 0 (b) $y=\pm\sqrt{3}$ (c) $y=\frac{1}{2}$ (d) $y=\pm 3$

25) A circular template has a radius of 10 cm. The measurement of radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this template is

(a) 0.2% (b) 0.4% (c) 0.04% (d) 0.08%

26) If w (x, y) = xy, x > 0, then $\frac{\partial w}{\partial x}$ is equal to

(a) x^y log x (b) y log x (c) yx^{y-1} (d) x log y

27) If g(x, y) = $3x^2$ - 5y + 2y, x(t) = e^t and y(t) = cos t, then $\frac{dg}{dt}$ is equal to

(a) $6e^{2t}$+5 sin t - 4 cos t sin t (b) $6e^{2t}$- 5 sin t + 4 cos t sin t (c) $3e^{2t}$+ 5 sin t + 4 cos t sin t (d) $3e^{2t}$ - 5 sin t + 4 cos t sin t

28) The value of $\int_{-4}^{4}\left[tan^{-1}\left(\frac{x^2}{x^4+1}\right)+tan^{-1}\left(\frac{x^4+1}{x^2}\right)\right]dx$ is

(a) π (b) 2π (c) 3π (d) 4π

29) The value of $\int_0^{\pi} sin^4 x dx$ is

(a) $\frac{3\pi}{10}$ (b) $\frac{3\pi}{8}$ (c) $\frac{3\pi}{4}$ (d) $\frac{3\pi}{2}$

30) The value of $\int_0^1 (sin^{-1}x)^2 dx$

(a) $\frac{\pi^2}{4} - 1$ (b) $\frac{\pi^2}{4} + 2$ (c) $\frac{\pi^2}{4} + 1$ (d) $\frac{\pi^2}{4} - 2$

31) The order and degree of the differential equation $\sqrt{sin\quad x}(dx + dy) = \sqrt{cos\quad x}(dx - dy)$

(a) 1,2 (b) 2,2 (c) 1,1 (d) 2,1

32) The solution of $\frac{dy}{dx}$ + p(x)y=0 is

(a) $y = ce^{\int pdx}$ (b) $y = ce^{-\int pdx}$ (c) $x = ce^{-\int pdx}$ (d) $xce^{\int pdx}$

33) If p and q are the order and degree of the differential equation $y = \frac{dy}{dx} + x^3\left(\frac{d^2y}{dx^2}\right) + xy = cosx$, When

(a) p < q (b) p = q (c) p > q (d) p exists and q does not exist

34) P is the amount of certain substance left in after time t. If the rate of evaporation of the substance is proportional to the amount remaining, then

(a) P=Ce^{kt} (b) P=ce^{-kt} (c) P=Ckt (d) Pt=C

35) Consider a game where the player tosses a sixsided fair die. H the face that comes up is 6, the player wins Rs.36, otherwise he loses Rs. k^2 , where k is the face that comes up k = {I, 2,3,4, 5}.
The expected amount to win at this game in Rs is

(a) $\frac{19}{6}$ (b) $-\frac{19}{6}$ (c) $\frac{3}{2}$ (d) $-\frac{3}{2}$

36) On a multiple-choice exam with 3 possible destructives for each of the 5 questions, the probability that a student will get 4 or more correct answers just by guessing is

(a) $\frac{11}{243}$ (b) $\frac{3}{8}$ (c) $\frac{1}{243}$ (d) $\frac{5}{243}$

37) Which of the following is a discrete random variable?
I. The number of cars crossing a particular signal in a day
II.The number of customers in a queue-to buy train tickets at a moment.
III.The time taken to complete a telephone call.

(a) I and II (b) II only (c) III only (d) II and III

38) Subtraction is not a binary operation in

(a) R (b) Z (c) N (d) Q

39) In the set R of real numbers '*' is defined as follows. Which one of the following is not a binary operation on R?

(a) a*b=min (a.b) (b) a*b= max (a,b) (c) a*b= a (d) a*b=a^b

40) In the last column of the truth table for ¬(p ∨ ¬q) the number of final outcomes of the truth value 'F' are

(a) 1 (b) 2 (c) 3 (d) 4

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KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

STD : XII **MATHEMATICS** **MARKS: 20**

DATE: **ONE MARK TEST-1 (BB FULLY)** **TIME: 15 min**

Choose the correct answer: **20 x 1 = 20**

1. 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) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$ 2) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$ 3) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$ 4) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$

2. If $\rho(A) = \rho([A|B])$, then the system $AX = B$ of linear equation is

   1) Consistent and has a unique solution 2) Inconsistent

   3) Consistent and has infinitely many solution 4) Consistent

3. The solution of the equation $|z| - z = 1 + 2i$ is

   1) -1 2) -2 3) 2 4) 1

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

   1) $2 - \frac{3}{2}i$ 2) $-\frac{3}{2} + 2i$ 3) $\frac{3}{2} - 2i$ 4) $2 + \frac{3}{2}i$

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

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

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

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

7. The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ is

   (1) $a^2 + b^2$ (2) $2(a^2 + b^2)$ (3) $4(a^2 + b^2)$ (4) $\frac{1}{2}(a^2 + b^2)$

8. If the two tangents drawn from a point P to the parabola $y^2 = 4x$ are at right angles then the locus of P is

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

9. If $\vec{a}, \vec{c}, \vec{b}$ are non-coplanar, non-zero vectors such that $[\vec{a}, \vec{c}, \vec{b}]$=3 than $\{[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}]\}^2$ is equal to

   1) 18 2) 27 3) 9 4) 81

10. The distance between the planes x+2y+3z=7=0 and 2x+ 4y+6z+7=0 is

1) $\frac{\sqrt{7}}{2\sqrt{2}}$ 2) $\frac{7}{2\sqrt{2}}$ 3) $\frac{\sqrt{7}}{2}$ 4) $\frac{7}{2}$

11. What is the value of the limit $\lim_{x\to 0}\left(\cot x-\frac{1}{x}\right)$ is

(1) 1 (2) 2 (3) 0 (4) ∞

12. The point of inflection of the curve $y=(x-1)^3$ is

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

13. If $g(x,y)=3x^2-5y+2y^2, x(t)=e^t$, and $y(t)=\cos t$ then $\frac{dg}{dt}$ is equal to

(1) $3e^{2t}+5\sin t+4\cos t\sin t$ (2) $6e^{2t}-5\sin t+4\cos t\sin t$

(3) $6e^{2t}+5\sin t-4\cos t\sin t$ (4) $3e^{2t}-5\sin t+4\cos t\sin t$

14. The value of $\int_0^{\pi}\frac{dx}{1+5^{\cos x}}$ is

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

15. If $\int_0^x f(t)dt = x+\int_x^1 t\,f(t)\,dt$, then the value of $f(1)$ is

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

16. The number of arbitrary constants in the particular solution of a differential equation of third order is

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

17. The integrating factor of the differential equation $\frac{dy}{dx}+P(x)y=Q(x)$ is x, then $P(x)$

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

18. On a multiple-choice exam with 3 possible destructives for each of the 5 questions, the probability that a student will get 4 or more correct answers just by guessing is

(1) $\frac{11}{243}$ (2) $\frac{5}{243}$ (3) $\frac{1}{243}$ (4) $\frac{3}{8}$

19. If a compound statement involves 3 simple statements, then the number of rows in the truth table is

(1) 3 (2) 6 (3) 8 (4) 9

20. Which one of the following is not true?

(1) Negation of a negation of a statement is the statement itself.

(2) If the last column of the truth table contains only T then it is a tautology.

(3) If the last column of its truth table contains only F then it is a contradiction

(4) If p and q are any two statements then $p\leftrightarrow q$ is a tautology.

KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

STD : XII **MATHEMATICS** **MARKS: 20**

DATE: **ONE MARK TEST-2 (BB FULLY)** **TIME: 15 min**

Choose the correct answer: **20 x 1 = 20**

1. If $A^T A^{-1}$ is symemetic, then A^2 =

   1) A^T 2) $(A^{-1})^2$ 3) A^{-1} 4) $(A^T)^2$

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

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

3. 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) 4 2) 3 3) 2 4) 1

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

   1) $\dfrac{5\pi}{6}$ 2) $\dfrac{\pi}{6}$ 3) $\dfrac{2\pi}{3}$ 4) $\dfrac{\pi}{2}$

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

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

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

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

7. The radius of the circle passing through the point $(6,2)$ two of whose diameter are $x+y=6$ and $x+2y=4$ is

   (1) 4 (2) $2\sqrt{5}$ (3) 6 (4) 10

8. The eccentricity of the ellipse $(x-3)^2+(y-4)^2=\dfrac{y^2}{9}$ is

   (1) $\dfrac{\sqrt{3}}{2}$ (2) $\dfrac{1}{3\sqrt{2}}$ (3) $\dfrac{1}{3}$ (4) $\dfrac{1}{\sqrt{3}}$

9. If $\vec{a}=\hat{\imath}+\hat{\jmath}+\hat{k}$, $\vec{b}=\hat{\imath}+\hat{\jmath}$, $\vec{c}=\hat{\imath}$ and $(\vec{a}\times\vec{b})\times\vec{c}=\lambda\vec{a}+\mu\vec{b}$, then the value of $\lambda+\mu$ is

   1) 3 2) 6 3) 1 4) 0

10. If the direction cosines of a line are $\frac{1}{c},\frac{1}{c},\frac{1}{c}$, then

    1) $c=\pm\sqrt{3}$ 2) $c=\pm 3$ 3) $c>0$ 4) $0<c<1$

11. Angle between $y^2 = x$ and $x^2 = y$ at the origin is

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

12. The curve $y = ax^4 + bx^2$ with $ab > 0$

(1) has no points of inflection (2) is concave down

(3) is concave up (4) has no horizontal tangent

13. If $w(x,y) = x^y, x > 0$, then $\frac{\partial w}{\partial x}$ is equal to

(1) $x\log y$ (2) yx^{y-1} (3) $y\log x$ (4) $x^y \log x$

14. The value of $\int_0^1 x(1-x)^{99}dx$ is

(1) $\frac{1}{11000}$ (2) $\frac{1}{10010}$ (3) $\frac{1}{10100}$ (4) $\frac{1}{10001}$

15. The value of $\int_0^a \left(\sqrt{a^2-x^2}\right)^3 dx$ is

(1) $\frac{3\pi a^2}{8}$ (2) $\frac{3\pi a^4}{16}$ (3) $\frac{\pi a^3}{16}$ (4) $\frac{3\pi a^4}{8}$

16. The integrating factor of the differential equation $\frac{dy}{dx} + y = \frac{1+y}{\lambda}$ is

(1) λe^x (2) $\frac{e^\lambda}{x}$ (3) $\frac{x}{e^\lambda}$ (4) e^x

17. The number of arbitrary constants in the general solutions of order n and $n+1$ are respectively

(1) $n-1, n$ (2) $n, n+1$ (3) $n+1, n+2$ (4) $n+1, n$

18. Let X have a Bernoulli distribution with mean 0.4, then the variance of $(2X-3)$ is

(1) 0.6 (2) 0.96 (3) 0.24 (4) 0.48

19. Which one is the inverse of the statement $(p \vee q) \to (p \wedge q)$?

(1) $\neg(p \vee q) \to (p \wedge q)$ (2) $(\neg p \vee \neg q) \to (\neg p \wedge \neg q)$

(3) $(p \wedge q) \to (p \vee q)$ (4) $(\neg p \wedge \neg q) \to (\neg p \vee \neg q)$

20. The proposition $p \wedge (\neg p \vee q)$ is

(1) a contradiction (2) a tautology

(3) logically equivalent to $p \vee q$ (4) logically equivalent to $p \wedge q$

KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

STD : XII **MATHEMATICS** **MARKS: 50**

DATE: **ONE MARK TEST-V (BB FULLY)** **TIME: 30 min**

Choose the correct answer: **50 x 1 = 50**

1. 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) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$
2. 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 value of x and y are respectively,
   1) $e^{(\Delta_2/\Delta_1)}, e^{(\Delta_3/\Delta_1)}$ 2) $\log(\Delta_1/\Delta_3), \log(\Delta_2/\Delta_3)$
   3) $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$ 4) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$
3. If $\rho(A) = \rho([A|B])$, then the system $AX = B$ of linear equation is
   1) Consistent and has a unique solution 2) Consistent
   3) Consistent and has infinitely many solution 4) Inconsisitent
4. If $0 \le \theta \le \pi$ and the system of equations $x + (\sin\theta)y - (\cos\theta)z = 0, (\cos\theta)x - y + z = 0$, $(\sin\theta)x + y - z = 0$ has a non-trivial solution then θ is
   1) $\frac{2\pi}{3}$ 2) $\frac{3\pi}{4}$ 3) $\frac{5\pi}{6}$ 4) $\frac{\pi}{4}$
5. 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
6. 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) $2 + \frac{3}{2}i$
7. If $(1+i)(1+2i)(1+3i)\ldots(1+ni) = x + iy$, then $2.5.10\ldots(1+n^2)$ is
   1) 1 2) i 3) $x^2 + y^2$ 4) $1 + n^2$
8. 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
9. If $\omega \ne 1$ 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) $-\sqrt{3}i$
10. If $\omega = cis\frac{2\pi}{3}$, then the number of distinct roots of $\begin{vmatrix} z+1 & \omega & \omega^2 \\ \omega & z+\omega^2 & 1 \\ \omega^2 & 1 & z+\omega \end{vmatrix} = 0$
    1) 1 2) 2 3) 3 4) 4
11. 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

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

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

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

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

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

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

16. $\sin(\tan^{-1}x), |x|<1$ 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) $\frac{x}{\sqrt{1+x^2}}$

17. The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{9}=1$ having centre at $(0,3)$ is

1) $x^2+y^2-6y-7=0$ 2) $x^2+y^2-6x+7=0$ 3) $x^2+y^2-6y-5=0$ 4) $x^2+y^2-6y+5=0$

18. Area of the greatest rectangle inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

1) $2ab$ 2) ab 3) $\sqrt{ab}$ 4) $\frac{a}{b}$

19. The eccentricity of the ellipse $(x-3)^2+(y-4)^2=\frac{y^2}{9}$ is

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

20. The circle passing through $(1,-2)$ and touching the axis of x at $(3,0)$ passing through the point

1) $(-5,2)$ 2) $(2,-5)$ 3) $(5,-2)$ 4) $(-2,5)$

21. The values of m for which the line $y=mx+2\sqrt{5}$ touches the hyperbola $16x^2-9y^2=144$ are the roots of $x^2-(a+b)x-4=0$, then the value of $(a+b)$ is

1) 2 2) 4 3) 0 4) -2

22. Consider the vectors $\vec{a},\vec{b},\vec{c},\vec{d}$ such that $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d})=\vec{0}$. Let P_1 and P_2 be the planes determined by the pairs of vectors $\vec{a},\vec{b}$, and $\vec{c},\vec{d}$ respectively. Then the angle between P_1 and P_2 is

1) 0° 2) 45° 3) 60° 4) 90°

23. The coordinates of the point where the line $\vec{r}=(6\hat{i}-\hat{j}-3\hat{k})+t(-\hat{i}+\hat{j}+4\hat{k})$ meets the plane $\vec{r}.(\hat{i}+\hat{j}+\hat{k})=3$ are

1) (2,1,0) 2) $(7,-1,-7)$ 3) $(1,2,-6)$ 4) $(5,-1,1)$

24. If the direction cosines of a line are $\frac{1}{c},\frac{1}{c},\frac{1}{c}$, then

1) $c=\pm 3$ 2) $c=\pm\sqrt{3}$ 3) $c>0$ 4) $0<c<1$

25. The maximum product of two positive numbers, when their sum of the squares is 200, is

1) 100 2) $25\sqrt{7}$ 3) 28 4) $24\sqrt{14}$

26. The vector equation $\vec{r}=(\hat{i}-2\hat{j}-\hat{k})+t(6\hat{i}+\hat{j}-\hat{k})$ represents a straight line passing through the points

1) $(0,6,-1)$ and $(1,-2,-1)$ 2) $(0,6,-1)$ and $(-1,-4,-2)$
3) $(1,-2,-1)$ and $(-1,4,-2)$ 4) $(1,-2,-1)$ and $(0,-6,1)$

27. If the planes $\vec{r}.(2\hat{i}-\lambda\hat{j}+\hat{k})=3$ and $\vec{r}.(4\hat{i}-\hat{j}-\mu\hat{k})=5$ are parallel, then the value of λ and μ are

1) $\frac{1}{2},-2$ 2) $-\frac{1}{2},2$ 3) $-\frac{1}{2},-2$ 4) $\frac{1}{2},2$

28. Find the point on the curve $6y = x^3 + 2$ at which y-coordinate changes 8 times as fast as x-coordinate is

1) $(4,11)$ 2) $(4,-11)$ 3) $(-4,11)$ 4) $(-4,-11)$

29. The function $\sin^4 x + \cos^4 x$ is increasing in the interval

1) $\left[\frac{5\pi}{8},\frac{3\pi}{4}\right]$ 2) $\left[\frac{\pi}{2},\frac{5\pi}{8}\right]$ 3) $\left[\frac{\pi}{4},\frac{\pi}{2}\right]$ 4) $\left[0,\frac{\pi}{4}\right]$

30. The curve $y = ax^4 + bx^2$ with $ab > 0$

1) has no horizontal tangent 2) is concave up

3) is concave down 4) has no points of inflection

31. The approximate change in the volume V of a cube of side x metres caused by increasing the side by 1% is

1) $0.3xdx m^3$ 2) $0.03xm^3$ 3) $0.03x^2m^3$ 4) $0.03x^3m^3$

32. If $u(x,y) = x^2 + 3xy + y = 2019$, then $\left.\frac{\partial u}{\partial x}\right|_{(4,-5)}$ is equal to

1) -4 2) -3 3) -7 4) 13

33. If $w(x,y,z) = x^2(y-z) + y^2(z-yx) + z^2(x-y)$, then $\frac{\partial w}{\partial x}+\frac{\partial w}{\partial y}+\frac{\partial w}{\partial z}$ is

1) $xy+yz+zx$ 2) $x(y+z)$ 3) $y(z+x)$ 4) 0

34. The value of $\int_0^{\frac{\pi}{6}} \cos^3 3x\, dx$ is

1) $\frac{2}{3}$ 2) $\frac{2}{9}$ 3) $\frac{1}{9}$ 4) $\frac{1}{3}$

35. The value of $\int_0^{\infty} e^{-3x}x^2\, dx$ is

1) $\frac{7}{27}$ 2) $\frac{5}{27}$ 3) $\frac{4}{27}$ 4) $\frac{2}{27}$

36. If $\int_1^x \frac{e^{\sin u}}{u}du,\ x>1,$ and $\int_1^3 \frac{e^{\sin x^2}}{x}dx = \frac{1}{2}[f(a)-f(1)]$, then one of the possible value of a is

1) 3 2) 6 3) 9 4) 5

37. The value of $\int_0^a \left(\sqrt{a^2-x^2}\right)^3 dx$ is

1) $\frac{\pi a^3}{16}$ 2) $\frac{3\pi a^4}{16}$ 3) $\frac{3\pi a^2}{8}$ 4) $\frac{3\pi a^4}{8}$

38. The degree of the differential equation $y(x) = 1 + \frac{dy}{dx} + \frac{1}{1.2}\left(\frac{dy}{dx}\right)^2 + \frac{1}{1.2.3}\left(\frac{dy}{dx}\right)^3 + ...$ is

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

39. If the solution of the differential equation $\frac{dy}{dx} = \frac{ax+3}{2y+f}$ represents a circle, then the value of a is

1) 2 2) -2 3) 1 4) -1

40. The solution of $\frac{dy}{dx} = 2^{y-x}$ is

1) $2^x + 2^y = C$ 2) $2^x - 2^y = C$ 3) $\frac{1}{2^x} - \frac{1}{2^y} = C$ 4) $x + y = C$

41. Integrating factor of the differential equation $\frac{dy}{dx}=\frac{x+y+1}{x+1}$ is

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

42. The slope at any point of a curve $y=f(x)$ is given by $\frac{dy}{dx}=3x^2$ and it passes through $(-1,1)$.

Then the equation of the curve is

1) $y=x^3+2$ 2) $y=3x^2+4$ 3) $y=3x^3+4$ 4) $y=x^3+5$

43. Two coins are to be flipped. The first coin will land on heads with probability 0.6, the second with Probability 0.5. Assume that the results of the flips are independent, and let X equal the total number of heads that result. The value of $E[X]$ is

1) 0.11 2) 1.1 3)11 4)1

44. Suppose that X takes on one of the values 0, 1, and 2. If for some constant k, $P(X=i)=k\,P(X=i-1)$ for $i=1,\ 2$ and $P(X=0)=\frac{1}{7}$. Then the value of k is

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

45. If $f(x)=\begin{cases}2x & 0\le x\le a\\ 0 & otherwise\end{cases}$ is a probability density function of a random variable, then the value of a is

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

46. The probability function of a random variable is defined as:

x	-2	-1	0	1	2
$f(x)$	k	$2k$	$3k$	$4k$	$5k$

Then $E(X)$ is equal to:

1) $\frac{1}{15}$ 2) $\frac{1}{10}$ 3) $\frac{1}{3}$ 4) $\frac{2}{3}$

47.

p	q	$(p\wedge q)\rightarrow\neg p$
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is correct for the truth value of $(p\wedge q)\rightarrow\neg p$?

	(a)	(b)	(c)	(d)
1)	T	T	T	T
2)	F	T	T	T
3)	F	F	T	T
4)	T	T	T	F

48. The dual of $\neg(p\vee q)\vee[p\vee(p\wedge\neg r)]$ is

1) $\neg(p\wedge q)\wedge[p\vee(p\wedge\neg r)]$ 2) $(p\wedge q)\wedge[p\wedge(p\vee\neg r)]$

3) $\neg(p\wedge q)\wedge[p\wedge(p\wedge r)]$ 4) $\neg(p\wedge q)\wedge[p\wedge(p\vee\neg r)]$

49. Subtraction is not a binary operation in

1) $\mathbb{R}$ 2) $\mathbb{Z}$ 3) $\mathbb{N}$ 4) $\mathbb{Q}$

50. Which one of the following is not true?

1) Negation of a negation of a statement is the statement itself.
2) If the last column of the truth table contains only T then it is a tautology.
3) If the last column of its truth table contains only F then it is a contradiction
4) If p and q are any two statements then $p\leftrightarrow q$ is a tautology.

KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

STD : XII **MATHEMATICS** **MARKS: 50**

DATE: **ONE MARK TEST-IV (BB FULLY)** **TIME: 30 min**

Choose the correct answer: **50 x 1 = 50**

1. If $A=\begin{bmatrix}1&-2\\1&4\end{bmatrix}=\begin{bmatrix}6&0\\0&6\end{bmatrix}$, Then

   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) $\begin{bmatrix}4&-1\\2&1\end{bmatrix}$

2. If $adj\,A=\begin{bmatrix}2&3\\4&-1\end{bmatrix}$ and $adj\,B=\begin{bmatrix}1&-2\\-3&1\end{bmatrix}$ 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) $\begin{bmatrix}-6&-2\\5&-10\end{bmatrix}$

3. 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 $adj(\lambda A)=\lambda^n adj(A)$

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

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

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

   1) $\lambda=7,\mu\neq-5$ 2) $\lambda=-7,\mu=5$ 3) $\lambda\neq7,\mu\neq-5$ 4) $\lambda=7,\mu=-5$

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

6. 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) $\frac{1}{i-2}$

7. The principal argument of $\frac{3}{-1+i}$ is

   1) $\frac{-5\pi}{6}$ 2) $\frac{-2}{3}$ 3) $\frac{-3\pi}{4}$ 4) $\frac{-\pi}{2}$

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

   1) $\frac{2\pi}{3}$ 2) $\frac{\pi}{6}$ 3) $\frac{5\pi}{6}$ 4) $\frac{\pi}{2}$

9. 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

10. 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) $-cis\,\frac{2\pi}{3}$ 4) $-cis\,\frac{4\pi}{3}$

11. A zero of x^3+64 is

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

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

1) $|k|\le 6$ 2) $k=0$ 3) $|k|>6$ 4) $|k|\ge 6$

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

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

14. 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

15. 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

16. 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

17. The radius of the circle $3x^2+by^2+4bx-6by+b^2=0$ is

1) 1 2) 3 3) $\sqrt{10}$ 4) $\sqrt{11}$

18. If $x+y=k$ is a normal to the parabola $y^2=12x$, then the value of k is

1) 3 2) -1 3) 1 4) 9

19. If the two tangents drawn from a point P to the parabola $y^2=4x$ are at right angles then the locus of P is

1) $2x+1=0$ 2) $x=-1$ 3) $2x-1=0$ 4) $x=1$

20. The locus of a point whose distance from $(-2,0)$ is $\frac{2}{3}$ times its distance from the line $x=-\frac{9}{2}$ is

1) a parabola 2) a hyperbola 3) an ellipse 4) a circle

21. If the coordinates at one end of a diameter of the circle $x^2+y^2-8x-4y+c=0$ are $(11,2)$, the coordinates of the other end are

1) $(-5,2)$ 2) $(-3,2)$ 3) $(5,-2)$ 4) $(-2,5)$

22. If $[\vec{a},\vec{c},\vec{b}]=1$, then the value of $\frac{\vec{a}.(\vec{b}\times\vec{c})}{(\vec{c}\times\vec{a}).\vec{b}}+\frac{\vec{b}(\vec{c}\times\vec{b})}{(\vec{a}\times\vec{b}).\vec{c}}+\frac{\vec{c}.(\vec{a}\times\vec{b})}{(\vec{c}\times\vec{b}).\vec{a}}$ is

1) 1 2) -1 3) 2 4) 3

23. If the line $\frac{x-2}{3}=\frac{y-1}{-5}=\frac{z+2}{2}$ lies in the plane $x+3y-\alpha z+\beta=0$, then $(\alpha+\beta)$ is

1) $(-5,5)$ 2) $(-6,7)$ 3) $(5,-5)$ 4) $(6,-7)$

24. Distance from the origin to the plane $3x-6y+2z+7=0$ is

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

25. If the distance of the point (1,1,1) from the origin is half of its distance from the plane $x+y+z+k=0$, then the values of k are

1) ± 3 2) ± 6 3) $-3,9$ 4) $3,-9$

26. If the length of the perpendicular from the origin to the plane $2x+3y+\lambda z=1$, $\lambda>0$ is $\frac{1}{5}$, then the value of λ is

1) $2\sqrt{3}$ 2) $3\sqrt{2}$ 3) 0 4) 1

27. The minimum value of the function $|3-x|+9$ is

1) 0 2) 3 3) 6 4) 9

28. The maximum value of the function $x^2e^{-2x},\ x>0$ is

1) $\frac{1}{e}$ 2) $\frac{1}{2e}$ 3) $\frac{1}{e^2}$ 4) $\frac{4}{e^4}$

29. One of the closest points on the curve $x^2-y^2=4$ to the point $(6,0)$ is

1) $(2,0)$ 2) $(\sqrt{5},1)$ 3) $(3,\sqrt{5})$ 4) $(\sqrt{13},-\sqrt{3})$

30. The point of inflection of the curve $y=(x-1)^3$ is

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

31. If $v(x,y)=\log(e^x+e^y)$, then $\frac{\partial v}{\partial x}+\frac{\partial v}{\partial y}$ is equal to

1) e^x+e^y 2) $\frac{1}{e^x+e^y}$ 3) 2 4) 1

32. If $f(x)=\frac{x}{x+1}$, then its differential is given by

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

33. Linear approximation for $g(x)=\cos x$ at $x=\frac{\pi}{2}$ is

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

34. The value of $\int_{-4}^{4}\left[\tan^{-1}\left(\frac{x^2}{x^4+1}\right)+\tan^{-1}\left(\frac{x^4+1}{x^2}\right)\right]dx$ is

1) π 2) 2π 3) 3π 4) 4π

35. The value of $\int_{0}^{\pi}\frac{dx}{1+5^{\cos x}}$ is

1) $\frac{\pi}{2}$ 2) π 3) $\frac{3\pi}{2}$ 4) 2π

36. If $\int_{0}^{a}\frac{1}{4+x^2}dx=\frac{\pi}{8}$ then a is

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

37. If $\int_{0}^{x}f(t)dt=x+\int_{x}^{1}t\,f(t)\,dt$, then the value of $f(1)$ is

1) $\frac{1}{2}$ 2) 2 3) 1 4) $\frac{3}{4}$

38. The differential equation of the family of curves $y=Ae^x+Be^{-x}$, where A and B are arbitrary constants is

1) $\frac{d^2y}{dx^2}+y=0$ 2) $\frac{d^2y}{dx^2}-y=0$ 3) $\frac{dy}{dx}+y=0$ 4) $\frac{dy}{dx}-y=0$

39. The solution of the differential equation $\frac{dy}{dx}+\frac{1}{\sqrt{1-x^2}}=0$ is

1) $y+\sin^{-1}x=c$ 2) $x+\sin^{-1}y=0$ 3) $y^2+2\sin^{-1}x=c$ 4) $x^2+2\sin^{-1}y=0$

40. If $\sin x$ is the integrating factor of the linear differential equation $\frac{dy}{dx}+Py=Q$, then P is

1) $\log\sin x$ 2) $\cos x$ 3) $\tan x$ 4) $\cot x$

41. The population P in any year t is such that the rate of increase in the population is proportional to the population. Then

1) $P=Ce^{kt}$ 2) $P=Ce^{-kt}$ 3) $P=Ckt$ 4) $P=C$

42. P is the amount of certain substance left in after time t. If the rate of evaporation of the substance is proportional to the amount remaining, then

1) $P=Ce^{kt}$ 2) $P=Ce^{-kt}$ 3) $P=Ckt$ 4) $Pt=C$

43. Consider a game where the player tosses a six-sided fair die. If the face that comes up is 6, the player wins ₹36, otherwise he loses ₹ k^2, where k is the face that comes up $k=\{1,2,3,4,5\}$. The expected amount to win at this game in ₹ is

1) $\frac{19}{6}$ 2) $-\frac{19}{6}$ 3) $\frac{3}{2}$ 4) $-\frac{3}{2}$

44. If X is a binomial random variable with expected value 6 and variance 2.4, Then $P(X=5)$ is

1) $\binom{10}{5}\left(\frac{3}{5}\right)^6\left(\frac{2}{5}\right)^4$ 2) $\binom{10}{5}\left(\frac{3}{5}\right)^{10}$ 3) $\binom{10}{5}\left(\frac{3}{5}\right)^4\left(\frac{2}{5}\right)^6$ 4) $\binom{10}{5}\left(\frac{3}{5}\right)^5\left(\frac{2}{5}\right)^5$

45. Which of the following is a discrete random variable?

I. The number of cars crossing a particular signal in a day.

II. The number of customers in a queue to buy train tickets at a moment.

III. The time taken to complete a telephone call.

1) I and II 2) II only 3) III only 4) II and III

46. A computer salesperson knows from his past experience that he sells computers to one in every twenty customers who enter the showroom. What is the probability that he will sell a computer to exactly two of the next three customers?

1) $\frac{57}{20^3}$ 2) $\frac{57}{20^2}$ 3) $\frac{19^3}{20^3}$ 4) $\frac{57}{20}$

47. The operation $*$ defined by $a*b=\frac{ab}{7}$ is not a binary operation on

1) $\mathbb{Q}^+$ 2) $\mathbb{Z}$ 3) $\mathbb{R}$ 4) $\mathbb{C}$

48. Which one of the following statements has truth value F ?

1) Chennai is in India or $\sqrt{2}$ is an integer

2) Chennai is in India or $\sqrt{2}$ is an irrational number

3) Chennai is in China or $\sqrt{2}$ is an integer

4) Chennai is in China or $\sqrt{2}$ is an irrational number

49. Which one of the following is incorrect? For any two propositions p and q, we have

1) $\neg(p\vee q)\equiv\neg p\wedge\neg q$ 2) $\neg(p\wedge q)\equiv\neg p\vee\neg q$

3) $\neg(p\vee q)\equiv\neg p\vee\neg q$ (4) $\neg(\neg p)\equiv p$

50. The proposition $p\wedge(\neg p\vee q)$ is

1) a tautology 2) a contradiction

3) logically equivalent to $p\wedge q$ 4) logically equivalent to $p\vee q$

KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

STD : XII **MATHEMATICS** **MARKS: 50**

DATE: **ONE MARK TEST-III (BB FULLY)** **TIME: 30 min**

Choose the correct answer: **50 x 1 = 50**

1. If $|\text{adj}(\text{adj } A)| = |A|^9$, then the order of the square matrix A is
   1) 3 2) 4 3) 2 4) 5
2. If $P = \begin{bmatrix} 1 & x & 0 \\ 1 & 3 & 0 \\ 2 & 4 & -2 \end{bmatrix}$ is the joint of 3×3 matrix A and $|A| = 4$, then x is
   1) 15 2) 12 3) 14 4) 11
3. If A= $A = \begin{bmatrix} \frac{3}{5} & \frac{4}{5} \\ x & \frac{3}{5} \end{bmatrix}$ and $A^T = A^{-1}$, then value of x is
   1) $\frac{-4}{5}$ 2) $\frac{-3}{5}$ 3) $\frac{3}{5}$ 4) $\frac{4}{5}$
4. 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
5. The rank of 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
6. $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is
   1) 0 2) 1 3) -1 4) i
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. z_1, z_2 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
9. The principal argument of $(\sin 40^\circ + i\cos 40^\circ)^5$ is
   1) -110° 2) -70° 3) 70° 4) 110°
10. If $\omega \ne 1$ 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) $(1,1)$
11. A polynomial equation in x of degree n always has
    1) n distinct roots 2) n real roots 3) n complex roots 4) at most one root.
12. 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) ∞
13. The value of $\sin^{-1}(\cos x)$, $0 \le x \le \pi$ is
    1) $\pi - x$ 2) $x - \frac{\pi}{2}$ 3) $\frac{\pi}{2} - x$ 4) $x - \pi$

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

1) [1,2] 2) [−1,1] 3) [0,1] 4) [−1,0]

15. $\sin^{-1}\left(\tan\frac{\pi}{4}\right)-\sin^{-1}\left(\sqrt{\frac{3}{x}}\right)=\frac{\pi}{6}$. 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) $x^2+x-6=0$

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

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

17. The equation of the circle passing through $(1,5)$ and $(4,1)$ and touching y - axis is $x^2+y^2-5x-6y+9+\lambda(4x+3y-19)=0$ Where λ is equal to

1) $0,-\frac{40}{9}$ 2) 0 3) $\frac{40}{9}$ 4) $-\frac{40}{9}$

18. The radius of the circle passing through the point $(6,2)$ two of whose diameter are $x+y=6$ and $x+2y=4$ is

1) 10 2) $2\sqrt{5}$ 3) 6 4) 4

19. Tangents are drawn to the hyperbola $\frac{x^2}{9}-\frac{y^2}{4}=1$ parallel to the straight line $2x-y=1$. One of the points of contact of tangents on the hyperbola is

1) $\left(\frac{9}{2\sqrt{2}},\frac{-1}{\sqrt{2}}\right)$ 2) $\left(\frac{-9}{2\sqrt{2}},\frac{1}{\sqrt{2}}\right)$ 3) $\left(\frac{9}{2\sqrt{2}},\frac{1}{\sqrt{2}}\right)$ 4) $\left(3\sqrt{3},-2\sqrt{2}\right)$

20. Consider an ellipse whose centre is of the origin and its major axis is along x-axis. If its eccentrcity is $\frac{3}{5}$ and the distance between its foci is 6, then the area of the quadrilateral inscribed in the ellipse with diagonals as major and minor axis of the ellipse is

1) 8 2) 32 3) 80 4) 40

21. An ellipse has OB as semi minor axes, F and F' its foci and the angle FBF' is a right angle. Then the eccentricity of the ellipse is

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

22. If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $[\vec{a},\vec{c},\vec{b}]$ is equal to

1) 2 2) −1 3) 1 4) 0

23. If $\vec{a},\vec{c},\vec{b}$ are non-coplanar, non-zero vectors such that $[\vec{a},\vec{c},\vec{b}]$=3 than $\{[\vec{a}\times\vec{b},\vec{b}\times\vec{c},\vec{c}\times\vec{a}]\}^2$ is equal to

1) 81 2) 9 3) 27 4) 18

24. If $\vec{a}=2\hat{\imath}+3\hat{\jmath}-\hat{k}$, $\vec{b}=\hat{\imath}+2\hat{\jmath}+-\hat{k}$, $\vec{c}=3\hat{\imath}+5\hat{\jmath}-\hat{k}$, then a vector perpendicular to $\vec{a}$ and lies in the plane containing is $\vec{b}$ *and* $\vec{c}$ is

1) $-17\hat{\imath}+21\hat{\jmath}-97\hat{k}$ 2) $17\hat{\imath}+21\hat{\jmath}-123\hat{k}$

3) $-17\hat{\imath}-21\hat{\jmath}+97\hat{k}$ 4) $-17\hat{\imath}-21\hat{\jmath}-97\hat{k}$

25. The angle between the line $\vec{r}=(\hat{\imath}+2\hat{\jmath}-3\hat{k})+t(2\hat{\imath}+\hat{\jmath}-2\hat{k})$ and the plane $\vec{r}.(\hat{\imath}+\hat{\jmath})+4=0$ is

1) 0° 2)30° 3) 45° 4)90°

26. The distance between the planes x+2y+3z=7=0 and 2x+ 4y+6z+7=0 is

1) $\frac{\sqrt{7}}{2\sqrt{2}}$ 2) $\frac{7}{2}$ 3) $\frac{\sqrt{7}}{2}$ 4) $\frac{7}{2\sqrt{2}}$

27. The volume of a sphere is increasing in volume at the rate of 3π cm3/sec. The rate of change of its radius when radius when radius is $\frac{1}{2}$ cm

1) 3 cm/s 2) 2cm/s (3) 1 cm/s (4) $\frac{1}{2}$ cm/s

28. Angle between $y^2 = x$ and $x^2 = y$ at the origin is

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

29. The number given by the Mean value theorem for the function $\frac{1}{x}, x \in [1,9]$ is

1) 2 2) 2.5 3) 3 4) 3.5

30. The maximum slope of the tangent to the curve $y = e^x \sin x, x \in [0, 2\pi]$ is at

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

31. A circular template has a radius of 10 cm. The measurement of radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this template is

1) 0.2% 2) 0.4% 3) 0.04% 4) 0.08%

32. If $f(x,y) = e^{xy}$, then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to

1) xye^{xy} 2) $(1+xy)e^{xy}$ 3) $(1+y)e^{xy}$ 4) $(1+x)e^{xy}$

33. If $g(x,y) = 3x^2 - 5y + 2y^2, x(t) = e^t$, and $y(t) = \cos t$ then $\frac{dg}{dt}$ is equal to

1) $6e^{2t} + 5\sin t - 4\cos t \sin t$ 2) $6e^{2t} - 5\sin t + 4\cos t \sin t$
3) $3e^{2t} + 5\sin t + 4\cos t \sin t$ 4) $3e^{2t} - 5\sin t + 4\cos t \sin t$

34. For any value of $n \in \mathbb{Z}$, $\int_0^{\pi} e^{\cos^2 x} \cos^3[(2n+1)x]dx$ is

1) $\frac{\pi}{2}$ 2) π 3) 0 4) 2

35. The value of $\int_0^1 x(1-x)^{99} dx$ is

1) $\frac{1}{11000}$ 2) $\frac{1}{10100}$ 3) $\frac{1}{10010}$ 4) $\frac{1}{10001}$

36. If $\frac{\Gamma(n+2)}{\Gamma(n)} = 90$ then n is

1) 10 2) 5 3) 8 4) 9

37. The value of $\int_0^{\pi} \sin^4 x \, dx$ is

1) $\frac{3\pi}{10}$ 2) $\frac{3\pi}{8}$ 3) $\frac{3\pi}{4}$ 4) $\frac{3\pi}{2}$

38. The order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{1/3} + x^{1/4} = 0$ are respectively

1) 2, 3 2) 3, 3 3) 2, 6 4) 2, 4

39. The integrating factor of the differential equation $\frac{dy}{dx} + y = \frac{1+y}{\lambda}$ is

1) $\frac{x}{e^{\lambda}}$ 2) $\frac{e^{\lambda}}{x}$ 3) λe^x 4) e^x

40. If p and q are the order and degree of the differential equation $y\frac{dy}{dx} + x^3\left(\frac{d^2y}{dx^2}\right) + xy = \cos x$, when

1) $p < q$ 2) $p = q$ 3) $p > q$ 4) p exists and q does not exist

41. The general solution of the differential equation $\log\left(\frac{dy}{dx}\right) = x + y$ is

1) $e^{x} + e^{y} = C$ 2) $e^{x} + e^{-y} = C$ 3) $e^{-x} + e^{y} = C$ 4) $e^{-x} + e^{-y} = C$

42. The solution of the differential equation $\frac{dy}{dx} = \frac{y}{x} + \frac{\phi\left(\frac{y}{x}\right)}{\phi'\left(\frac{y}{x}\right)}$ is

1) $x\phi\left(\frac{y}{x}\right) = k$ 2) $\phi\left(\frac{y}{x}\right) = kx$ 3) $y\phi\left(\frac{y}{x}\right) = k$ 4) $\phi\left(\frac{y}{x}\right) = ky$

43. Let X be random variable with probability density function $f(x) = \begin{cases} \frac{2}{x^3} & x \geq 1 \\ 0 & x < 1 \end{cases}$ Which of the following statement is correct

1) both mean and variance exist 2) mean exists but variance does not exist
3) both mean and variance do not exist 4) variance exists but Mean does not exist.

44. If the function $f(x) = \frac{1}{12}$ for $a < x < b$, represents a probability density function of a continuous random variable *X*, then which of the following cannot be the value of *a* and *b*?

1) 0 and 12 2) 5 and 17 3) 7 and 19 4) 16 and 24

45. On a multiple-choice exam with 3 possible destructives for each of the 5 questions, the probability that a student will get 4 or more correct answers just by guessing is

1) $\frac{11}{243}$ 2) $\frac{3}{8}$ 3) $\frac{1}{243}$ 4) $\frac{5}{243}$

46. The random variable X has the probability density function $f(x) = \begin{cases} ax + b & 0 < x < 1 \\ 0 & otherwise \end{cases}$ and $E(X) = \frac{7}{12}$, then *a* and *b* are respectively

1) 1 and $\frac{1}{2}$ 2) $\frac{1}{2}$ and 1 3) 2 and 1 4) 1 and 2

47. Which one of the following is a binary operation on $\mathbb{N}$?

1) Subtraction 2) Multiplication 3) Division 4) All the above

48. If $a * b = \sqrt{a^2 + b^2}$ on the real numbers then $*$ is

1) commutative but not associative 2) associative but not commutative
3) both commutative and associative 4) neither commutative nor associative

49. Which one is the inverse of the statement $(p \vee q) \to (p \wedge q)$?

1) $(p \wedge q) \to (p \vee q)$ 2) $\neg(p \vee q) \to (p \wedge q)$
3) $(\neg p \vee \neg q) \to (\neg p \wedge \neg q)$ 4) $(\neg p \wedge \neg q) \to (\neg p \vee \neg q)$

50. In the last column of the truth table for $\neg(p \vee \neg q)$ the number of final outcomes of the truth value 'F' are

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

KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

STD : XII | **MATHEMATICS** | **MARKS: 50**

DATE: | **ONE MARKS TEST-II (BB FULLY)** | **TIME: 30 min**

Choose the correct answers : **50 x 1 = 50**

1. If A is a 3 x 3 non – singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then $BB^T =$
   1) A 2) B 3) I_3 4) B^T

2. If $A = \begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, Then $9I_2 - A =$
   1) A^{-1} 2) $\frac{A^{-1}}{2}$ 3) $3A^{-1}$ 4) $2A^{-1}$

3. If $A = \begin{bmatrix} 3 & 1 & -1 \\ 2 & -2 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{23} & a_{33} \end{bmatrix}$ then the value of a_{23} is
   1) 0 2) -2 3) -3 4) -1

4. If A^TA^{-1} is symemetic, then A^2 =
   1) A^{-1} 2) $(A^T)^2$ 3) A^T 4) $(A^{-1})^2$

5. If $\boldsymbol{A} = \begin{bmatrix} \mathbf{1} & \mathbf{tan}\frac{\theta}{2} \\ -\mathbf{tan}\frac{\theta}{2} & \mathbf{1} \end{bmatrix}$ 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) $\left(\sin^2\frac{\theta}{2}\right) A^T$

6. The value of $\sum_{i=1}^{13}\left(i^n + i^{n-1}\right)$ is
   1) $1 + i$ 2) i 3) 1 4) 0

7. If $z = \frac{\left(\sqrt{3}+i\right)^3 (3i+4)^2}{(8+6i)^2}$, then $|z|$ is
   1) 0 2) 1 3) 2 4) 3

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 $|z_1| = 1, |z_2| = 2, |z_3| = 3$ and $|9z_1z_2 + 4z_1z_3 + z_2z_3| = 12$, then the value of $|\boldsymbol{z_1} + \boldsymbol{z_2} + \boldsymbol{z_3}|$ is
   1) 1 2) 2 3) 3 4) 4

10. If $\frac{z-1}{z+1}$ is purely imaginary, then $|z|$ is
    1) $\frac{1}{2}$ 2) 1 3) 2 4) 3

11. 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) m^n 4) n^m

12. 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

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

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

14. 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) $-\frac{\pi}{5}$

15. $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right)$ 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) $\tan^{-1}\left(\frac{1}{2}\right)$

16. 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) $\frac{\pi}{3}$

17. The circle $x^2 + y^2 = 4x + 8y + 5$ intersects the line $3x - 4y = m$ at two distinct points if

1) $15 < m < 65$ 2) $35 < m < 85$ 3) $-85 < m < -35$ 4) $-35 < m < 15$

18. The equation of the normal to the circle $x^2 + y^2 - 2x - 2y + 1 = 0$ which is parallel to the line $2x + 4y = 3$ is

1) $x + 2y = 3$ 2) $x + 2y + 3 = 0$ 3) $2x + 4y + 3 = 0$ 4) $x - 2y + 3 = 0$

19. If the normals of the parabola $y^2 = 4x$ drawn at the end points of its latus rectum are tangents to the circle $(x-3)^2 + (y+2)^2 = r^2$, then the value of r^2 is

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

20. The ellipse $E_1 : \frac{x^2}{9} + \frac{y^2}{4} = 1$is inscribed in a rectangle R whose sides are parallel to the coordinate axes. Another ellipse E_2 passing through the point $(0, 4)$ circumscribes the rectangle R . The eccentricity of the ellipse is

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

21. Let C be the circle with centre at $(1,1)$ and radius = 1. If T is the circle centered at $(0, y)$ passing through the origin and touching the circle C externally, then the radius of T is equal to

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

22. If $\vec{a}.\vec{b} = \vec{b}.\vec{c} = \vec{c}.\vec{a}$ =0, then the value of $[\vec{a}, \vec{c}, \vec{b}]$ is

1) $|\vec{a}|\ |\vec{b}|\ |\vec{c}|$ 2) $\frac{1}{3}|\vec{a}|\ |\vec{b}|\ |\vec{c}|$ 3) 1 4) -1

23. If $\vec{a}$ and $\vec{b}$ are unit vectors such that $[\vec{a}, \vec{b}, \vec{a}\times\vec{b}] = \frac{\pi}{4}$, then the angle between $\vec{a}$ and $\vec{b}$ is

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

24. The order and degree of the differential equation $\sqrt{\sin x}(dx + dy) = \sqrt{\cos x}(dx - dy)$ is

1) 1, 2 2) 2, 2 3) 1, 1 4) 2, 1

25. If the volume of the parallelepiped with $\vec{a}\times\vec{b}, \vec{b}\times\vec{c}, \vec{c}\times\vec{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c})$, $(\vec{b}\times\vec{c}),(\vec{c}\times\vec{a})$ and $(\vec{c}\times\vec{a})\times(\vec{a}\times\vec{b})$ as coterminous edges is,

1) 8 cubic units 2) 512 cubic units 3) 64 cubic units 4) 24 cubic units

26. If $\vec{a}\times(\vec{b}\times\vec{c}) = (\vec{a}\times\vec{b})\times\vec{c}$, where $\vec{a}, \vec{b}, \vec{c}$ are any three vectors such that $\vec{b}.\vec{c} \neq 0$ and $\vec{a}.\vec{b} \neq 0$, then $\vec{a}$ and $\vec{b}$ are

1) Perpendicular 2) parallel 3) inclined at an angle $\frac{\pi}{3}$ 4) inclined at an angle $\frac{\pi}{6}$

27. The angle between the lines $\frac{x-2}{3} = \frac{y+1}{-2}$,z = 2 and $\frac{x-1}{1} = \frac{2y+3}{3} = \frac{z+5}{2}$ is

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

28. Four buses carrying 160 students from the same school arrive at a football stadium. The buses carry, respectively, 42, 36, 34, and 48 students. One of the students is randomly selected. Let X denote the number of students that were on the bus carrying the randomly selected student. One of the 4 bus drivers is also randomly selected. Let Y denote the number of students on that bus. Then $\boldsymbol{E}[\boldsymbol{X}]$ and $\boldsymbol{E}[\boldsymbol{Y}]$ respectively are
    1) 50, 40 2) 40, 50 3) 40.75, 40 4) 41, 41
29. The position of a particle moving along a horizontal line of any time t is given by $s(t)=3t^2-2t-8$. The time at which the particle is at rest is
    1) $\boldsymbol{t=0}$ 2) $\boldsymbol{t=\frac{1}{3}}$ 3) $\boldsymbol{t=1}$ 4) $\boldsymbol{t=3}$
30. The slope of the line normal to the curve $f(x)=2\cos 4x$ at $x=\frac{\pi}{12}$ is
    1) $-4\sqrt{3}$ 2) -4 3) $\frac{\sqrt{3}}{12}$ 4) $4\sqrt{3}$
31. The number given by the Rolle's theorem for the function $x^3-3x^2, x\in[0,3]$ is
    1) 1 2) $\sqrt{2}$ 3) $\frac{3}{2}$ 4) 2
32. If $u(x,y)=e^{x^2+y^2}$, then $\frac{\partial u}{\partial x}$ is equal to
    1) $e^{x^2+y^2}$ 2) $2xu$ 3) x^2u 4) y^2u
33. The change in the surface area $S=6x^2$ of a cube when the edge length varies from x_0 to x_0+dx is
    1) $12x_0+dx$ 2) $12x_0dx$ 3) $6x_0dx$ 4) $6x_0+dx$
34. If $f(x,y,z)=xy+yz+zx$, then f_x-f_z is equal to
    1) $z-x$ 2) $y-z$ 3) $x-z$ 4) $y-x$
35. The value of $\int_0^{\frac{2}{3}}\frac{dx}{\sqrt{4-9x^2}}$ is
    1) $\boldsymbol{\frac{\pi}{6}}$ 2) $\boldsymbol{\frac{\pi}{2}}$ 3) $\boldsymbol{\frac{\pi}{4}}$ 4) π
36. If $f(t)=\int_0^x t\cos t\,dt$, then $\frac{df}{dx}=$
    1) $\cos x-x\sin x$ 2) $\sin x+x\cos x$ 3) $x\cos x$ 4) $x\sin x$
37. The volume of solid of revolution of the region bounded by $y^2=x(a-x)$ about x-axis is
    1) πa^3 2) $\boldsymbol{\frac{\pi a^3}{4}}$ 3) $\boldsymbol{\frac{\pi a^3}{5}}$ 4) $\boldsymbol{\frac{\pi a^3}{6}}$
38. The value of $\int_0^1(\sin^{-1}x)^2\,dx$ is
    1) $\boldsymbol{\frac{\pi^2}{4}-1}$ 2) $\boldsymbol{\frac{\pi^2}{4}+2}$ 3) $\boldsymbol{\frac{\pi^2}{4}+1}$ 4) $\boldsymbol{\frac{\pi^2}{4}-2}$
39. The solution of the differential equation $2x\frac{dy}{dx}-y=3$ represents
    1) straight lines 2) circles 3) parabola 4) ellipse
40. The solution of the differential equation $\frac{dy}{dx}=2xy$ is
    1) $y=ce^{x^2}$ 2) $y=2x^2+c$ 3) $y=ce^{-x^2}+c$ 4) $y=x^2+c$
41. The number of arbitrary constants in the general solutions of order n and $n+1$ are respectively
    1) $n-1, n$ 2) $n, n+1$ 3) $n+1, n+2$ 4) $n+1, n$

42. The number of arbitrary constants in the particular solution of a differential equation of third order is
1) 3 2) 2 3) 1 4) 0

43. A random variable X has binomial distribution with n = 25 and p = 0.8 then standard deviation of X is
1) 6 2) 4 3) 3 4) 2

44. If $P(X=0)=1-P(X=1)$. If $E[X] = 3Var(X)$, then $\boldsymbol{P(X=0)}$.
1) $\frac{2}{3}$ 2) $\frac{2}{5}$ 3) $\frac{1}{5}$ 4) $\frac{1}{3}$

45. Let X have a Bernoulli distribution with mean 0.4, then the variance of $(2X-3)$ is
1) 0.24 2) 0.48 3) 0.6 4) 0.96

46. If in 6 trials, X is a binomial variate which follows the relation $9P(X=4) = P(X=2)$, then the probability of success is
1) 0.125 2) 0.25 3) 0.375 4) 0.75

47. A binary operation on a set S is a function from
1) $S \to S$ 2) $(S\times S)\to S$ 3) $S \to (S\times S)$ 4) $(S\times S)\to(S\times S)$

48. If a compound statement involves 3 simple statements, then the number of rows in the truth table is
1) 9 2) 8 3) 6 4) 3

49. Which one is the contrapositive of the statement $(p\vee q)\to r$?
1) $\neg r\to(\neg p\wedge\neg q)$ 2) $\neg r\to(p\vee q)$ 3) $r\to(p\wedge q)$ 4) $p\to(q\vee r)$

50. The truth table for $(p\wedge q)\vee\neg q$ is given below

p	q	$(p\wedge q)\vee(\neg q)$
T	T	(a)
T	F	(b)
F	T	(c)
F	F	(d)

Which one of the following is true?

	(a)	(b)	(c)	(d)
(1)	T	T	T	T
(2)	T	F	T	T
(3)	T	T	F	T
(4)	T	F	F	F

KALAIMAGAL MATRIC HIGHER SECONDARY SCHOOL, MOHANUR.

STD : XII **MATHEMATICS** **MARKS: 50**

DATE: **ONE MARKS TEST-I (BB FULLY)** **TIME: 30 min**

Choose the correct answer: **50 x 1 = 50**

1. If $A=\begin{bmatrix}3 & 5\\ 1 & 2\end{bmatrix}$, B = adj A and C = 3A, then $\frac{|adjB|}{|C|}=$

   1) $\frac{1}{3}$ 2) $\frac{1}{9}$ 3) $\frac{1}{4}$ 4) 1

2. If $A=\begin{bmatrix}2 & 0\\ 1 & 5\end{bmatrix}$ and $B=\begin{bmatrix}1 & 4\\ 2 & 0\end{bmatrix}$ then $|\text{adj}(AB)|=$

   1) -40 2) -80 3) -60 4) -20

3. If A, B and C are invertible metrics of some order, then which one of the following is not true

   1) $\text{adj } A = |A| A^{-1}$ 2) $\text{adj}(AB) = (\text{adj } A)(\text{adj } B)$

   3) $\det A^{-1} = (\det A)^{-1}$ 4) $(ABC)^{-1} = C^{-1}B^{-1}C^{-1}$

4. 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) $\begin{bmatrix}5 & -2\\ 3 & -1\end{bmatrix}$

5. 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) $\sin\theta$ 3) $\cos\theta$ 4) 1

6. The area of the triangle formed by the complex numbers z, iz and $z+iz$ in Argand's diagram is

   1) $\frac{1}{2}|z|^2$ 2) $|z|^2$ 3) $\frac{3}{2}|z|^2$ 4) $2|z|^2$

7. If z is a non zero complex number, such that $2iz^2=\bar{z}$ then $|z|$ is

   1) $\frac{1}{2}$ 2) 1 3) 2 4) 3

8. 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

9. If z is a complex number such that $z \in \mathbb{C} \setminus \mathbb{R}$ and $z+\frac{1}{z} \in \mathbb{R}$, then $|z|$ is

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

10. 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

11. 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) $-\frac{q}{p}$

12. 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) $a \leq 0$

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

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

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

1) $|\alpha|\le\frac{1}{\sqrt{2}}$ 2) $|\alpha|\ge\frac{1}{\sqrt{2}}$ 3) $|\alpha|<\frac{1}{\sqrt{2}}$ 4) $|\alpha|>\frac{1}{\sqrt{2}}$

15. 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

16. 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) $-\frac{1}{5}$

17. The eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half the distance between the foci is

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

18. The length of the diameter of the circle which touches the x -axis at the point $(1,0)$ and passes through the point $(2,3)$.

1) $\frac{6}{5}$ 2) $\frac{5}{3}$ 3) $\frac{10}{3}$ 4) $\frac{3}{5}$

19. The centre of the circle inscribed in a square formed by the lines $x^2-8x-12=0$ and $y^2-14y+45=0$ is

1) $(4,7)$ 2) $(7,4)$ 3) $(9,4)$ 4) $(4,9)$

20. If $P(x,y)$ be any point on $16x^2+25y^2=400$ with foci $F_1(3,0)$ and $F_2(-3,0)$ then PF_1+PF_2 is

1) 8 2) 6 3) 10 4) 12

21. The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ and $\frac{x^2}{a^2}-\frac{y^2}{b^2}=-1$ is

1) $4(a^2+b^2)$ 2) $2(a^2+b^2)$ 3) a^2+b^2 4) $\frac{1}{2}(a^2+b^2)$

22. If a vector $\vec{\alpha}$ lies in the plane of $\vec{\beta}$ and $\vec{\gamma}$, then

1) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]=1$ 2) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]=-1$ 3) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]=1$ 4) $[\vec{\alpha},\vec{\beta},\vec{\gamma}]=2$

23. If $\vec{a},\vec{c},\vec{b}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$, and is parallel to $\vec{c}$ then $\vec{a}\times(\vec{c}\times\vec{b})$ is equal to

1) $\vec{a}$ 2) $\vec{b}$ 3) $\vec{c}$ 4) $\vec{0}$

24. The volume of the parallelepiped with its edges represented by the vectors $\hat{i}+\hat{j}$, $\hat{i}+2\hat{j}$, $\hat{i}+\hat{j}+\pi\hat{k}$ Is

1) $\frac{\pi}{2}$ 2) $\frac{\pi}{3}$ 3) π 4) $\frac{\pi}{4}$

25. If $\vec{a}=\hat{i}+\hat{j}+\hat{k}$, $\vec{b}=\hat{i}+\hat{j}$, $\vec{c}=\hat{i}$ and $(\vec{a}\times\vec{b})\times\vec{c}=\lambda\vec{a}+\mu\vec{b}$, then the value of $\lambda+\mu$ is

1) 0 2) 1 3) 6 4) 3

26. If $\vec{a},\vec{c},\vec{b}$ are non-coplanar vectors such that $\vec{a}\times(\vec{b}\times\vec{c})=\frac{\vec{b}+\vec{c}}{\sqrt{2}}$, then the angle between $\vec{a}$ and $\vec{b}$ is

1) $\frac{\pi}{2}$ 2) $\frac{3\pi}{4}$ 3) $\frac{\pi}{4}$ 4) π

27. A balloon rises straight up at 10 m/s. An observer is 40m away from the spot where the balloon left the ground. Find the rate of change of the balloon's angle of elevation in radian per second when the balloon is 30 metres above the ground.
1) $\frac{3}{25}$ radian/sec 2) $\frac{4}{25}$ radian/sec 3) $\frac{1}{5}$ radian/sec 4) $\frac{1}{3}$ radian/sec
28. A stone is thrown up vertically. The height it reaches at time t seconds is given by $x = 80t - 16t^2$. The stone reaches the maximum height in time t seconds is given by
1) 2 2) 2.5 3)3 4)3.5
29. The abscissa of the point on the curve $f(x) = \sqrt{8-2x}$ at which the slope of the tangent is -0.25 ?
1) -8 2) -4 3) -2 4) 0
30. The tangent to the curve $y^2 - xy + 9 = 0$ is vertical when
1) $y = 0$ 2) $y = \pm\sqrt{3}$ 3) $y = \frac{1}{2}$ 4) $y = \pm 3$
31. What is the value of the limit $\lim_{x\to 0}\left(\cot x - \frac{1}{x}\right)$ is
1) 0 2) 1 3) 2 4) ∞
32. The percentage error of fifth root of 31 is approximately how many times the percentage error in 31?
1) $\frac{1}{31}$ 2) $\frac{1}{5}$ 3) 5 4) 31
33. If $w(x, y) = x^y, x > 0$, then $\frac{\partial w}{\partial x}$ is equal to
1) $x^y \log x$ 2) $y \log x$ 3) yx^{y-1} 4) $x \log y$
34. If we measure the side of a cube to be 4 cm with an error of 0.1 cm, then the error in our calculation of the volume is
1) 0.4 cu.cm 2) 0.45 cu.cm 3) 2 cu.cm 4) 4.8 cu.cm
35. The value of $\int_{-1}^{2} |x| dx$ is
1) $\frac{1}{2}$ 2) $\frac{3}{2}$ 3) $\frac{5}{2}$ 4) $\frac{7}{2}$
36. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x \cos x \, dx$ is
1) $\frac{3}{2}$ 2) $\frac{1}{2}$ 3) 0 4) $\frac{2}{3}$
37. The value of $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \left(\frac{2x^7 - 3x^5 + 7x^3 - x + 1}{\cos^2 x}\right) dx$ is
1) 4 2) 3 3) 2 4) 0
38. The area between $y^2 = 4x$ and its latus rectum is
1) $\frac{2}{3}$ 2) $\frac{4}{3}$ 3) $\frac{8}{3}$ 4) $\frac{5}{3}$
39. The differential equation representing the family of curves $y = A\cos(x + B)$, where A and B are parameters, is
1) $\frac{d^2y}{dx^2} - y = 0$ 2) $\frac{d^2y}{dx^2} + y = 0$ 3) $\frac{d^2y}{dx^2} = 0$ 4) $\frac{d^2x}{dy^2} = 0$

40. The order of the differential equation of all circles with centre at (h,k) and radius 'a' is
1) 2 2) 3 3) 4 4) 1

41. The general solution of the differential equation $\frac{dy}{dx}=\frac{y}{x}$ is
1) $xy=k$ 2) $y=k\log x$ 3) $y=kx$ 4) $\log y=kx$

42. The solution of $\frac{dy}{dx}+p(x)y=0$ is
1) $y=ce^{\int pdx}$ 2) $y=ce^{-\int pdx}$ 3) $x=ce^{-\int pdy}$ 4) $x=ce^{\int pdy}$

43. The integrating factor of the differential equation $\frac{dy}{dx}+P(x)y=Q(x)$ is x, then $P(x)$
1) x 2) $\frac{x^2}{2}$ 3) $\frac{1}{x}$ 4) $\frac{1}{x^2}$

44. A rod of length $2l$ is broken into two pieces at random. The probability density function of the shorter of the two pieces is $f(x)=\begin{cases}\frac{1}{l} & 0<x<l\\ 0 & l\le x<2l\end{cases}$ The mean and variance of the shorter of the two pieces are respectively
1) $\frac{l}{2},\frac{l^2}{3}$ 2) $\frac{l}{2},\frac{l^2}{6}$ 3) $l,\frac{l^2}{12}$ 4) $\frac{l}{2},\frac{l^2}{12}$

45. A pair of dice numbered 1, 2, 3, 4, 5, 6 of a six-sided die and 1, 2, 3, 4 of a four-sided die is rolled and the sum is determined. Let the random variable X denote this sum. Then the number of elements in the inverse image of 7 is
1) 1 2) 2 3) 3 4) 4

46. Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed n times. Then the possible values of X are
1) $i+2n,\ i=0,1,2,.....n$
2) $2i-n,\ i=0,1,2,.....n$
3) $n-i,\ \ i=0,1,2,.....n$
4) $2i+2n, i=0,1,2,.....n$

47. In the set $\mathbb{R}$ of real numbers '$*$' is defined as follows. Which one of the following is not a binary operation on $\mathbb{R}$?
1) $a*b$=min $(a \,.\, b)$ 2) $a*b$= max (a,b) 3) $a*b=a$ 4) $a*b=a^b$

48. In the set $\mathbb{Q}$ define $a\odot b=a+b+ab$. For what value of y, $3\odot(y\odot 5)=7$?
1) $y=\frac{2}{3}$ 2) $y=-\frac{2}{3}$ 3) $y=-\frac{3}{2}$ 4) $y=4$

49. Which one of the following statements has the truth value T ?
1) sin x is an even function.
2) Every square matrix is non-singular
3) The product of complex number and its conjugate is purely imaginary
4) $\sqrt{5}$ is an irrational number

50. Determine the truth value of each of the following statements:
(a) 4+2=5 and 6+3=9
(b) 3+2=5 and 6+1=7
(c) 4+5=9 and 1+2= 4
(d) 3+2=5 and 4+7=11

	(a)	(b)	(c)	(d)
1)	F	T	F	T
2)	T	F	T	F
3)	T	T	F	F
4)	F	F	T	T

CENTUM ACHIEVERS' ACADEMY

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CLASS : XII **ONE MARK TEST (VOLUME.1)** **SUB: MATHEMATICS**

Choose the Correct or the most suitable answer from the given four alternatives : **$(125\times 1 = 125)$**

1. If the coordinates at one end of a diameter of the circle $x^2+y^2-8x-4y+c=0$ are (11,2). the coordinates of the other end are

(1) $(-5,2)$ (2) $(2,-5)$ (3) $(5,-2)$ (4) $(-2,5)$

2. If $|\text{adj}\,(\text{adj}\ A)| = |A|^9$, then the order of the square matrix A is

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

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

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

4. If $A = \begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then $|\text{adj}\,(AB)| =$

(1) -40 (2) -80 (3) -60 (4) -20

5. If the length of the perpendicular from the origin to the plane $2x+3y+\lambda z=1, \lambda>0$ is $\frac{1}{5}$, then the value of λ is

(1) $2\sqrt{3}$ (2) $3\sqrt{2}$ (3) 0 (4) 1

6. If $\vec{a},\vec{b},\vec{c}$ are three non-coplanar unit vectors such that $\vec{a}\times(\vec{b}\times\vec{c}) = \frac{\vec{b}+\vec{c}}{\sqrt{2}}$, then the angle between $\vec{a}$ and $\vec{b}$ is

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

7. Area of the greatest rectangle inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

(1) $2ab$ (2) ab (3) $\sqrt{ab}$ (4) $\frac{a}{b}$

8. If A, B and C are invertible matrices of some order, then which one of the following is not true?

(1) $\text{adj}\ A = |A|A^{-1}$ (2) $\text{adj}(AB) = (\text{adj}\ A)(\text{adj}\ B)$

(3) $\det A^{-1} = (\det A)^{-1}$ (4) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

9. If $x+y=k$ is a normal to the parabola $y^2=12x$, then the value of k is

(1) 3 (2) -1 (3) 1 (4) 9

10. The locus of a point whose distance from $(-2,0)$ is $\frac{2}{3}$ times its distance from the line $x=\frac{-9}{2}$ is

(1) a parabola (2) a hyperbola (3) an ellipse (4) a circle

11. 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) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

12. The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ having centre at (0,3) is

(1) $x^2 + y^2 - 6y - 7 = 0$ (2) $x^2 + y^2 - 6y + 7 = 0$

(3) $x^2 + y^2 - 6y - 5 = 0$ (4) $x^2 + y^2 - 6y + 5 = 0$

13. The vector equation $\vec{r} = (\hat{\imath} - 2\hat{\jmath} - \hat{k}) + t(6\hat{\jmath} - \hat{k})$ represents a straight line passing through the points

(1) $(0,6,-1)$ and $(1,-2,-1)$ (2) $(0,6,-1)$ and $(-1,-4,-2)$

(3) $(1,-2,-1)$ and $(1,4,-2)$ (4) $(1,-2,-1)$ and $(0,-6,1)$

14. 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) $\sin\theta$ (3) $\cos\theta$ (4) 1

15. If a vector $\vec{\alpha}$ lies in the plane of $\vec{\beta}$ and $\vec{\gamma}$, then

(1) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}] = 1$ (2) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}] = -1$ (3) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}] = 0$ (4) $[\vec{\alpha}, \vec{\beta}, \vec{\gamma}] = 2$

16. If adj $A = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and 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) $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

17. The equation of the normal to the circle $x^2 + y^2 - 2x - 2y + 1 = 0$ which is parallel to the line $2x + 4y = 3$ is

(1) $x + 2y = 3$ (2) $x + 2y + 3 = 0$

(3) $2x + 4y + 3 = 0$ (4) $x - 2y + 3 = 0$

18. 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) $-\frac{q}{p}$

19. If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar, non-zero vectors such that $[\vec{a}, \vec{b}, \vec{c}] = 3$, then $\{[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}]\}^2$ is equal to

(1) 81 (2) 9 (3) 27 (4) 18

20. The ellipse $E_1: \frac{x^2}{9} + \frac{y^2}{4} = 1$ is inscribed in a rectangle R whose sides are parallel to the coordinate axes. Another ellipse E_2 passing through the point (0,4) circumscribes the rectangle R. The eccentricity of the ellipse is

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

21. The value of $\sum_{n=1}^{13} (i^n + i^{n-1})$ is

(1) $1 + i$ (2) i (3) 1 (4) 0

22. 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) $\frac{1}{i-2}$

23. 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) $\begin{bmatrix}4 & -1\\2 & 1\end{bmatrix}$

24. 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

25. If $\left|z-\frac{3}{z}\right|=2$, then the least value of $|z|$ is

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

26. If the normals of the parabola $y^2=4x$ drawn at the end points of its latus rectum are tangents to the circle $(x-3)^2+(y+2)^2=r^2$, then the value of r^2 is

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

27. If $\vec{a}\cdot\vec{b}=\vec{b}\cdot\vec{c}=\vec{c}\cdot\vec{a}=0$, then the value of $[\vec{a},\vec{b},\vec{c}]$ is

(1) $|\vec{a}||\vec{b}||\vec{c}|$ (2) $\frac{1}{3}|\vec{a}||\vec{b}||\vec{c}|$ (3) 1 (4) -1

28. If A is a 3×3 non-singular matrix such that $AA^T=A^TA$ and $B=A^{-1}A^T$, then $BB^T=$

(1) A (2) B (3) I_3 (4) B^T

29. If $\vec{a}$ and $\vec{b}$ are unit vectors such that $[\vec{a},\vec{b},\vec{a}\times\vec{b}]=\frac{1}{4}$, then the angle between $\vec{a}$ and $\vec{b}$ is

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

30. 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

31. If z is a complex number such that $z\in\mathbb{C}\setminus\mathbb{R}$ and $z+\frac{1}{z}\in\mathbb{R}$, then $|z|$ is

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

32. 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) ∞

33. 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

34. The principal argument of $(\sin 40^\circ+i\cos 40^\circ)^5$ is

(1) -110° (2) -70° (3) 70° (4) 110°

35. Consider the vectors $\vec{a},\vec{b},\vec{c},\vec{d}$ such that $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d})=\vec{0}$. Let P_1 and P_2 be the planes determined by the pairs of vectors $\vec{a},\vec{b}$ and $\vec{c},\vec{d}$ respectively. Then the angle between P_1 and P_2 is

(1) 0° (2) 45° (3) 60° (4) 90°

36. If $(1+i)(1+2i)(1+3i)\cdots(1+ni)=x+iy$, then $2\cdot5\cdot10\cdots(1+n^2)$ is

(1) 1 (2) i (3) x^2+y^2 (4) $1+n^2$

37. 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) $\frac{\pi}{3}$

38. If $0\le\theta\le\pi$ and the system of equations $x+(\sin\ \theta)y-(\cos\ \theta)z=0, (\cos\ \theta)x-y+z=0,$

$(\sin\ \theta)x+y-z=0$ has a non-trivial solution then θ is

(1) $\frac{2\pi}{3}$ (2) $\frac{3\pi}{4}$ (3) $\frac{5\pi}{6}$ (4) $\frac{\pi}{4}$

39. 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

40. If $\omega\neq1$ 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) $-\sqrt{3}i$

41. If the direction cosines of a line are $\frac{1}{c},\frac{1}{c},\frac{1}{c}$, then

(1) $c=\pm3$ (2) $c=\pm\sqrt{3}$ (3) $c>0$ (4) $0<c<1$

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

43. If $\vec{a}=\hat{\imath}+\hat{\jmath}+\hat{k},\ \vec{b}=\hat{\imath}+\hat{\jmath},\ \vec{c}=\hat{\imath}$ and $(\vec{a}\times\vec{b})\times\vec{c}=\lambda\vec{a}+\mu\vec{b}$, then the value of $\lambda+\mu$ is

(1) 0 (2) 1 (3) 6 (4) 3

44. If $\omega=$ cis $\frac{2\pi}{3}$, then the number of distinct roots of $\begin{vmatrix}z+1 & \omega & \omega^2\\ \omega & z+\omega^2 & 1\\ \omega^2 & 1 & z+\omega\end{vmatrix}=0$

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

45. 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) m^n (4) n^m

46. If $A=\begin{bmatrix}7 & 3\\ 4 & 2\end{bmatrix}$, then $9I_2-A=$

(1) A^{-1} (2) $\frac{A^{-1}}{2}$ (3) $3A^{-1}$ (4) $2A^{-1}$

47. 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) $2|z|^2$

48. 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

49. If z is a non zero complex number, such that $2iz^2 = \bar{z}$ then $|z|$ is

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

50. The eccentricity of the ellipse $(x-3)^2 + (y-4)^2 = \frac{y^2}{9}$ is

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

51. 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

52. 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) $a \leq 0$

53. 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

54. 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) $x - \pi$

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

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

56. If $A = \begin{bmatrix} \frac{3}{5} & \frac{4}{5} \\ x & \frac{3}{5} \end{bmatrix}$ and $A^2 = A^{-1}$, then the value of x is

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

57. If the two tangents drawn from a point P to the parabola $y^2 = 4x$ are at right angles then the locus of P is

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

58. 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

59. 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

60. 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]

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

(1) $\frac{2\pi}{3}$ (2) $\frac{\pi}{6}$ (3) $\frac{5\pi}{6}$ (4) $\frac{\pi}{2}$

62. 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) $-\frac{1}{5}$

63. If the planes $\vec{r}\cdot(2\hat{\imath}-\lambda\hat{\jmath}+\hat{k})=3$ and $\vec{r}\cdot(4\hat{\imath}+\hat{\jmath}-\mu\hat{k})=5$ are parallel, then the value of λ and μ are

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

64. $\tan^{-1}\left(\frac{1}{4}\right)+\tan^{-1}\left(\frac{2}{9}\right)$ 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) $\tan^{-1}\left(\frac{1}{2}\right)$

65. The eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half the distance between the foci is

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

66. $\sin^{-1}\left(\tan\frac{\pi}{4}\right)-\sin^{-1}\left(\sqrt{\frac{3}{x}}\right)=\frac{\pi}{6}$. 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) $x^2+x-6=0$

67. 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) $\begin{bmatrix}5 & -2\\ 3 & -1\end{bmatrix}$

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

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

69. If $\vec{a}\times(\vec{b}\times\vec{c})=(\vec{a}\times\vec{b})\times\vec{c}$, where $\vec{a},\vec{b},\vec{c}$ are any three vectors such that $\vec{b}\cdot\vec{c}\neq 0$ and $\vec{a}\cdot\vec{b}\neq 0$, then $\vec{a}$ and $\vec{c}$ are

(1) perpendicular (2) parallel (3) inclined at angle $\frac{\pi}{3}$ (4) inclined at angle $\frac{\pi}{6}$

70. 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) $\tan 2\alpha$

71. If the distance of the point (1,1,1) from the origin is half of its distance from the plane $x+y+z+k=0$, then the values of k are

(1) ± 3 (2) ± 6 (3) $-3,9$ (4) $3,-9$

72. If $|x|\leq 1$, 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

73. 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

74. 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) $\frac{\sqrt{3}}{2}$

75. If $A^T A^{-1}$ is symmetric, then $A^2 =$

(1) A^{-1} (2) $(A^T)^2$ (3) A^T (4) $(A^{-1})^2$

76. The equation of the circle passing through (1,5) and (4,1) and touching y-axis is

$x^2 + y^2 - 5x - 6y + 9 + \lambda(4x + 3y - 19) = 0$ where λ is equal to

(1) $0, -\frac{40}{9}$ (2) 0 (3) $\frac{40}{9}$ (4) $\frac{-40}{9}$

77. 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) $-\frac{\pi}{5}$

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

(1) $|k| \le 6$ (2) $k = 0$ (3) $|k| > 6$ (4) $|k| \ge 6$

79. The circle $x^2 + y^2 = 4x + 8y + 5$ intersects the line $3x - 4y = m$ at two distinct points if

(1) $15 < m < 65$ (2) $35 < m < 85$

(3) $-85 < m < -35$ (4) $-35 < m < 15$

80. The length of the diameter of the circle which touches the x-axis at the point (1,0) and passes through the point (2,3).

(1) $\frac{6}{5}$ (2) $\frac{5}{3}$ (3) $\frac{10}{3}$ (4) $\frac{3}{5}$

81. The radius of the circle $3x^2 + by^2 + 4bx - 6by + b^2 = 0$ is

(1) 1 (2) 3 (3) $\sqrt{10}$ (4) $\sqrt{11}$

82. z_1, z_2, 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

83. 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

84. If $P(x, y)$ be any point on $16x^2 + 25y^2 = 400$ with foci $F_1(3,0)$ and $F_2(-3,0)$ then $PF_1 + PF_2$ is

(1) 8 (2) 6 (3) 10 (4) 12

85. The radius of the circle passing through the point (6,2) two of whose diameter are $x + y = 6$ and $x + 2y = 4$ is

(1) 10 (2) $2\sqrt{5}$ (3) 6 (4) 4

86. 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

(1) $e^{(\Delta_2/\Delta_1)}, e^{(\Delta_3/\Delta_1)}$ (2) $\log(\Delta_1/\Delta_3), \log(\Delta_2/\Delta_3)$

(3) $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$ (4)) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

87. 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) $2 + \frac{3}{2}i$

88. 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

89. The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ is

(1) $4(a^2 + b^2)$ (2) $2(a^2 + b^2)$ (3) $a^2 + b^2$ (4) $\frac{1}{2}(a^2 + b^2)$

90. 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) $[-2, -\sqrt{2}]$

91. Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ parallel to the straight line $2x - y = 1$. One of the points of contact of tangents on the hyperbola is

(1) $\left(\frac{9}{2\sqrt{2}}, \frac{-1}{\sqrt{2}}\right)$ (2) $\left(\frac{-9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ (3) $\left(\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$ (4) $(3\sqrt{3}, -2\sqrt{2})$

92. 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

93. The coordinates of the point where the line $\vec{r} = (6\hat{\imath} - \hat{\jmath} - 3\hat{k}) + t(-\hat{\imath} + 4\hat{k})$ meets the plane $\vec{r} \cdot (\hat{\imath} + \hat{\jmath} - \hat{k}) = 3$ are

(1) $(2,1,0)$ (2) $(7,-1,-7)$ (3) $(1,2,-6)$ (4) $(5,-1,1)$

94. 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

95. Let C be the circle with centre at $(1,1)$ and radius $= 1$. If T is the circle centered at $(0, y)$ passing through the origin and touching the circle C externally, then the radius of T is equal

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

96. $\sin(\tan^{-1} x), |x| < 1$ 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) $\frac{x}{\sqrt{1+x^2}}$

97. 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) $(1,1)$

98. An ellipse has OB as semi minor axes, F and F' its foct and the angle FBF' is a right angle. Then the eccentricity of the ellipse is

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

99. 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) $\left(\sin^2\frac{\theta}{2}\right)A$

100. The circle passing through $(1,-2)$ and touching the axis of x at $(3,0)$ passing through the point

(1) $(-5,2)$ (2) $(2,-5)$ (3) $(5,-2)$ (4) $(-2,5)$

101. 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

102. The values of m for which the line $y = mx + 2\sqrt{5}$ touches the hyperbola $16x^2 - 9y^2 = 144$ are the roots of $x^2 - (a+b)x - 4 = 0$, then the value of $(a+b)$ is

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

103. If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $[\vec{a}, \vec{c}, \vec{b}]$ is equal to

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

104. The principal argument of $\frac{3}{-1+i}$ is

(1) $\frac{-5\pi}{6}$ (2) $\frac{-2\pi}{3}$ (3) $\frac{-3\pi}{4}$ (4) $\frac{-\pi}{2}$

105. 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

106. If $\vec{a}, \vec{b}, \vec{c}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$, and is parallel to $\vec{c}$ then $\vec{a} \times (\vec{b} \times \vec{c})$ is equal to

(1) $\vec{a}$ (2) $\vec{b}$ (3) $\vec{c}$ (4) $\vec{0}$

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

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

108. If $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, $B = \text{adj } A$ and $C = 3A$, then $\frac{|\text{adj } B|}{|C|} =$

(1) $\frac{1}{3}$ (2) $\frac{1}{9}$ (3) $\frac{1}{4}$ (4) 1

109. If $[\vec{a}, \vec{b}, \vec{c}] = 1$, then the value of $\frac{\vec{a}\cdot(\vec{b}\times\vec{c})}{(\vec{c}\times\vec{a})\cdot\vec{b}} + \frac{\vec{b}\cdot(\vec{c}\times\vec{a})}{(\vec{a}\times\vec{b})\cdot\vec{c}} + \frac{\vec{c}\cdot(\vec{a}\times\vec{b})}{(\vec{c}\times\vec{b})\cdot\vec{a}}$ is

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

110. $i^n + i^{n+1} + i^{n+2} + i^{n+3}$ is

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

111. The volume of the parallelepiped with its edges represented by the vectors $\hat{\imath} + \hat{\jmath}, \hat{\imath} + 2\hat{\jmath}, \hat{\imath} + \hat{\jmath} + \pi\hat{k}$ is

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

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

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

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

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

114. 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) $\sqrt{5} + 2$

115. If $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} - \hat{k}$, $\vec{b} = \hat{\imath} + 2\hat{\jmath} - 5\hat{k}$, $\vec{c} = 3\hat{\imath} + 5\hat{\jmath} - \hat{k}$, then a vector perpendicular to $\vec{a}$ and lies in the plane containing $\vec{b}$ and $\vec{c}$ is

(1) $-17\hat{\imath} + 21\hat{\jmath} - 97\hat{k}$ (2) $17\hat{\imath} + 21\hat{\jmath} - 123\hat{k}$

(3) $-17\hat{\imath} - 21\hat{\jmath} + 97\hat{k}$ (4) $-17\hat{\imath} - 21\hat{\jmath} - 97\hat{k}$

116. The angle between the lines $\frac{x-2}{3} = \frac{y+1}{-2}, z = 2$ and $\frac{x-1}{1} = \frac{2y+3}{3} = \frac{z+5}{2}$ is

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

117. If the line $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$ lies in the plane $x + 3y - \alpha z + \beta = 0$, then (α, β) is

(1) $(-5,5)$ (2) $(-6,7)$ (3) $(5,-5)$ (4) $(6,-7)$

118. The angle between the line $\vec{r} = (\hat{\imath} + 2\hat{\jmath} - 3\hat{k}) + t(2\hat{\imath} + \hat{\jmath} - 2\hat{k})$ and the plane $\vec{r} \cdot (\hat{\imath} + \hat{\jmath}) + 4 = 0$ is

(1) $0°$ (2) $30°$ (3) $45°$ (4) $90°$

119. The centre of the circle inscribed in a square formed by the lines $x^2 - 8x - 12 = 0$ and $y^2 - 14y + 45 = 0$ is

(1) $(4,7)$ (2) $(7,4)$ (3) $(9,4)$ (4) $(4,9)$

120. Distance from the origin to the plane $3x - 6y + 2z + 7 = 0$ is

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

121. 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

122. The distance between the planes $x + 2y + 3z + 7 = 0$ and $2x + 4y + 6z + 7 = 0$ is

(1) $\frac{\sqrt{7}}{2\sqrt{2}}$ (2) $\frac{7}{2}$ (3) $\frac{\sqrt{7}}{2}$ (4) $\frac{7}{2\sqrt{2}}$

123. 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

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

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

125. If $\frac{z-1}{z+1}$ is purely imaginary, then $|z|$ is

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

[redacted]

1mark 4 chapters

12th Standard 2019 EM

Date : 28-Jul-19

Maths

Reg.No. : | | | | | | |

Time : 02:55:00 Hrs

Total Marks : 175

For answers check YouTube channel

SR MATHS TEST PAPERS

175 x 1 = 175

1) If |adj(adj A)| = $|A|^9$, then the order of the square matrix A is

(a) 3 (b) 4 (c) 2 (d) 5

2) If A is a 3 × 3 non-singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then BB^T =

(a) A (b) B (c) I (d) B^T

3) If A = $\begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, B = adj A and C = 3A, then $\frac{|adjB|}{|C|}$ =

(a) $\frac{1}{3}$ (b) $\frac{1}{9}$ (c) $\frac{1}{4}$ (d) 1

4) If A $\begin{bmatrix} 1 & -2 \\ 1 & 4 \end{bmatrix}$ = $\begin{bmatrix} 6 & 0 \\ 0 & 6 \end{bmatrix}$, then A =

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

5) If A = $\begin{bmatrix} 7 & 3 \\ 4 & 2 \end{bmatrix}$, then 9I - A =

(a) A^{-1} (b) $\frac{A^{-1}}{2}$ (c) $3A^{-1}$ (d) $2A^{-1}$

6) If A = $\begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then |adj (AB)| =

(a) -40 (b) -80 (c) -60 (d) -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

(a) 15 (b) 12 (c) 14 (d) 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

(a) 0 (b) -2 (c) -3 (d) -1

9) If A, B and C are invertible matrices of some order, then which one of the following is not true?

(a) adj A = $|A|A^{-1}$ (b) adj(AB) = (adj A)(adj B) (c) det A^{-1} = $(\det A)^{-1}$ (d) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

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} =

(a) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

11) If A^TA^{-1} is symmetric, then A^2 =

(a) A^{-1} (b) $(A^T)^2$ (c) A^T (d) $(A^{-1})^2$

12) If A is a non-singular matrix such that $A^{-1} = \begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$, then $(A^T)^{-1}$ =

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

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

(a) $\frac{-4}{5}$ (b) $\frac{-3}{5}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

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

(a) $\left(\cos^2\frac{\theta}{2}\right)A$ (b) $\left(\cos^2\frac{\theta}{2}\right)A^T$ (c) $\left(\cos^2\theta\right)I$ (d) $(\sin^2\frac{\theta}{2})A$

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

(a) 0 (b) sin θ (c) cos θ (d) 1

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

(a) 17 (b) 14 (c) 19 (d) 21

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

(a) $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$ (b) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$ (c) $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$ (d) $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

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

(a) 1 (b) 2 (c) 4 (d) 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,

(a) $e^{(\Delta_2/\Delta_1)}, e^{(\Delta_3/\Delta_1)}$ (b) $\log(\Delta_1/\Delta_3), \log(\Delta_2/\Delta_3)$ (c) $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$ (d) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

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 $\text{adj}(\lambda A) = \lambda^n \text{adj}(A)$.

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

(a) Only (i) (b) (ii) and (iii) (c) (iii) and (iv) (d) (i), (ii) and (iv)

21) If ρ(A) = ρ([A | B]), then the system AX = B of linear equations is

(a) consistent and has a unique solution (b) consistent (c) consistent and has infinitely many solution (d) inconsistent

22) If 0 ≤ θ ≤ π 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

(a) $\frac{2\pi}{3}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{4}$

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

(a) $\lambda = 7, \mu \neq -5$ (b) $\lambda = 7, \mu = 5$ (c) $\lambda \neq 7, \mu \neq -5$ (d) $\lambda = 7, \mu = -5$

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

(a) 2 (b) 4 (c) 3 (d) 1

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

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

26) The system of linear equations x + y + z = 6, x + 2y + 3z =14 and 2x + 5y + λz =μ (λ, μ ∈ R) is consistent with unique solution if

(a) λ = 8 (b) λ = 8, μ ≠ 36 (c) λ ≠ 8 (d) none

27) If the system of equations x = cy + bz, y = az + cx and z = bx + ay has a non - trivial solution then

(a) $a^2 + b^2 + c^2 = 1$ (b) abc ≠ 1 (c) a + b + c =0 (d) $a^2 + b^2 + c^2 + 2abc = 1$

28) Let A be a 3 x 3 matrix and B its adjoint matrix If |B|=64, then |A|=

(a) ±2 (b) ±4 (c) ±8 (d) ±12

29) If A^T is the transpose of a square matrix A, then

(a) $|A| \neq |A^T|$ (b) $|A| = |A^T|$ (c) $|A| + |A^T| = 0$ (d) $|A| = |A^T|$ only

30) The number of solutions of the system of equations 2x+y = 4, x - 2y = 2, 3x + 5y = 6 is

(a) 0 (b) 1 (c) 2 (d) infinitely many

31) If A is a square matrix that IAI = 2, than for any positive integer n, $|A^n|$ =

(a) 0 (b) 2n (c) 2^n (d) n^2

32) The system of linear equations x + y + z = 2, 2x + y - z = 3, 3x + 2y + kz = has a unique solution if

(a) k ≠ 0 (b) -1 < k < 1 (c) -2 < k < 2 (d) k=0

33) If A is a square matrix of order n, then |adj A| =

(a) $|A|^{n-1}$ (b) $|A|^{n-2}$ (c) $|A|^n$ (d) None

34) If the system of equations x + 2y - 3x = 2, (k + 3) z = 3, (2k + 1) y + z = 2. is inconsistent then k is

(a) $-3, -\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 1 (d) 2

35) If A = $\begin{pmatrix} cosx & sinx \\ -sinx & cosx \end{pmatrix}$ and A(adj A) =λ $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ then λ is

(a) sinx cosx (b) 1 (c) 2 (d) none

36) If A is a matrix of order m x n, then $\rho(A)$ is

(a) m (b) n (c) ≤ min (m,n) (d) ≥ min (m,n)

37) The system of equations x + 2y + 3z = 1, x - y + 4z = 0, 2x + y + 7z = 1 has

(a) One solution (b) Two solution (c) No solution (d) Infinitely many solution

38) If $\rho(A) = \rho([A/B])$ = number of unknowns, then the system is

(a) consistent and has infinitely many solutions (b) consistent (c) inconsistent (d) consistent and has unique solution

39) Which of the following is not an elementary transformation?

(a) $R_i \leftrightarrow R_j$ (b) $R_i \to 2R_i + R_j$ (c) $C_j \to C_j + C_i$ (d) $R_i \to R_i + C_j$

40) If $\rho(A)$ = r then which of the following is correct?

(a) all the minors of order n which do not vanish (b) 'A' has at least one minor "of order r which does not vanish and all higher order minors vanish (c) 'A' has at least one (r + 1) order minor which vanish (d) all (r + 1) and higher order minors should not vanish

41) Every homogeneous system ______

(a) Is always consistent (b) Has only trivial solution (c) Has infinitely many solution (d) Need not be consistent

42) If $\rho(A) \neq \rho([AIB])$, then the system is

(a) consistent and has infinitely many solutions (b) consistent and has a unique solution (c) consistent (d) inconsistent

43) In the non - homogeneous system of equations with 3 unknowns if $\rho(A) = \rho([AIB]) = 2$, then the system has _______

(a) unique solution (b) one parameter family of solution (c) two parameter family of solutions (d) in consistent

44) Cramer's rule is applicable only when ______

(a) $\Delta \neq 0$ (b) $\Delta = 0$ (c) $\Delta =0, \Delta_x =0$ (d) $\Delta_x = \Delta_y = \Delta_z =0$

45) In a homogeneous system if ρ (A) =ρ([A|0]) < the number of unknouns then the system has ________

(a) trivial solution (b) only non - trivial solution (c) no solution (d) trivial solution and infinitely many non - trivial solutions

46) In the system of equations with 3 unknowns, if $\Delta = 0$, and one of Δ_x, Δ_y of Δ_z is non zero then the system is ______

(a) Consistent (b) inconsistent (c) consistent with one parameter family of solutions (d) consistent with two parameter family of solutions

47) In the system of liner equations with 3 unknowns If $\rho(A) = \rho([A|B]) =1$, the system has ________

(a) unique solution (b) inconsistent (c) consistent with 2 parameter -family of solution (d) consistent with one parameter family of solution.

48) If A = [2 0 1] then the rank of AA^T is ______

(a) 1 (b) 2 (c) 3 (d) 0

49) If A is a non-singular matrix then $|A^{-1}|$= ______

(a) $\left|\frac{1}{A^2}\right|$ (b) $\frac{1}{|A^2|}$ (c) $\left|\frac{1}{A}\right|$ (d) $\frac{1}{|A|}$

50) In a square matrix the minor M_{ij} and the' co-factor A_{ij} of and element a_{ij} are related by _____

(a) $A_{ij} = -M_{ij}$ (b) $A_{ij} = M_{ij}$ (c) $A_{ij} = (-1)^{i+j} M_{ij}$ (d) $A_{ij} =(-1)^{i-j} M_{ij}$

51) $i^n+i^{n+1}+i^{n+2}+i^{n+3}$ is

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

52) The value of $\sum_{i=1}^{13}\left(i^n + i^{n-1}\right)$ is

(a) 1+ i (b) i (c) 1 (d) 0

53) The area of the triangle formed by the complex numbers z,iz, and z+iz in the Argand's diagram is

(a) $\frac{1}{2}|z|^2$ (b) $|z|^2$ (c) $\frac{3}{2}|z|^2$ (d) $2|z|^2$

54) The conjugate of a complex number is $\frac{1}{i-2}$/Then the complex number is

(a) $\frac{1}{i+2}$ (b) $\frac{-1}{i+2}$ (c) $\frac{-1}{i-2}$ (d) $\frac{1}{i-2}$

55) If $z = \frac{(\sqrt{3}+i)^3(3i+4)^2}{(8+6i)^2}$, then |z| is equal to

(a) 0 (b) 1 (c) 2 (d) 3

56) If z is a non zero complex number, such that $2iz^2=\bar{z}$ then |z|is then |z| is

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 3

57) If $z - 2 + i \leq 2$ then the greatest value of |z| is

(a) $\sqrt{3}-2$ (b) $\sqrt{3}+2$ (c) $\sqrt{5}-2$ (d) $\sqrt{5}+2$

58) If $\left|z-\frac{3}{z}\right|=2$ then the least value |z| is

(a) 1 (b) 2 (c) 3 (d) 5

59) If |z|=1, then the value of $\frac{1+z}{1+z}$ is

(a) z (b) $\bar{z}$ (c) $\frac{1}{2}$ (d) 1

60) The solution of the equation |z|-z=1+2i is

(a) $\frac{3}{2}-2i$ (b) $-\frac{3}{2}+2i$ (c) $2-\frac{3}{2}i$ (d) $2+\frac{3}{2}i$

61) 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

(a) 1 (b) 2 (c) 3 (d) 4

62) If z is a complex number such that $z\epsilon C/R$ and $z+\frac{1}{z}\epsilon R$ then|z| is

(a) 0 (b) 1 (c) 2 (d) 3

63) z_1,z_3 and z_3 are complex number such that z1+z2+z3=0 and $|z_1|=|z_2|=|z_3|=1$ then $z_1^2+z_2^2+z_2^3$ is

(a) 3 (b) 2 (c) 1 (d) 0

64) If $\frac{z-1}{z+1}$ is purely imaginary, then |z| is

(a) $\frac{1}{2}$ (b) 1 (c) 2 (d) 3

65) If z=x+iy is a complex number such that |z+2|=|z−2|, then the locus of z is

(a) real axis (b) imaginary axis (c) ellipse (d) circle

66) The principal argument of $\frac{3}{-1+i}$

(a) $\frac{-5\pi}{6}$ (b) $\frac{-2\pi}{3}$ (c) $\frac{-3\pi}{4}$ (d) $\frac{-\pi}{2}$

67) The principal argument of (sin 40°+i cos40°)5 is

(a) −110° (b) −70° (c) 70° (d) 110°

68) If (1+i)(1+2i)(1+3i)(1+ni)=x+iy , then $2\cdot5\cdot10...\left(1+n^2\right)$

(a) 1 (b) i (c) x^2+y^2 (d) $1+n^2$

69) If $\omega\neq1$ is a cubic root of unity and $(1+\omega)^7=A+B\omega$,then (A,B) equals

(a) (1,0) (b) (−1,1) (c) (0,1) (d) (1,1)

70) The principal argument of the complex number $\frac{\left(1+i\sqrt{3}\right)^2}{4i\left(1-i\sqrt{3}\right)}$ is

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{2}$

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

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

72) The product of all four values of $\left(cos\frac{\pi}{3}+isin\frac{\pi}{3}\right)^{\frac{1}{4}}$ is

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

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

(a) 1 (b) -1 (c) $\sqrt{3i}$ (d) $-\sqrt{3i}$

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

(a) $cis\frac{2\pi}{3}$ (b) $cis\frac{4\pi}{3}$ (c) $-cis\frac{2}{3}$

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

(a) 1 (b) 2 (c) 3 (d) 4

76) The value of (1+i) $(1+i^2)$ $(1+i^3)$ $(1+i^4)$ is

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

77) If $\sqrt{a+ib}$ =x+iy, then possible value of $\sqrt{a-ib}$ is

(a) x^2+y^2 (b) $\sqrt{x^2+y^2}$ (c) x+iy (d) x-iy

78) If, $i^2 = -1$, then $i^1 + i^2 + i^3 + ...+$ up to 1000 terms is equal to

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

79) If z=$\cos\frac{\pi}{4}$+i $\sin\frac{\pi}{6}$, then

(a) |z| =1, arg(z) =$\frac{\pi}{4}$ (b) |z| =1, arg(z) =$\frac{\pi}{6}$ (c) |z|=$\frac{\sqrt{3}}{2}$, arg(z)=$\frac{5\pi}{24}$ (d) |z| = $\frac{\sqrt{3}}{2}$, arg (z) =$\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$

80) If a=cosθ + i sinθ, then $\frac{1+a}{1-a}$ =

(a) $\cot\frac{\theta}{2}$ (b) cot θ (c) $i\cot\frac{\theta}{2}$ (d) $i\tan\frac{\theta}{2}$

81) The principal value of the amplitude of (1+i) is

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{12}$ (c) $\frac{3\pi}{4}$ (d) π

82) The least positive integer n such that $\left(\frac{2i}{1+i}\right)^n$ is a positive integer is

(a) 16 (b) 8 (c) 4 (d) 2

83) If a = 1+ i, then a^2 equals

(a) 1-i (b) 2-i (c) (1+i)(1-i) (d) i-1

84) If z = $\frac{1}{(2+3i)^2}$ then |z| =

(a) $\frac{1}{13}$ (b) $\frac{1}{5}$ (c) $\frac{1}{12}$ (d) none of these

85) If z=1-cosθ + i sinθ, then |z| =

(a) $2\sin\frac{1}{3}$ (b) $2\cos\frac{\theta}{2}$ (c) $2|\sin\frac{\theta}{2}|$ (d) $2|\cos\frac{\theta}{2}|$

86) If z=$\frac{1}{1-cos\theta-isin\theta}$, the Re(z) =

(a) 0 (b) $\frac{1}{2}$ (c) $\cot\frac{\theta}{2}$ (d) $\frac{1}{2}\cot\frac{\theta}{2}$

87) If x+iy =$\frac{3+5i}{7-6i}$, they y =

(a) $\frac{9}{85}$ (b) $-\frac{9}{85}$ (c) $\frac{53}{85}$ (d) none of these

88) The amplitude of $\frac{1}{i}$ is equal to

(a) 0 (b) $\frac{\pi}{2}$ (c) $-\frac{\pi}{2}$ (d) π

89) The value of $(1+i)^4 + (1-i)^4$ is

(a) 8 (b) 4 (c) -8 (d) -4

90) The complex number z which satisfies the condition $\left|\frac{1+z}{1-z}\right|=1$ lies on

(a) circle $x^2+y^2=1$ (b) x-axis (c) y-axis (d) the lines x+y=1

91) If z = a + ib lies in quadrant then $\frac{\bar{z}}{z}$ also lies in the III quadrant if

(a) a > b > 0 (b) a < b < 0 (c) b < a < 0 (d) b > a > 0

92) $\frac{1+e^{-i\theta}}{1+e^{i\theta}} =$

(a) cosθ + i sinθ (b) cosθ - i sinθ (c) sinθ - i cosθ (d) sinθ + icosθ

93) If $z^n = cos\frac{n\pi}{3} + isin\frac{n\pi}{3}$, then $z_1, z_2 ..... z_6$ is

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

94) If x =cosθ + i sinθ, then the value of $x^n+\frac{1}{x^n}$ is

(a) 2 cosθ (b) 2i sin nθ (c) 2i sin nθ (d) 2i cos nθ

95) If ω is the cube root of unity, then the value of $(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^8)$ is

(a) 9 (b) -9 (c) 16 (d) 32

96) The points represented by 3 - 3i, 4 - 2i, 3 - i and 2 - 2i form _____ in the argand plane.

(a) collinear points (b) Vertices of a parallelogram (c) Vertices of a rectangle (d) Vertices of a square

97) $(1+i)^3$ = ______

(a) 3 + 3i (b) 1 + 3i (c) 3 - 3i (d) 2i - 2

98) $\frac{(cos\theta+isin\theta)^6}{(cos\theta-isin\theta)^5}$ = ________

(a) cos 11θ - isin 11θ (b) cos 11θ + isin 11θ (c) cosθ + i sinθ (d) $cos\frac{6\theta}{5} + isin\frac{6\theta}{5}$

99) If a =cosα + i sinα, b= -cosβ + i sinβ then $\left(ab - \frac{1}{ab}\right)$ is _________

(a) -2i sin(α - β) (b) 2i sin(α - β) (c) 2 cos(α - β) (d) -2 cos(α - β)

100) The conjugate of $\frac{1+2i}{1-(1-i)^2}$ is _______

(a) $\frac{1+2i}{1-(1-i)^2}$ (b) $\frac{5}{1-(1-i)^2}$ (c) $\frac{1-2i}{1+(1+i)^2}$ (d) $\frac{1+2i}{1+(1-i)^2}$

101) The modular of $\frac{(-1+i)(1-i)}{1+i\sqrt{3}}$ is ______

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

102) The value of $\frac{(cos45^0+isin45^0)^2(cos30^0-isin30^0)}{cos30^0+isin30^0}$ is

(a) $\frac{1}{2}+i\frac{\sqrt{3}}{2}$ (b) $\frac{1}{2}-i\frac{\sqrt{3}}{2}$ (c) $-\frac{\sqrt{3}}{2}+\frac{1}{2}$ (d) $\frac{\sqrt{3}}{2}+\frac{1}{2}$

103) If x=cosθ + i sinθ, then $x^n+\frac{1}{x^n}$ is ______

(a) 2 cos nθ (b) 2 i sin nθ (c) 2^n cosθ (d) 2^n i sinθ

104) If z_1, z_2, z_3 are the vertices of a parallelogram, then the fourth vertex z_4 opposite to z_2 is _____

(a) $z_1 + z_2 - z_2$ (b) $z_1 + z_2 - z_3$ (c) $z_1 + z_2 - z_3$ (d) $z_1 - z_2 - z_3$

105) If $x_r=cos\left(\frac{\pi}{2^r}\right) + isin\left(\frac{\pi}{2^r}\right)$ then $x_1, x_2 ... x_\infty$ is

(a) -∞ (b) -2 (c) -1 (d) 0

106) A zero of $x^3 + 64$ is

(a) 0 (b) 4 (c) 4i (d) -4

107) If f and g are polynomials of degrees m and n respectively, and if h(x) =(f 0 g)(x), then the degree of h is

(a) mn (b) m+n (c) m^n (d) n^m

108) A polynomial equation in x of degree n always has

(a) n distinct roots (b) n real roots (c) n imaginary roots (d) at most one root

109) If α,β and γ are the roots of x^3+px^2+qx+r, then $\Sigma\frac{1}{\alpha}$ is

(a) $-\frac{q}{r}$ (b) $\frac{p}{r}$ (c) $\frac{q}{r}$ (d) $-\frac{q}{p}$

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

(a) -1 (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) 5

111) The polynomial x^3-5x^2+9x has three real roots if and only if, k satisfies

(a) |k|≤6 (b) k=0 (c) |k| > 6 (d) |k|≥6

112) The number of real numbers in [0,2π] satisfying $\sin^4x-2\sin^2x+1$ is

(a) 2 (b) 4 (c) 1 (d) ∞

113) If $x^3+12x^2+10ax+1999$ definitely has a positive root, if and only if

(a) a≥0 (b) a > 0 (c) a< 0 (d) a≤0

114) The polynomial x^3+2x+3 has

(a) one negative and two real roots (b) one positive and two imaginary roots (c) three real roots (d) no solution

115) The number of positive roots of the polynomial $\Sigma_{j=0}^{n} n_{C_r}(-1)^r x^r$ is

(a) 0 (b) n (c) < n (d) r

116) If a, b, c ∈ Q and p +√q (p,q ∈ Q) is an irrational root of $ax^2+bx+c=0$ then the other root is

(a) -p+√q (b) p-iq (c) p-√q (d) -p-√q

117) The quadratic equation whose roots are ∝ and β is

(a) (x - ∝)(x -β) =0 (b) (x - ∝)(x + β) =0 (c) $\propto+\beta=\frac{b}{a}$ (d) $\propto.\beta=\frac{-c}{a}$

118) Ifj(x) = 0 has n roots, thenf'(x) = 0 has __________ roots

(a) n (b) n -1 (c) n+1 (d) (n-r)

119) If x is real and $\frac{x^2-x+1}{x^2+x+1}$ then

(a) $\frac{1}{3}$ ≤k≤ (b) k≥5 (c) k≤0 (d) none

120) Let a > 0, b > 0, c > 0. h n both th root of th quatlon $ax^2+b+C= 0$ are

(a) real and negative (b) real and positive (c) rational numb rs (d) none

121) The equation $\sqrt{x+1}-\sqrt{x-1}=\sqrt{4x-1}$ has

(a) no solution (b) one solution (c) two solution (d) more than one solution

122) If the root of the equation $x^3 +bx^2+cx-1=0$ form an Increasing G.P, then

(a) one of the roots is 2 (b) one of the rots is 1 (c) one of the rots is -1 (d) one of the rots is -2

123) For real x, the equation $\left|\frac{x}{x-1}\right| + |x| = \frac{x^2}{|x-1|}$ has

(a) one solution (b) two solution (c) at least two solution (d) no solution

124) If the equation ax2+ bx+c=0(a > 0) has two roots ∝ and β such that ∝< - 2 and β > 2, then

(a) b2-4ac=0 (b) b^2 - 4ac < 0 (c) b^2 - 4ac > 0 (d) b^2 - 4ac≥0

125) If $(2+\sqrt{3})x^2-2x+1+(2-\sqrt{3})x^2-2x-1=\frac{2}{2-\sqrt{3}}$ then x=

(a) 0,2 (b) 0,1 (c) 0,3 (d) 0, √3

126) If ∝, β, ɤ are the roots of the equation $x^3-3x+11=0$, then ∝+β+ɤ is __________.

(a) 0 (b) 3 (c) -11 (d) -3

127) If ∝, β,ɤ are the roots of 9x3-7x+6=0, then ∝ β ɤ is __________

(a) $\frac{-7}{9}$ (b) $\frac{7}{9}$ (c) 0 (d) $\frac{-2}{3}$

128) If x^2 - hx - 21 = 0 and x^2 - 3hx + 35 = 0 (h > 0) have a common root, then h = ___________

(a) 0 (b) 1 (c) 4 (d) 3

129) If $ax^2 + bx + c = 0$, a, b, c E R has no real zeros, and if a + b + c < 0, then __________

(a) c > 0 (b) c< 0 (c) c=0 (d) c≥0

130) If $p(x) = ax^2 + bx + c$ and $Q(x) = -ax^2 + dx + c$ where ac ≠ 0 then p(x). Q(x) = 0 has at least _______ real roots.

(a) no (b) 1 (c) 2 (d) infinite

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

(a) $\pi - x$ (b) $x - \frac{\pi}{2}$ (c) $\frac{\pi}{2} - x$ (d) $\pi - x$

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

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) π

133) $\sin^{-1}\frac{3}{5} - \cos^{-1}\frac{12}{13} + \sec^{-1}\frac{5}{3} - cosec^{1-}\frac{13}{2}$ is equal to

(a) 2π (b) π (c) 0 (d) $\tan^{-1}\frac{12}{65}$

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

(a) $|\alpha| \le \frac{1}{\sqrt{2}}$ (b) $|\alpha| \ge \frac{1}{\sqrt{2}}$ (c) $|\alpha| < \frac{1}{\sqrt{2}}$ (d) $|\alpha| > \frac{1}{\sqrt{2}}$

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

(a) $-\pi \le x \le 0$ (b) $0\pi \le x \le 0$ (c) $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$ (d) $-\frac{\pi}{4} \le x \le \frac{3\pi}{4}$

136) 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

(a) 0 (b) 1 (c) 2 (d) 3

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

(a) $\frac{-\pi}{10}$ (b) $\frac{\pi}{5}$ (c) $\frac{\pi}{10}$ (d) $-\frac{\pi}{5}$

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

(a) [1,2] (b) [-1,1] (c) [0,1] (d) [-1,0]

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

(a) $-\sqrt{\frac{24}{25}}$ (b) $\sqrt{\frac{24}{25}}$ (c) $\frac{1}{5}$ (d) $-\frac{1}{5}$

140) $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{3}\right)$ is equal to

(a) $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$ (b) $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$ (c) $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$ (d) $\tan^{-1}\left(\frac{1}{2}\right)$

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

(a) [-1,1] (b) $[\sqrt{2},2]$ (c) $\left[-2, -\sqrt{2}\right] \cup \left[\sqrt{2}, 2\right]$ (d) $\left[-2, -\sqrt{2}\right] \cap \left[\sqrt{2}, 2\right]$

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

(a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{3}$

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

(a) $x^2-x-6=0$ (b) $x^2-x-12=0$ (c) $x^2+x-12=0$ (d) $x^2+x-6=0$

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

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

145) If $\cot^{-1}\left(\sqrt{\sin\alpha}\right) + \tan^{-1}\left(\sqrt{\sin\alpha}\right) = u$, then cos2u is equal to

(a) $\tan^2\alpha$ (b) 0 (c) -1 (d) $\tan 2\alpha$

146) If |x| ≤ 1, then $2\tan^{-1} x - \sin^{-1}\frac{2x}{1+x^2}$ is equal to

(a) $\tan^{-1}x$ (b) $\sin^{-1}x$ (c) 0 (d) π

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

(a) no solution (b) unique solution (c) two solutions (d) infinite number of solutions

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

(a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{5}}$ (c) $\frac{2}{\sqrt{5}}$ (d) $\frac{\sqrt{3}}{2}$

149) If $\sin^{-1}\frac{x}{5}+cosec^{-1}\frac{5}{4}=\frac{\pi}{2}$, then the value of x is

(a) 4 (b) 5 (c) 2 (d) 3

150) $\sin(\tan^{-1}x)$, $|x|<1$ ia equal to

(a) $\frac{x}{\sqrt{1-x^2}}$ (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{1}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$

151) If $tan^{-1}\left\{\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right\}=\alpha$ then $x^2=$

(a) $sin2\alpha$ (b) $sin\alpha$ (c) $cos2\alpha$ (d) $cos\alpha$

152) If $sin^{-1}x-cos^{-1}x=\frac{\pi}{6}$ then

(a) $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{-1}{2}$ (d) none of these

153) The number of solutions of the equation $tan^{-1}2x+tan^{-1}3x=\frac{\pi}{4}$

(a) 2 (b) 3 (c) 1 (d) none

154) If $\alpha=tan^{-1}\left(tan\frac{5\pi}{4}\right)$ and $\beta=tan^{-1}\left(-tan\frac{2\pi}{3}\right)$ then

(a) $4\alpha=3\beta$ (b) $3\alpha=4\beta$ (c) $\alpha-\beta=\frac{7\pi}{12}$ (d) none

155) The number of real solutions of the equation $\sqrt{1+cos2x}=2sin^{-1}(sinx),\ -\pi<x<\pi$ is

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

156) ·If $\alpha=tan^{-1}\left(\frac{\sqrt{3}}{2y-x}\right)$, $\beta=tan^{-1}\left(\frac{2x-y}{\sqrt{3}y}\right)$ then $\alpha-\beta$

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{2}$ (d) $\frac{-\pi}{3}$

157) $tan^{-1}\left(\frac{1}{4}\right)+tan^{-1}\left(\frac{2}{11}\right)=$

(a) 0 (b) $\frac{1}{2}$ (c) -1 (d) none

158) If $\tan^{-1}(3)+\tan^{-1}(x)=\tan^{-1}(8)$ then x=

(a) 5 (b) $\frac{1}{5}$ (c) $\frac{5}{14}$ (d) $\frac{14}{5}$

159) The value of $cos^{-1}\left(\frac{cos5\pi}{3}\right)+sin^{-1}\left(\frac{sin5\pi}{3}\right)$ is

(a) $\frac{\pi}{2}$ (b) $\frac{5\pi}{3}$ (c) $\frac{10\pi}{3}$ (d) 0

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

(a) $\frac{6}{15}$ (b) $\frac{24}{25}$ (c) $\frac{4}{5}$ (d) $\frac{-24}{25}$

161) If $4cos^{-1}x + sin^{-1}x = \pi$ then x is

(a) $\frac{3}{2}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{2}{\sqrt{3}}$

162) If $tan^{-1}\left(\frac{x+1}{x-1}\right) + tan^{-1}\left(\frac{x-1}{x}\right) = tan^{-1}(-7)$ then x Is

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

163) If $cos^{-1}x > x > sin^{-1}x$ then

(a) $\frac{1}{\sqrt{2}} < x \le 1$ (b) $0 \le x < \frac{1}{\sqrt{2}}$ (c) $-1 \le x < \frac{1}{\sqrt{2}}$ (d) x > 0

164) In a ΔABC if C is a right angle, then $tan^{-1}\left(\frac{a}{b+c}\right) + tan^{-1}\left(\frac{b}{c+a}\right) =$

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{4}$ (c) $\frac{5\pi}{2}$ (d) $\frac{\pi}{6}$

165) $cot\left(\frac{\pi}{4} - cot^{-1}3\right)$

(a) 7 (b) 6 (c) 5 (d) none

166) If $tan^{-1}(cot\theta) = 2\theta, then\theta =$

(a) ± 3 (b) $\pm\frac{\pi}{4}$ (c) $\pm\frac{\pi}{6}$ (d) none

167) The domain of $cos^{-1}(,x^2 - 4)$ Is______

(a) [3,5] (b) [-1. 1] (c) $\left[-\sqrt{5}, -\sqrt{3}\right] \cup \left[\sqrt{3}, \sqrt{5}\right]$ (d) [0,1]

168) The value of tan $\left(cos^{-1}\frac{3}{5} + tan^{-1}\frac{1}{4}\right)$ is______

(a) $\frac{19}{8}$ (b) $\frac{8}{19}$ (c) $\frac{19}{12}$ (d) $\frac{3}{4}$

169) The value of $sin(2(tan^{-1} 0.75)$ is___________

(a) 0.75 (b) 1.5 (c) 0.96 (d) $sin^{-1}(1.5)$

170) If x > 1,then $2tan^{-1}x + sin^{-1}\left(\frac{2x}{1+x^2}\right)$________

(a) $4 tan^{-1}x$ (b) 0 (c) $\frac{\pi}{2}$ (d) π

171) If $\theta = sin^{-1}\left(sin(-60^0)\right)$ then one of the possible values of θ is _________

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{2\pi}{3}$ (d) $\frac{-2\pi}{3}$

172) The value of $sin^{-1}\left(cos\frac{33\pi}{5}\right)$ is________

(a) $\frac{3\pi}{5}$ (b) $\frac{-\pi}{10}$ (c) $\frac{\pi}{10}$ (d) $\frac{7\pi}{5}$

173) If x < 0, y < 0 such that xy = 1, then $tan^{-1}(x) + tan^{-1}(y)$ =_____

(a) $\frac{\pi}{2}$ (b) $\frac{-\pi}{2}$ (c) $-\pi$ (d) none

174) The pricipal value of $sin^{-1}\left(\frac{-1}{2}\right)$ is _________

(a) $\frac{\pi}{6}$ (b) $\frac{-\pi}{6}$ (c) $\frac{\pi}{3}$ (d) $\frac{-\pi}{3}$

175) $tan^{-1}\left(tan\frac{9\pi}{8}\right)$

(a) $\frac{9\pi}{8}$ (b) $\frac{9\pi}{8}$ (c) $\frac{\pi}{8}$ (d) $\frac{-\pi}{8}$

21 x 2 = 42

176) The rank of any 3 x 4 matrix is

(1) May be 1

(2) May be 2

(3) May be 3

(4) Maybe 4

177) If A is symmetric then

(1) A^T= A

(2) adj A is symmetric

(3) adj (A^T)= $(adj\ A)^T$

(4) A is orthogonal

178) If A is a non-singular matrix of odd order them

1) Order of A is 2m + 1

(2) Order of A is 2m + 2

(3) |adj AI is positive

(4) IAI ≠ 0

179) If A is a orthogonal matrix, then

(1) $AA^T= A^TA=I$

(2) A is non-singular

(3) IAI= 0

(4) $A^{-1} = A^T$

180) A matrix which is obtained from an identity matrix by applying only one elementary transformation is

(1) Identity matrix

(2) Elementary matrix

(3) Square matrix

(4) Equivalent to identify matrix

181) i^{-1} =

(i) $\frac{1}{i}$

(ii) i

(iii) -i

(4) $\frac{1}{i^2}$

182) When z =x+iy, then iz is

(1) x-iy

(2) i(x+iy)

(3) -y+ix

(4) Rotation ofz by 90° in the counter clockwise direction

183) (1+3i) (1-3i)

(i) $(1)^2 - (3i)^2$

(2) 1 + 9

(3) 10

(4) -8

184) If z=x+iy, then z $\bar{z}$ =

(i) (x+iy) (x-iy)

(2) $|z|^2$

(3) $x^2 + y^2$

(4) |z|

185) The princlple argumentofa complex number.

(1) θ = α

(2) θ = -α

(3) $\frac{\pi}{2} - \alpha$

(4) θ = α - π

186) Application of De Moivre's theorem.

(1) $(\sin\theta + i\cos\theta)^n = \sin n\theta + i\cos n\theta$

(2) $(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$

(3) $(\cos\theta + i\sin\theta)^{-n} = \cos n\theta - i\sin n\theta$

(4) $(\cos\theta - i\sin\theta)^{-n} = \cos n\theta + i\sin n\theta$

187) 1) $x + \frac{1}{x} = 2$

2) $ax^2+bx+c=0$

3) $\sqrt{x} + \frac{1}{\sqrt{x}} = 4$

4) $ax^2 + \frac{b}{x} + c = 0$

188) (1) $2x^2 + 7x - 2x + 7 = 0$

(2) $6x^2 - 6x^3 + 5 = 0$

(3) $-5 + 6x + 5x^2 - 6x^3 = 0$

(4) $9x^4 - 5x^3 + 5x^2 - 9 = 0$

189) (1) $\left(\frac{3}{5}\right)^x = x - x^2 - 9$

(2) sin x = 4

(3) tan x= 1

(4) cos x=7

190) If ≠ 0, then $\frac{p}{2x} = \frac{a}{a+c} + \frac{b}{x-c}$ has two equal roots then p = __________

(1) $p = (\sqrt{a} - \sqrt{b})^2$

(2) $(\sqrt{a} + \sqrt{b})^2$

(3) $\left(\sqrt{a} \pm \sqrt{b}\right)^2$

(4) 0

191) Ifax + by = 1, $Cx^2 + dy^2 = 1$ have only only one solution, then

(1) $\frac{a^2}{c} + \frac{b^2}{d} = 1$

(2) $x = \frac{a}{c}$

(3) $x = \frac{c}{a}$

(4) $x = \frac{b}{d}$

192) (1) Domain is $(-\infty, -1] \cup [1, \infty)$

(2) Range is $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right) - \{0\}$

(3) Odd function

(4) Periodic function

193) (1 tan(tan-1x)= x if $x \epsilon R$

(2) $sin^{-1}\left(\frac{1}{x}\right) = cosec \quad x \quad if \quad x \epsilon R(-4/1)$

(3) $cos^{-1}\left(\frac{1}{x}\right) = sec \quad x \quad if \quad x \epsilon R(-1/1)$

(4)

$$\tan^{-1}\left(\frac{1}{x}\right) = \begin{cases} \cot^{-1} x, & \text{if} \quad x > 0 \\ -A + \cot^{-1} & \text{if} \quad x < 0 \end{cases}$$

194)

(1) The x- intercept is 1 and the y- intercept is $\frac{\pi}{2}$

(2) It is an even function

(3) Not symmetric with respect to origin

(4) Not symmetric with respect to y-axis

195) (1) $sin^{-1}x = cos^{-1}\sqrt{1 - x^2}$ if $0 \le x \le 1$

(2) $sin^{-1}x = -cos^{-1}\sqrt{1 - x^2}$ if $-1 \le x \le 0$

(3) $cos^{-1}x = sin^{-1}\sqrt{1 + x^2}$ if $0 \le x \le 1$

(4) $cos^{-1}x = sin^{-1}\sqrt{1 - x^2}$ if $0 \le x \le 1$

196) (1) cot(corl(+600)) = -600

(2) cot(corl(I782)) = 1782

(3) $cot\left(cot^{-1}\left(\frac{-17}{9}\right)\right) = \frac{-17}{9}$

(4) $cot(cot^{-1}\left(\sqrt{3}\right) = \sqrt{3}$

****

For answers check YouTube channel
SR MATHS TEST PAPERS

175 x 1 = 175

1) (b) 4

2) (c) I

3) (b) $\frac{1}{9}$

4) (c) $\begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$

5) (d) $2A^{-1}$

6) (b) -80

7) (d) 11

8) (d) -1

9) (b) adj(AB) = (adj A)(adj B)

10) (a) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$

11) (b) $(A^T)^2$

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

13) (a) $\frac{-4}{5}$

14) (b) $\left(\cos^2\frac{\theta}{2}\right)A^T$

15) (d) 1

16) (c) 19

17) (b) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$

18) (a) 1

19) (d) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

20) (d) (i), (ii) and (iv)

21) (b) consistent

22) (d) $\frac{\pi}{4}$

23) (d) λ = 7, μ = -5

24) (d) 1

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

26) (c) $\lambda \neq 8$

27) (d) $a^2 + b^2 + c^2 + 2abc = 1$

28) (c) ±8

29) (b) $|A| = |A^T|$

30) (a) 0

31) (a) 0

32) (a) $k \neq 0$

33) (a) $|A|^{n-1}$

34) (a) -3, $-\frac{1}{2}$

35) (b) 1

36) (c) ≤ min (m,n)

37) (d) Infinitely many solution

38) (d) consistent and has unique solution

39) (d) $R_i \longrightarrow R_i + C_j$

40) (b) 'A' has at least one minor "of order r which does not vanish and all higher order minors vanish

41) (a) Is always consistent

42) (d) inconsistent

43) (b) one parameter family of solution

44) (a) $\Delta \neq 0$

45) (d) trivial solution and infinitely many non - trivial solutions

46) (b) inconsistent

47) (c) consistent with 2 parameter -family of solution

48) (a) 1

49) (d) $\frac{1}{|A|}$

50) (c) $A_{ij} = (-1)^{i+j} M_{ij}$

51) (a) 0

52) (a) 1+ i

53) (a) $\frac{1}{2}|z|^2$

54) (b) $\frac{-1}{i+2}$

55) (c) 2

56) (a) $\frac{1}{2}$

57) (d) $\sqrt{5}+2$

58) (a) 1

59) (a) z

60) (a) $\frac{3}{2} - 2i$

61) (b) 2

62) (b) 1

63) (d) 0

64) (b) 1

65) (b) imaginary axis

66) (c) $\frac{-3\pi}{4}$

67) (a) −110°

68) (c) x^2+y^2

69) (d) (1,1)

70) (d) $\frac{\pi}{2}$

71) (b) -1

72) (c) 1

73) (d) $-\sqrt{3}i$

74) (a) $cis\frac{2\pi}{3}$

75) (a) 1

76) (b) 0

77) (d) x-iy

78) (d) 0

79)

(d) $|z| = \frac{\sqrt{3}}{2}$, arg (z) $= \tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$

80) (c) $i \cot \frac{\theta}{2}$

81) (a) $\frac{\pi}{4}$

82) (b) 8

83) (b) 2-i

84) (a) $\frac{1}{13}$

85) (c) $2|\sin\frac{\theta}{2}|$

86) (b) $\frac{1}{2}$

87) (c) $\frac{53}{85}$

88) (c) $-\frac{\pi}{2}$

89) (c) -8

90) (b) x-axis

91) (c) $b < a < 0$

92) (b) $\cos\theta - i \sin\theta$

93) (b) -1

94) (a) $2 \cos\theta$

95) (a) 9

96) (d) Vertices of a square

97) (d) 2i - 2

98) (b) $\cos 11\theta + i\sin 11\theta$

99) (a) $-2i \sin(\alpha - \beta)$

100)

(b) $\frac{5}{1-(1-i)^2}$

101)

(c) 1

102)

(d) $\frac{\sqrt{3}}{2} + \frac{1}{2}$

103)

(a) $2 \cos n\theta$

104)

(a) $z_1 + z_2 - z_2$

105)

(c) -1

106)

(d) -4

107)

(a) mn

108)

(a) n distinct roots

109)

(a) $-\frac{q}{r}$

110)

(b) $\frac{5}{4}$

111)

(d) |k|≥6

112)

(a) 2

113)

(c) a<0

114)

(a) one negative and two real roots

115)

(b) n

116)

(c) p-√q

117)

(a) (x - ∝)(x -β) =0

118)

(b) n -1

119)

(a) $\frac{1}{3}$ ≤k≤

120)

(b) real and positive

121)

(a) no solution

122)

(b) one of the rots is 1

123)

(c) at least two solution

124)

(c) b^2 - 4ac >0

125)

(a) 0,2

126)

(a) 0

127)

(d) $\frac{-2}{3}$

128)

(c) 4

129)

(b) c<0

130)

(c) 2

131)

(c) $\frac{\pi}{2} - x$

132)

(b) $\frac{\pi}{3}$

133)

(c) 0

134)

(a) $|\alpha| \leq \frac{1}{\sqrt{2}}$

135)

(b) $0\pi \leq x \leq 0$

136)

(a) 0

137)

(c) $\frac{\pi}{10}$

138)

(a) [1,2]

139)

(d) $-\frac{1}{5}$

140)

(d) $tan^{-1}\left(\frac{1}{2}\right)$

141)

(c) $\left[-2, -\sqrt{2}\right] \cup \left[\sqrt{2}, 2\right]$

142)

(b) $\frac{3\pi}{4}$

143)

(b) $x^2 - x - 12 = 0$

144)

(a) $\frac{\pi}{2}$

145)

(c) -1

146)

(c) 0

147)

(b) unique solution

148)

(b) $\frac{1}{\sqrt{5}}$

149)

(d) 3

150)

(d) $\frac{x}{\sqrt{1+x^2}}$

151)

(a) $sin2\alpha$

152)

(b) $\frac{\sqrt{3}}{2}$

153)

(a) 2

154)

(a) $4\alpha = 3\beta$

155)

(a) 0

156)

(a) $\frac{\pi}{6}$

157)

(a) 0

158)

(b) $\frac{1}{5}$

159)

(d) 0

160)

(d) $\frac{-24}{25}$

161)

(c) $\frac{\sqrt{3}}{2}$

162)

(d) 2

163)

(a) $\frac{1}{\sqrt{2}} < x \leq 1$

164)

(b) $\frac{\pi}{4}$

165)

(a) 7

166)

(c) $\pm\frac{\pi}{6}$

167)

(c) $\left[-\sqrt{5}, -\sqrt{3}\right] \cup \left[\sqrt{3}, \sqrt{5}\right]$

168)

(b) $\frac{8}{19}$

169)

(c) 0.96

170)

(d) π

171)

(a) $\frac{\pi}{3}$

172)

(b) $\frac{-\pi}{10}$

173)

(b) $\frac{-\pi}{2}$

174)

(a) $\frac{\pi}{6}$

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(c) $\frac{\pi}{8}$

21 x 2 = 42

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A is orthogonal

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Order of A is 2m + 2

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IAI = 0

180)

Identity matrix

181)

i

182)

x-iy

183)

-8

184)

|z|

185)

$\frac{\pi}{2} - \alpha$

186)

$(\sin \theta + i \cos \theta)^n = \sin n\theta + i \cos n\theta$

187)

4) $ax^2 + \frac{b}{x} + c = 0$

188)

(2) $6x^2 - 6x^3 + 5 = 0$

189)

(3) tan x= 1

190)

(4) 0

191)

(3) $x = \frac{c}{a}$

192)

Periodic function

193)

tan(tan-1x)= x if $x \epsilon R$

194)

It is an even function

195)

$cos^{-1}x = sin^{-1}\sqrt{1 - x^2}$ if $0 \leq x \leq 1$

196)

cot(corl(+600)) = -600

12th Standard

Maths

Reg.No. :

Exam Time : 00:50:00 Hrs

Total Marks : 50

50 x 1 = 50

1) If |adj(adj A)| = $|A|^9$, then the order of the square matrix A is

(a) 3 (b) 4 (c) 2 (d) 5

2) If A = $\begin{bmatrix} 2 & 0 \\ 1 & 5 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 4 \\ 2 & 0 \end{bmatrix}$ then |adj (AB)| =

(a) -40 (b) -80 (c) -60 (d) -20

3) If A, B and C are invertible matrices of some order, then which one of the following is not true?

(a) adj A = $|A|A^{-1}$ (b) adj(AB) = (adj A)(adj B) (c) det A^{-1} = $(\det A)^{-1}$ (d) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$

4) If A = $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ and A(adj A) = $\begin{bmatrix} k & 0 \\ 0 & k \end{bmatrix}$ then adj (AB) is

(a) 0 (b) sin θ (c) cos θ (d) 1

5) 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,

(a) $e^{(\Delta_2/\Delta_1)}, e^{(\Delta_3/\Delta_1)}$ (b) log (Δ_1/Δ_3), log (Δ_2/Δ_3) (c) log (Δ_2/Δ_1), log(Δ_3/Δ_1) (d) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

6) 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(λA) = λ^n adj(A).

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

(a) Only (i) (b) (ii) and (iii) (c) (iii) and (iv) (d) (i), (ii) and (iv)

7) If ρ(A) = ρ([A | B]), then the system AX = B of linear equations is

(a) consistent and has a unique solution (b) consistent (c) consistent and has infinitely many solution (d) inconsistent

8) If $0 \le \theta \le \pi$ 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

(a) $\frac{2\pi}{3}$ (b) $\frac{3\pi}{4}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{4}$

9) If the system of equations x = cy + bz, y = az + cx and z = bx + ay has a non - trivial solution then

(a) $a^2 + b^2 + c^2 = 1$ (b) abc ≠ 1 (c) a + b + c =0 (d) $a^2 + b^2 + c^2 + 2abc =1$

10) The number of solutions of the system of equations 2x+y = 4, x - 2y = 2, 3x + 5y = 6 is

(a) 0 (b) 1 (c) 2 (d) infinitely many

11) Every homogeneous system ______

(a) Is always consistent (b) Has only trivial solution (c) Has infinitely many solution (d) Need not be consistent

12) The value of $\sum_{i=1}^{13}\left(i^n + i^{n-1}\right)$ is

(a) 1+ i (b) i (c) 1 (d) 0

13) The area of the triangle formed by the complex numbers z,iz, and z+iz in the Argand's diagram is

(a) $\frac{1}{2}|z|^2$ (b) $|z|^2$ (c) $\frac{3}{2}|z|^2$ (d) $2|z|^2$

14) The solution of the equation |z|-z=1+2i is

15) z_1, z_2 and z_3 are complex number such that $z_1+z_2+z_3=0$ and $|z_1|=|z_2|=|z_3|=1$ then $z_1^2+z_2^2+z_3^3$ is

(a) 3 (b) 2 (c) 1 (d) 0

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

(a) (1,0) (b) (−1,1) (c) (0,1) (d) (1,1)

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

(a) 1 (b) -1 (c) $\sqrt{3}i$ (d) $-\sqrt{3}i$

18) If, $i^2 = -1$, then $i^1 + i^2 + i^3 + \ldots +$ up to 1000 terms is equal to

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

19) The amplitude of $\frac{1}{i}$ is equal to

(a) 0 (b) $\frac{\pi}{2}$ (c) $-\frac{\pi}{2}$ (d) π

20) If ω is the cube root of unity, then the value of $(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^8)$ is

(a) 9 (b) -9 (c) 16 (d) 32

21) A polynomial equation in x of degree n always has

(a) n distinct roots (b) n real roots (c) n imaginary roots (d) at most one root

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

(a) $|k|\leq 6$ (b) k=0 (c) $|k| > 6$ (d) $|k|\geq 6$

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

(a) 2 (b) 4 (c) 1 (d) ∞

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

(a) $a\geq 0$ (b) $a > 0$ (c) $a < 0$ (d) $a\leq 0$

25) The number of positive zeros of the polynomial $\Sigma_{j=0}^{n} n_{C_r}$ $(-1)^r x^r$ is

(a) 0 (b) n (c) < n (d) r

26) The quadratic equation whose roots are ∝ and β is

(a) (x - ∝)(x -β) =0 (b) (x - ∝)(x + β) =0 (c) ∝+β=$\frac{b}{a}$ (d) ∝.β=$\frac{-c}{a}$

27) Let a > 0, b > 0, c > 0. h n both th root of th quatlon ax^2+b+C= 0 are

(a) real and negative (b) real and positive (c) rational numb rs (d) none

28) If ∝, β,ɤ are the roots of 9x3-7x+6=0, then ∝ β ɤ is ___________

(a) $\frac{-7}{9}$ (b) $\frac{7}{9}$ (c) 0 (d) $\frac{-2}{3}$

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

(a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) π

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

(a) $-\pi \leq x \leq 0$ (b) $0\pi \leq x \leq 0$ (c) $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ (d) $-\frac{\pi}{4} \leq x \leq \frac{3\pi}{4}$

31) 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

(a) 0 (b) 1 (c) 2 (d) 3

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

33) If $\sin^{-1}\frac{x}{5} + cosec^{-1}\frac{5}{4} = \frac{\pi}{2}$, then the value of x is

(a) 4 (b) 5 (c) 2 (d) 3

34) $\sin(\tan^{-1}x)$, $|x|< 1$ ia equal to

(a) $\frac{x}{\sqrt{1-x^2}}$ (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{1}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$

35) If $\tan^{-1}(3)+\tan^{-1}(x)=\tan^{-1}(8)$then x=

(a) 5 (b) $\frac{1}{5}$ (c) $\frac{5}{14}$ (d) $\frac{14}{5}$

36) The eccentricity of the hyperbola whose latus rectum is 8 and conjugate axis is equal to half the distance between the foci is

(a) $\frac{4}{3}$ (b) $\frac{4}{\sqrt{3}}$ (c) $\frac{2}{\sqrt{3}}$ (d) $\frac{3}{2}$

37) The length of the diameter of the circle which touches the x -axis at the point (1,0) and passes through the point (2,3) .

(a) $\frac{6}{5}$ (b) $\frac{5}{3}$ (c) $\frac{10}{5}$ (d) $\frac{3}{5}$

38) If P(x, y) be any point on $16x^2+25y^2=400$ with foci F1 (3,0) and F2 (-3,0) then PF_1 PF_2 + is

(a) 8 (b) 6 (c) 10 (d) 12

39) If the normals of the parabola $y^2 = 4x$ drawn at the end points of its latus rectum are tangents to the circle $(x-3)^2+(y+2)^2=r^2$, then the value of r^2 is

(a) 2 (b) 3 (c) 1 (d) 4

40) The eccentricity of the ellipse $(x-3)^2 +(y-4)^2 =\frac{y^2}{9}$ is

(a) $\frac{\sqrt{3}}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{3\sqrt{2}}$ (d) $\frac{1}{\sqrt{3}}$

41) If the two tangents drawn from a point P to the parabolay2 = 4xare at right angles then the locus of P is

(a) 2x+1=0 (b) x = −1 (c) 2x−1=0 (d) x =1

42) If a parabolic reflector is 20 em in diameter and 5 em deep, then its focus is

(a) (0,5) (b) (5,0) (c) (10,0) (d) (0, 10)

43) The locus of the point of intersection of perpendicular tangents of the parabola $y^2 = 4ax$ is

(a) latus rectum (b) directrix (c) tangent at the vertex (d) axis of the parabola

44) If $\vec{a}$ and $\vec{b}$ are parallel vectors, then $[\vec{a}, \vec{c}, \vec{b}]$ is equal to

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

45) $\vec{a}.\vec{b} = \vec{b}.\vec{c} = \vec{c}.\vec{a} = 0$, then the value of $[\vec{a}, \vec{b}, \vec{c}]$ is

(a) $|\vec{a}||\vec{b}||\vec{c}|$ (b) $\frac{1}{3}|\vec{a}||\vec{b}||\vec{c}|$ (c) 1 (d) -1

46) If $\vec{a}, \vec{b}, \vec{c}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$ and is parallel to $\vec{c}$ then $\vec{a} \times (\vec{b} \times \vec{c})$ is equal to

(a) $\vec{a}$ (b) $\vec{b}$ (c) $\vec{c}$ (d) $\vec{0}$

47) If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar, non-zero vectors such that $[\vec{a}, \vec{b}, \vec{c}] = 3$, then $\{[\vec{a} \times \vec{b}, \vec{b} \times \vec{c}, \vec{c} \times \vec{a}]\}^2$ is equal to

(a) 81 (b) 9 (c) 27 (d) 18

48) If $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \times \vec{b}) \times \vec{c}$ where $\vec{a}, \vec{b}, \vec{c}$ are any three vectors such that $\vec{a}, \vec{b} \neq 0$ and $\vec{a}.\vec{b} \neq 0$ then $\vec{a}$ and $\vec{c}$ are

49) If the length of the perpendicular from the origin to the plane $2x + 3y + \lambda z = 1, \lambda > 0$ is $\frac{[illegible]}{5}$ then the value of λ is

(a) $2\sqrt{3}$ (b) $3\sqrt{2}$ (c) 0 (d) 1

50) The p.v, OP of a point P make angles 60^o and 45^o with X and Y axis respectively. The angle of inclination of $\vec{OP}$ with z-axis is

(a) 75^o (b) 60^o (c) 45^o (d) 3

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Time: 3 Hours | Maximum Marks: 90

PART-I

I. Choose the correct answer. Answer all the questions. [20 × 1 = 20]

1. If $|\text{adj}(\text{adj } A)| = |A|^9$, then the order of the square matrix A is ....
(a) 3 (b) 4 (c) 2 (d) 5

2. 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 ....
(a) 1 (b) 2 (c) 3 (d) 4

3. The value of $\left(\frac{1+\sqrt{3}i}{1-\sqrt{3}i}\right)^{10}$ is ....
(a) cis $\frac{2\pi}{3}$ (b) cis $\frac{4\pi}{3}$ (c) $-$ cis $\frac{2\pi}{3}$ (d) $-$ cis $\frac{4\pi}{3}$

4. If $\cot^{-1}(\sqrt{\sin\alpha}) + \tan^{-1}(\sqrt{\sin\alpha}) = u$, then $\cos 2u$ is equal to ....
(a) $\tan^2\alpha$ (b) 0 (c) -1 (d) $\tan 2\alpha$

5. If $\cot^{-1} x = \frac{2\pi}{5}$ for some $x \in R$, the value of $\tan^{-1} x$ is ....
(a) $-\frac{\pi}{10}$ (b) $\frac{\pi}{5}$ (c) $\frac{\pi}{10}$ (d) $-\frac{\pi}{5}$

6. The radius of the circle passing through the point (6, 2) two of whose diameter are $x + y = 6$ and $x + 2y = 4$ is ....
(a) 10 (b) $2\sqrt{5}$ (c) 6 (d) 4

7. The length of the L.R. of $x^2 = -4y$ is ....
(a) 1 (b) 2 (c) 3 (d) 4

8. Distance from the origin to the plane $3x - 6y + 2z + 7 = 0$ is ....
(a) 0 (b) 1 (c) 2 (d) 3

9. The distance from the origin to the plane $\vec{r}\cdot(2\vec{i} - \vec{j} + 5\vec{k}) = 7$ is ....
(a) $\frac{7}{\sqrt{30}}$ (b) $\frac{\sqrt{30}}{7}$ (c) $\frac{30}{7}$ (d) $\frac{7}{30}$

10. The number given by the Mean value theorem for the function $\frac{1}{x}$, $x \in [1, 9]$ is ....
(a) 2 (b) 2.5 (c) 3 (d) 3.5

11. f is a differentiable function defined on an interval I with positive derivative. Then f is ....

(*a*) increasing on I
(*b*) decreasing on I
(*c*) strictly increasing on I
(*d*) strictly decreasing on I

12. If we measure the side of a cube to be 4 cm with an error of 0.1 cm, then the error in our calculation of the volume is ....

(*a*) 0.4 cu.cm (*b*) 0.45 cu.cm (*c*) 2 cu.cm (*d*) 4.8 cu.cm

13. If $u(x, y) = e^{x^2+y^2}$, then $\frac{\partial u}{\partial x}$ is equal to ....

(*a*) $e^{x^2+y^2}$ (*b*) $2xu$ (*c*) x^2u (*d*) y^2u

14. The value of $\int_0^\infty e^{-3x} x^2 dx$ is............ .

(*a*) $\frac{7}{27}$ (*b*) $\frac{5}{27}$ (*c*) $\frac{4}{27}$ (*d*) $\frac{2}{27}$

15. $\int_0^a f(x)dx$ is............ .

(*a*) $\int_0^a f(x-a)dx$ (*b*) $\int_0^a f(a-x)dx$ (*c*) $\int_0^a f(2a-x)dx$ (*d*) $\int_0^a f(x-2a)x$

16. The integrating factor of the differential equation $\frac{dy}{dx}$ + P(x)y = Q (x) is x, then P(x)............

(*a*) x (*b*) $\frac{x^2}{2}$ (*c*) $\frac{1}{x}$ (*d*) $\frac{1}{x^2}$

17. The order and degree of the differential equation $\frac{d^2y}{dx^2}+\left(\frac{dy}{dx}\right)^{1/3}+x^{1/4}=0$ are respectively ....

(*a*) 2, 3 (*b*) 3,3 (*c*) 2, 6 (*d*) 2, 4

18. Which of the following is a discrete random variable?

I. The number of cars crossing a particular signal in a day.
II. The number of customers in a queue to buy train tickets at a moment.
III. The time taken to complete a telephone call.

(*a*) I and II (*b*) II only (*c*) III only (*d*) II and III

19. If p is true and q is false then which of the following is not true?

(*a*) $p \to q$ is false (*b*) $p \vee q$ is true (*c*) $p \wedge q$ is false (*d*) $p \leftrightarrow q$ is true

20. The operation $*$ defined by $a*b = \frac{ab}{7}$ is not a binary operation on ....

(*a*) $\mathbb{Q}^+$ (*b*) $\mathbb{Z}$ (*c*) $\mathbb{R}$ (*c*) $\mathbb{C}$

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Time: 3 Hours Maximum Marks: 90

PART-I

I. Choose the correct answer. Answer all the questions. **[20 × 1 = 20]**

1. If $A^T A^{-1}$ is symmetric, then $A^2 =$ ....
   (a) A^{-1} (b) $(A^T)^2$ (c) A^T (d) $(A^{-1})^2$

2. If $p + iq = \dfrac{a+ib}{a-ib}$ then $p^2 + q^2 =$ ....
   (a) 0 (b) 2 (c) 1 (d) −1

3. 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 ....
   (a) 1 (b) −1 (c) $\sqrt{3}\,i$ (d) $-\sqrt{3}\,i$

4. The value of $\sin^{-1}(\cos x)$, $0 \leq x \leq \pi$ is ....
   (a) $\pi - x$ (b) $x - \dfrac{\pi}{2}$ (c) $\dfrac{\pi}{2} - x$ (d) $\pi - x$

5. The radius of the circle $3x^2 + by^2 + 4bx - 6by + b^2 = 0$ is ....
   (a) 1 (b) 3 (c) $\sqrt{10}$ (d) $\sqrt{11}$

6. The equation of the directrix of the parabola $y^2 = -8x$ is ....
   (a) $y + 2 = 0$ (b) $x - 2 = 0$ (c) $y - 2 = 0$ (d) $x + 2 = 0$

7. If $\vec{a}$ and $\vec{b}$ are parallel vector, then $\left[\vec{a}, \vec{c}, \vec{b}\right]$ is equal to ....
   (a) 2 (b) −1 (c) 1 (d) 0

8. The length of the perpendicular from the origin to the plane $\vec{r} \cdot (3\vec{i} + 4\vec{j} + 12\vec{k}) = 26$ is ....
   (a) 26 (b) $\dfrac{26}{169}$ (c) 2 (d) $\dfrac{1}{2}$

9. The curve $y = ax^4 + bx^2$ with $ab > 0$
   (a) has no horizontal tangent (c) is concave up
   (c) is concave down (d) has no points of inflection

10. The asymptote to the curve $y^2(1 + x) = x^2(1 - x)$ is ....
    (a) $x = 1$ (b) $y = 1$ (c) $y = -1$ (d) $x = -1$

11. If $f(x, y, z) = xy + yz + zx$, then $f_x - f_z$ is equal to ....
(a) $z - x$ (b) $y - z$ (c) $x - z$ (d) $y - x$

12. If $f(x, y) = e^{xy}$, then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to ....
(a) xye^{xy} (b) $(1 + xy)e^{xy}$ (c) $(1 + y)e^{xy}$ (d) $(1 + x)e^{xy}$

13. The value of $\int_0^{\frac{\pi}{6}} \cos^3 3x \, dx$ is............ .
(a) $\frac{2}{3}$ (b) $\frac{2}{9}$ (c) $\frac{1}{9}$ (d) $\frac{1}{3}$

14. If $f(x)$ is even then $\int_{-a}^{a} f(x)dx$ ....
(a) 0 (b) $2\int_0^a f(x)dx$ (c) $\int_0^a f(x)dx$ (d) $-2\int_0^a f(x)dx$

15. The order and degree of the differential equation $\sqrt{\sin x}(dx + dy) = \sqrt{\cos x}(dx - dy)$ is ....
(a) 1, 2 (b) 2, 2 (c) 1, 1 (d) 2, 1

16. The solution of the differential equation $\frac{dy}{dx} = 2xy$ is ....
(a) $y = ce^{x^2}$ (b) $y = 2x^2 + c$ (c) $y = ce^{-x^2} + c$ (d) $y = x^2 + c$

17. If $P\{X = 0\} = 1 - P\{X = 1\}$. If $E[X] = 3Var(X)$, then $P\{X = 0\}$ ....
(a) $\frac{2}{3}$ (b) $\frac{2}{5}$ (c) $\frac{1}{5}$ (d) $\frac{1}{3}$

18. Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed n times. Then the possible values of X are ....
(a) $i + 2n, i = 0, 1, 2 \ldots n$ (b) $2i - n, i = 0, 1, 2 \ldots n$
(c) $n - i, i = 0, 1, 2 \ldots n$ (d) $2i + 2n, i = 0, 1, 2 \ldots n$

19. In the set $\mathbb{Q}$ define $a \odot b = a + b + ab$. For what value of y, $3 \odot (y \odot 5) = 7$?
(a) $y = \frac{2}{3}$ (b) $y = \frac{-2}{3}$ (c) $y = \frac{-3}{2}$ (d) $y = 4$

20. If X is a continuous random variable then $P(X \geq a) =$ ....
(a) $P(X < a)$ (b) $1 - P(X > a)$ (c) $P(X > a)$ (d) $1 - P(x \geq a)$

[redacted]

Time: 3 Hours **Maximum Marks: 90**

PART-I

I. Choose the correct answer. Answer all the questions. **[20 × 1 = 20]**

1. If A is a 3×3 non-singular matrix such that $AA^T = A^T A$ and $B = A^{-1}A^T$, then $BB^T =$ ....
   (a) A (b) B (c) I_3 (d) B^T

2. The rank of the matrix $\begin{bmatrix} 7 & -1 \\ 2 & 1 \end{bmatrix}$ is ....
   (a) 9 (b) 2 (c) 1 (d) 5

3. The value of $\sum_{i=1}^{13}(i^n + i^{n-1})$ is ....
   (a) $1 + i$ (b) i (c) 1 (d) 0

4. Which of the following is incorrect?
   (a) $Re(z) \leq |z|$ (b) $Im(z) \leq |z|$ (c) $z\bar{z} = |z|^2$ (d) $Re(z) \geq |z|$

5. According to the rational root theorem, which number is not possible rational zero of $4x^7 + 2x^4 - 10x^3 - 5$?
   (a) -1 (b) $\frac{5}{4}$ (c) $\frac{4}{5}$ (d) 5

6. If $\cot^{-1}\left(\sqrt{\sin\alpha}\right) + \tan^{-1}\left(\sqrt{\sin\alpha}\right) = u$, then $\cos 2u$ is equal to ....
   (a) $\tan^2\alpha$ (b) 0 (c) -1 (d) $\tan 2\alpha$

7. The domain of the function defined by $f(x) = \sin^{-1}\sqrt{x-1}$ is ....
   (a) $[1, 2]$ (b) $[-1, 1]$ (c) $[0, 1]$ (d) $[-1, 0]$

8. The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ is.............. .
   (a) $4(a^2 + b^2)$ (b) $2(a^2 + b^2)$ (c) $a^2 + b^2$ (d) $\frac{1}{2}(a^2 + b^2)$

9. The directrix of the parabola $x^2 = -4y$ is ....
   (a) $x = 1$ (b) $x = 0$ (c) $y = 1$ (d) $y = 0$

10. If the line $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$ lies in the plane $x + 3y - \alpha z + b = \beta$, then (α, β) is ....
    (a) $(-5, 5)$ (b) $(-6, 7)$ (c) $(5, -5)$ (d) $(6, -7)$

11. If $\vec{a}\times(\vec{b}\times\vec{c})=(\vec{a}\times\vec{b})\times\vec{c}$ for non-coplanar vectors $\vec{a},\vec{b},\vec{c}$ then ....

(a) $\vec{a}$ parallel to $\vec{b}$ (b) $\vec{b}$ parallel to $\vec{c}$ (c) $\vec{c}$ parallel to $\vec{a}$ (d) $\vec{a}+\vec{b}+\vec{c}=\vec{0}$

12. The maximum product of two positive numbers, when their sum of the squares is 200, is ....

(a) 100 (b) $25\sqrt{7}$ (c) 28 (d) $24\sqrt{14}$

13. If $w(x, y, z) = x^2(y-z) + y^2(z-x) + z^2(x-y)$, then $\frac{\partial w}{\partial x}+\frac{\partial w}{\partial y}+\frac{\partial w}{\partial z}$ is ....

(a) $xy+yz+zx$ (b) $x(y+z)$ (c) $y(z+x)$ (d) 0

14. If $u(x, y) = x^2+3xy+y-2019$, then $\left.\frac{\partial u}{\partial x}\right|_{(4,-5)}$ is equal to ....

(a) -4 (b) -3 (c) -7 (d) 13

15. The volume of solid of revolution of the region bounded by $y^2 = x(a-x)$ about x-axis is ....

(a) πa^3 (b) $\frac{\pi a^3}{4}$ (c) $\frac{\pi a^3}{5}$ (d) $\frac{\pi a^3}{6}$

16. $\int_0^a f(x)dx+\int_0^a f(2a-x)dx=$ ....

(a) $\int_0^a f(x)dx$ (b) $2\int_0^a f(x)dx$ (c) $\int_0^{2a} f(x)dx$ (d) $\int_0^{2a} f(a-x)dx$

17. The differential equation of the family of curves $y = Ae^x + Be^{-x}$, where A and B are arbitrary constants is............ .

(a) $\frac{d^2y}{dx^2}+y=0$ (b) $\frac{d^2y}{dx^2}-y=0$ (c) $\frac{dy}{dx}+y=0$ (d) $\frac{dy}{dx}-y=0$

18. The differential equation corresponding to $xy = c^2$ where c is an arbitrary constant, is ....

(a) $xy''+x=0$ (b) $y''=0$ (c) $xy'+y=0$ (d) $xy''-x=0$

19. If $f(x)=\begin{cases}2x, & 0\le x\le a\\ 0, & \text{otherwise}\end{cases}$ is a probability density function of a random variable, then the value of a is ....

(a) 1 (b) 2 (c) 3 (d) 4

20. The proposition $p\wedge(\neg p\vee q)]$ is ....

(a) a tautology (b) a contradiction

(c) logically equivalent to $p\wedge q$ (d) logically equivalent to $p\vee q$

[redacted]

Time: 3 Hours [redacted] Maximum Marks: 90

PART - I

I. Choose the correct answer. Answer all the questions. [20 × 1 = 20]

1. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $\lambda A^{-1} = A$, then λ is ....
   (a) 17 (b) 14 (c) 19 (d) 21
2. If $\omega \neq 1$ is a cubic root of unity and $(1+\omega)^7 = A + B\omega$, then (A, B) equals to ....
   (a) (1, 0) (b) (–1, 1) (c) (0, 1) (d) (1, 1)
3. The value of $z - \bar{z}$ is ....
   (a) $2\,Im(z)$ (b) $2i\,Im(z)$ (c) $Im(z)$ (d) $i\,Im(z)$
4. If $x^3 + 12x^2 + 10ax + 1999$ definitely has a positive zero, if and only if ....
   (a) $a \geq 0$ (b) $a > 0$ (c) $a < 0$ (d) $a \leq 0$
5. $\sin(\tan^{-1} x)$, $|x| < 1$ is equal to ....
   (a) $\frac{x}{\sqrt{1-x^2}}$ (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{1}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$
6. The centre of the circle inscribed in a square formed by the lines $x^2 - 8x - 12 = 0$ and $y^2 - 14y + 45 = 0$ is ....
   (a) (4, 7) (b) (7, 4) (c) (9, 4) (d) (4, 9)
7. The axis of the parabola $x^2 = -4y$ is ....
   (a) $y = 1$ (b) $x = 0$ (c) $y = 0$ (d) $x = 1$
8. The coordinates of the point where the line $\vec{r} = (6\hat{i} - \hat{j} - 3\hat{k}) + t(-\hat{i} + 4\hat{k})$ meets the plane $\vec{r} \cdot (\hat{i} + \hat{j} - \hat{k}) = 3$ are ....
   (a) (2, 1, 0) (b) (7, –1, –7) (c) (1, 2, –6) (d) (5, –1, 1)
9. If the vectors $\vec{a} = 3\vec{i} + 2\vec{j} + 9\vec{k}$ and $\vec{b} = \vec{i} + m\vec{j} + 3\vec{k}$ are parallel then m is ....
   (a) $\frac{3}{2}$ (b) $\frac{2}{3}$ (c) $-\frac{3}{2}$ (d) $-\frac{2}{3}$
10. The minimum value of the function $|3 - x| + 9$ is ....
    (a) 0 (b) 3 (c) 6 (d) 9
11. The curve $y^2 = x^2(1 - x^2)$ has ....
    (a) an asymptote $x = -1$ (b) an asymptote $x = 1$
    (c) two asymptotes $x = 1$ and $x = -1$ (d) no asymptote

12. If $f(x, y, z) = xy + yz + zx$, then $f_x - f_z$ is equal to ....
(a) $z - x$ (b) $y - z$ (c) $x - z$ (d) $y - x$

13. A circular template has a radius of 10 cm. The measurement of radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this template is ....
(a) 0.2% (b) 0.4% (c) 0.04% (d) 0.08%

14. The value of $\int_0^{\pi} \sin^4 x\,dx$ is............ .
(a) $\frac{3\pi}{10}$ (b) $\frac{3\pi}{8}$ (c) $\frac{3\pi}{4}$ (d) $\frac{3\pi}{2}$

15. $\int_a^b f(x)dx$ is ....
(a) $2\int_0^a f(x)dx$ (b) $2\int_a^b f(a-x)dx$ (c) $\int_a^b f(b-x)dx$ (d) $\int_a^b f(a+b-x)dx$

16. The degree of the differential equation $y(x) = 1 + \frac{dy}{dx} + \frac{1}{1.2}\left(\frac{dy}{dx}\right)^2 + \frac{1}{1.2.3}\left(\frac{dy}{dx}\right)^3 + ...$is ....
(a) 2 (b) 3 (c) 1 (d) 4

17. In finding the differential equation corresponding to $y = e^{mx}$ where m is the arbitrary constant, then m is ....
(a) $\frac{y}{y'}$ (b) $\frac{y'}{y}$ (c) y' (d) y

18. Let X be random variable with probability density function $f(x) = \begin{cases} 2/x^3 & x \geq 1 \\ 0 & x < 1 \end{cases}$
Which of the following statement is correct
(a) both mean and variance exist (b) mean exists but variance does not exist
(c) both mean and variance do not exist (d) variance exists but mean does not exist

19. The random variable X has the probability density function $f(x) = \begin{cases} ax + b, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$ and E(X) = $\frac{7}{12}$, then a and b are respectively ....
(a) 1 and $\frac{1}{2}$ (b) $\frac{1}{2}$ and 1 (c) 2 and 1 (d) 1 and 2

20. A binary operation on a set S is a function from ....
(a) $S \to S$ (b) $(S \times S) \to S$ (c) $S \to (S \times S)$ (d) $(S \times S) \to (S \times S)$

[redacted]

Time: 3 Hours [redacted] Maximum Marks: 90

PART-I

I. Choose the correct answer. Answer all the questions. [20 × 1 = 20]

1. If A is a non-singular matrix such that $A^{-1} = \begin{bmatrix} 5 & 3 \\ -2 & -1 \end{bmatrix}$, then $(A^T)^{-1} =$ ....

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

2. If $\Delta \neq 0$ then the system is ....
   (a) Consistent and has unique solution
   (b) Consistent and has infinitely many solutions
   (c) Inconsistent
   (d) Either consistent or inconsistent

3. The solution of the equation $|z| - z = 1 + 2i$ is ....

   (a) $\frac{3}{2} - 2i$ (b) $-\frac{3}{2} + 2i$ (c) $2 - \frac{3}{2}i$ (d) $2 + \frac{3}{2}i$

4. The value of $e^{i\theta} + e^{-i\theta}$ is ....

   (a) $2 \cos \theta$ (b) $\cos \theta$ (c) $2 \sin \theta$ (d) $\sin \theta$

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

   (a) $|k| \leq 6$ (b) $k = 0$ (c) $|k| > 6$ (d) $|k| \geq 6$

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

   (a) [1, 2] (b) [-1, 1] (c) [0, 1] (d) [-1, 0]

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

   (a) $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$ (b) $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$ (c) $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$ (d) $\tan^{-1}\left(\frac{1}{2}\right)$

8. The equation of the latus rectum of $y^2 = 4x$ is ....

   (a) $x = 1$ (b) $y = 1$ (c) $x = 4$ (d) $y = -1$

9. The circle passing through (1, −2) and touching the axis of x at (3, 0) passing through the point ....

   (a) (−5, 2) (b) (2, −5) (c) (5, −2) (d) (−2, 5)

10. If the length of the perpendicular from the origin to the plane $2x + 3y + \lambda z = 1, \lambda > 0$ is $\frac{1}{5}$, then the value of λ is ....

(a) $2\sqrt{3}$ (b) $3\sqrt{2}$ (c) 0 (d) 1

11. The tangent to the curve $y^2 - xy + 9 = 0$ is vertical when ....

(a) $y = 0$ (b) $y = \pm\sqrt{3}$ (c) $y = \frac{1}{2}$ (d) $y = \pm\sqrt{3}$

12. The volume of a sphere is increasing in volume at the rate of $3\pi cm^3/sec$. The rate of change of its radius when radius is $\frac{1}{2}$ cm ....

(a) 3 cm/s (b) 2 cm/s (c) 1 cm/s (d) $\frac{1}{2}$ cm/s

13. If we measure the side of a cube to be 4 cm with an error of 0.1 cm, then the error in our calculation of the volume is ....

(a) 0.4 cu.cm (b) 0.45 cu.cm (c) 2 cu.cm (d) 4.8 cu.cm

14. If $v(x, y) = \log(e^x + e^y)$, then $\frac{\partial v}{\partial x} + \frac{\partial v}{\partial y}$ is equal to ....

(a) $e^x + e^y$ (b) $\frac{1}{e^x + e^y}$ (c) 2 (d) 1

15. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x \cos x \, dx$ is ....

(a) $\frac{3}{2}$ (b) $\frac{1}{2}$ (c) 0 (d) $\frac{2}{3}$

16. The general solution of the differential equation $\log\left(\frac{dy}{dx}\right) = x + y$ is............. .

(a) $e^x + e^y = c$ (b) $e^x + e^{-y} = c$ (c) $e^{-x} + e^y = c$ (d) $e^{-x} + e^{-y} = c$

17. The order and degree of the differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{1/3} + x^{1/4} = 0$ are respectively ....

(a) 2, 3 (b) 3,3 (c) 2, 6 (d) 2, 4

18. If X is a binomial random variable with expected value 6 and variance 2.4, Then $P\{X = 5\}$ is ....

(a) $\binom{10}{5}\left(\frac{3}{5}\right)^6\left(\frac{2}{5}\right)^4$ (b) $\binom{10}{5}\left(\frac{3}{5}\right)^5$ (c) $\binom{10}{5}\left(\frac{3}{5}\right)^4\left(\frac{2}{5}\right)^6$ (d) $\binom{10}{5}\left(\frac{3}{5}\right)^5\left(\frac{2}{5}\right)^5$

19. A random variable X has binomial distribution with $n = 25$ and $p = 0.8$ then standard deviation of X is ....

(a) 6 (b) 4 (c) 3 (d) 2

20. If $a*b = \sqrt{a^2 + b^2}$ on the real numbers then $*$ is ....

(a) commutative but not associative (b) associative but not commutative

(c) both commutative and associative (d) neither commutative nor associative

[redacted]

Time: 3 Hours [redacted] Maximum Marks: 90

PART-I

I. Choose the correct answer. Answer all the questions. **[20 × 1 = 20]**

1. If A, B and C are invertible matrices of some order, then which one of the following is not true?
   (a) adj A $= |A| A^{-1}$ (b) $\text{adj}(AB) = (\text{adj } A)(\text{adj } B)$
   (c) $\det A^{-1} = (\det A)^{-1}$ (d) $(ABC)^{-1} = C^{-1}B^{-1}A^{-1}$
2. z_1, z_2 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 ....
   (a) 3 (b) 2 (c) 1 (d) 0
3. If $a + ib = (8 - 6i) - (2i - 7)$ then the values of a and b are ....
   (a) 8, –15 (b) 8, 15 (c) 15, 9 (d) 15, –8
4. If $\rho(A) = \rho([A|\,B])$, then the system $AX = B$ of linear equations is ....
   (a) consistent and has a unique solution (b) consistent
   (c) consistent and has infinitely many solution (d) inconsistent
5. $\sin^{-1}\frac{3}{5} - \cos^{-1}\frac{12}{13} + \sec^{-1}\frac{5}{3} - \text{cosec}^{-1}\frac{13}{12} =$ ....
   (a) 2π (b) π (c) 0 (d) $\tan^{-1}\frac{12}{65}$
6. If $\sin^{-1}\frac{x}{5} + \text{cosec}^{-1}\frac{5}{4} = \frac{\pi}{2}$, then the value of x is ....
   (a) 4 (b) 5 (c) 2 (d) 3
7. The circle $x^2 + y^2 = 4x + 8y + 5$ intersects the line $3x - 4y = m$ at two distinct points if ....
   (a) $15 < m < 65$ (b) $35 < m < 85$ (c) $-85 < m < -35$ (d) $-35 < m < 15$
8. The equation of the tangent at (3, –6) to the parabola $y^2 = 12x$ is ....
   (a) $x - y - 3 = 0$ (b) $x + y - 3 = 0$ (c) $x - y + 3 = 0$ (d) $x + y + 3 = 0$
9. If the direction cosines of a line are $\frac{1}{c}, \frac{1}{c}, \frac{1}{c}$, then ....
   (a) $c = \pm 3$ (b) $c = \pm\sqrt{3}$ (c) $c > 0$ (d) $0 < c < 1$
10. Find the point on the curve $6y = x^3 + 2$ at which y-coordinate changes 8 times as fast as x-coordinate is ....
    (a) (4, 11) (b) (4, –11) (c) (–4, 11) (d) (–4, –11)

11. $\lim_{x \to 0} \dfrac{x}{\tan x}$ is ....

(a) 1 (b) −1 (c) 0 (d) ∞

12. If $v(x, y) = \log(e^x + e^y)$, then $\dfrac{\partial v}{\partial x} + \dfrac{\partial v}{\partial y}$ is equal to ....

(a) $e^x + e^y$ (b) $\dfrac{1}{e^x + e^y}$ (c) 2 (d) 1

13. The curve $y^2 = (x - 1)(x - 2)^2$ is not defined for ....

(a) $x \geq 1$ (b) $x \geq 2$ (c) $x < 2$ (d) $x < 1$

14. The value of $\int_0^1 x(1-x)^{99}\, dx$ is ....

(a) $\dfrac{1}{11000}$ (b) $\dfrac{1}{10100}$ (c) $\dfrac{1}{10010}$ (d) $\dfrac{1}{10001}$

15. The differential equation of the family of curves $y = Ae^x + Be^{-x}$, where A and B are arbitrary constants is............ .

(a) $\dfrac{d^2y}{dx^2} + y = 0$ (b) $\dfrac{d^2y}{dx^2} - y = 0$ (c) $\dfrac{dy}{dx} + y = 0$ (d) $\dfrac{dy}{dx} - y = 0$

16. The differential equation representing the family of curves $y = A\cos(x + B)$, where A and B are parameters, is ....

(a) $\dfrac{d^2y}{dx^2} - y = 0$ (b) $\dfrac{d^2y}{dx^2} + y = 0$ (c) $\dfrac{d^2y}{dx^2} = 0$ (d) $\dfrac{d^2x}{dy^2} = 0$

17. Four buses carrying 160 students from the same school arrive at a football stadium. The buses carry, respectively, 42, 36, 34, and 48 students. One of the students is randomly selected. Let X denote the number of students that were on the bus carrying the randomly selected student. One of the 4 bus drivers is also randomly selected. Let Y denote the number of students on that bus. Then E[X] and E[Y] respectively are ....

(a) 50, 40 (b) 40, 50 (c) 40.75, 40 (d) 41, 41

18. If in 6 trials, X is a binomial variate which follows the relation 9P(X = 4) = P(X = 2), then the probability of success is ....

(a) 0.125 (b) 0.25 (c) 0.375 (d) 0.75

19. In the set ℝ of real numbers '∗' is defined as follows. Which one of the following is not a binary operation on ℝ ?

(a) $a*b = \min(a.b)$ (b) $a*b = \max(a,b)$ (c) $a*b = a$ (d) $a * b = a^b$

20. The dual of $\neg(p \vee q) \vee [p \vee (p \wedge \neg r)]$ is ....

(a) $\neg(p \wedge q) \wedge [p \vee (p \wedge \neg r)]$ (b) $(p \wedge q) \wedge [p \wedge (p \vee \neg r)]$

(c) $\neg(p \wedge q) \wedge [p \wedge (p \wedge r)]$ (d) $\neg(p \wedge q) \wedge [p \wedge (p \vee \neg r)]$

[redacted]

Time: 3 Hours [redacted] Maximum Marks: 90

PART-I

I. Choose the correct answer. Answer all the questions. **[20 × 1 = 20]**

1. If $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$, B = adj A and C = 3A , then $\frac{|\text{adj}B|}{|C|}$ = ...

   (a) $\frac{1}{3}$ (b) $\frac{1}{9}$ (c) $\frac{1}{4}$ (d) 1

2. $\rho(A) \neq \rho(A, B)$ then the system is ....
   (a) consistent and has infinitely many solution
   (b) consistent and has unique solution
   (c) consistent
   (d) inconsistent

3. The principal argument of $(\sin 40° + i \cos 40°)^5$ is ....

   (a) $-110°$ (b) $-70°$ (c) $70°$ (d) $110°$

4. The fourth roots of unity are ....

   (a) $1 \pm i, -1 \pm i$ (b) $\pm i, 1 \pm i$ (c) $\pm 1, \pm i$ (d) $1, -1$

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

   (a) $-\frac{q}{r}$ (b) $-\frac{p}{r}$ (c) $\frac{q}{r}$ (d) $-\frac{q}{p}$

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

   (a) $[-1, 1]$ (b) $[\sqrt{2}, 2]$

   (c) $[-2, -\sqrt{2}] \cup [\sqrt{2}, 2]$ (d) $[-2, -\sqrt{2}] \cap [\sqrt{2}, 2]$

7. $\sin^{-1} x - \cos^{-1}(-x)$ = ...

   (a) $\frac{-\pi}{2}$ (b) $\frac{\pi}{2}$ (c) $\frac{-3\pi}{2}$ (d) $\frac{3\pi}{2}$

8. The ellipse $E_1 : \frac{x^2}{9} + \frac{y^2}{4} = 1$ is inscribed in a rectangle R whose sides are parallel to th

   coordinate axes. Another ellipse E_2 passing through the point (0, 4) circumscribes the rectang

   R. The eccentricity of the ellipse is ....

   (a) $\frac{\sqrt{2}}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

9. The eccentricity of the hyperbola $\frac{y^2}{9} - \frac{x^2}{25} = 1$ is ....

(a) $\frac{34}{3}$ (b) $\frac{5}{3}$ (c) $\frac{\sqrt{34}}{3}$ (d) $\frac{\sqrt{34}}{5}$

10. The area of the parallelogram having a diagonal $3\vec{i} + \vec{j} - \vec{k}$ and a side $\vec{i} - 3\vec{j} + 4\vec{k}$ is ....

(a) $10\sqrt{3}$ (b) $6\sqrt{30}$ (c) $\frac{3}{2}\sqrt{30}$ (d) $3\sqrt{30}$

11. The function $\sin^4 x + \cos^4 x$ is increasing in the interval ....

(a) $\left[\frac{5\pi}{8}, \frac{3\pi}{4}\right]$ (b) $\left[\frac{\pi}{2}, \frac{5\pi}{8}\right]$ (c) $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$ (d) $\left[0, \frac{\pi}{4}\right]$

12. The function $f(x) = x^3$ is ....

(a) increasing (b) decreasing

(c) strictly decreasing (d) strictly increasing

13. If $g(x, y) = 3x^2 - 5y + 2y^2$, $x(t) = e^t$ and $y(t) = \cos t$, then $\frac{dg}{dt}$ is equal to ....

(a) $6e^{2t} + 5 \sin t - 4 \cos t \sin t$ (b) $6e^{2t} - 5 \sin t + 4 \cos t \sin t$

(c) $3e^{2t} + 5 \sin t + 4 \cos t \sin t$ (d) $3e^{2t} - 5 \sin t + 4 \cos t \sin t$

14. For the function $y = x^3 + 2x^2$ the value of dy when $x = 2$ and $dx = 0.1$ is ....

(a) 1 (b) 2 (c) 3 (d) 4

15. The value of $\int_0^a \left(\sqrt{a^2 - x^2}\right)^3 dx$ is............ .

(a) $\frac{\pi a^3}{16}$ (b) $\frac{3\pi a^4}{16}$ (c) $\frac{3\pi a^2}{8}$ (d) $\frac{3\pi a^4}{8}$

16. If the solution of the differential equation $\frac{dy}{dx} = \frac{ax + 3}{2y + f}$ represents a circle, then the value of a is............ .

(a) 2 (b) −2 (c) 1 (d) −1

17. The solution of $\frac{dy}{dx} + P(x)y = 0$ is ....

(a) $y = ce^{\int P\,dx}$ (b) $y = ce^{-\int P\,dx}$ (c) $x = ce^{-\int P\,dy}$ (d) $x = ce^{\int P\,dy}$

18. A random variable X has binomial distribution with $n = 25$ and $p = 0.8$ then standard deviation of X is ....

(a) 6 (b) 4 (c) 3 (d) 2

19. A computer salesperson knows from his past experience that he sells computers to one in every twenty customers who enter the showroom. What is the probability that he will sell a computer to exactly two of the next three customers?

(a) $\frac{57}{20^3}$ (b) $\frac{57}{20^2}$ (c) $\frac{19^3}{20^3}$ (d) $\frac{57}{20}$

[redacted]

Time: 3 Hours [redacted] Maximum Marks: 90

PART-I

I. Choose the correct answer. Answer all the questions. [20 × 1 = 20]

1. 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 $k =$ ....

   (a) 0 (b) $\sin\theta$ (c) $\cos\theta$ (d) 1

2. In the system of 3 linear equations with three unknowns, $\rho(A) = \rho(A, B) = 1$ then the system .. ..

   (a) has unique solution
   (b) reduces to 2 equations and has infinitely many solution
   (c) reduces to a single equation and has infinitely many solution
   (d) is inconsistent

3. If $|z - 2 + i| \leq 2$, then the greatest value of $|z|$ is ....

   (a) $\sqrt{3} - 2$ (b) $\sqrt{3} + 2$ (c) $\sqrt{5} - 2$ (d) $\sqrt{5} + 2$

4. The value of $z\bar{z}$ is ....

   (a) $|z|$ (b) $|z|^2$ (c) $2|z|$ (d) $2|z|^2$

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

   (a) 0 (b) 4 (c) $4i$ (d) -4

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

   (a) $\frac{1}{2}$ (b) $\frac{1}{\sqrt{5}}$ (c) $\frac{2}{\sqrt{5}}$ (d) $\frac{\sqrt{3}}{2}$

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

   (a) $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$ (b) $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$ (c) $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$ (d) $\tan^{-1}\left(\frac{1}{2}\right)$

8. Let C be the circle with centre at (1, 1) and radius = 1. If T is the circle centered at (0, y) passing through the origin and touching the circle C externally, then the radius of T is equal ....

   (a) $\frac{\sqrt{3}}{\sqrt{2}}$ (b) $\frac{\sqrt{3}}{2}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

9. The point of contact of the tanget $y = mx + c$ and the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is ....

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

10. If $\vec{a}=2\hat{i}+3\hat{j}-\hat{k}, \vec{b}=\hat{i}+2\hat{j}-5\hat{k}, \vec{c}=3\hat{i}+5\hat{j}-\hat{k}$, then a vector perpendicular to $\vec{a}$ and lies in the plane containing $\vec{b}$ and $\vec{c}$ is ....

(a) $-17\hat{i}+21\hat{j}-97\hat{k}$ (b) $-17\hat{i}+21\hat{j}-123\hat{k}$

(c) $-17\hat{i}-21\hat{j}+97\hat{k}$ (d) $-17\hat{i}-21\hat{j}-97\hat{k}$

11. One of the closest points on the curve $x^2-y^2=4$ to the point (6, 0) is ....

(a) (2, 0) (b) $(\sqrt{5},1)$ (c) $(3,\sqrt{5})$ (d) $(\sqrt{13},-\sqrt{3})$

12. If $f(x)=\frac{x}{x+1}$ then its differential is given by ....

(a) $\frac{-1}{(x+1)^2}dx$ (b) $\frac{1}{(x+1)^2}dx$ (c) $\frac{1}{x+1}dx$ (d) $\frac{-1}{x+1}dx$

13. The curve $y^2=(x-1)(x-2)^2$ has ....

(a) an asymptote $x=1$ (b) an asymptote $x=2$

(c) two asymptote $x=1$ and $x=2$ (d) no asymptote

14. If $\int_0^x f(t)\,dt = x+\int_x^1 tf(t)\,dt$, then the value of $f(1)$ is........... .

(a) $\frac{1}{2}$ (b) 2 (c) 1 (d) $\frac{3}{4}$

15. The number of arbitrary constants in the general solutions of order n and $n+1$ are respectively............ .

(a) $n-1, n$ (b) $n, n+1$ (c) $n+1, n+2$ (d) $n+1, n$

16. The degree of the differential equation $y(x)=1+\frac{dy}{dx}+\frac{1}{1.2}\left(\frac{dy}{dx}\right)^2+\frac{1}{1.2.3}\left(\frac{dy}{dx}\right)^3+....$is ....

(a) 2 (b) 3 (c) 1 (d) 4

17. Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed n times. Then the possible values of X are ....

(a) $i+2n, i=0, 1, 2 ... n$ (b) $2i-n, i=0, 1, 2 ... n$

(c) $n-i, i=0, 1, 2 ... n$ (d) $2i+2n, i=0, 1, 2 ... n$

18. A random variable X has binomial distribution with $n=25$ and $p=0.8$ then standard deviation of X is ....

(a) 6 (b) 4 (c) 3 (d) 2

19. In the last column of the truth table for $\neg(p \vee \neg q)$ the number of final outcomes of the truth value 'F' are ....

(*a*) 1 (*b*) 2 (*c*) 3 (*d*) 4

20. Mean and variance of binomial distribution are ....

(*a*) nq, npq (*b*) $np, \sqrt{npq}$ (*c*) np, np (*d*) np, npq

[redacted]

Time: 3 Hours [redacted] Maximum Marks: 90

PART-I

I. Choose the correct answer. Answer all the questions. [20 × 1 = 20]

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

   (a) $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$ (b) $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$ (c) $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$ (d) $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

2. In the system of 3 linear equations with three unknowns, if $\Delta = 0$ and all 2 × 2 minors $\Delta = 0$ and atleast one 2 × 2 minor of Δ_x or Δ_y or Δ_z is non-zero then the system is ....

   (a) consistent

   (b) inconsistent

   (c) consistent and the system reduces or two equations

   (d) consistent and the system reduces to a single equation

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

   (a) $\frac{2\pi}{3}$ (b) $\frac{\pi}{6}$ (c) $\frac{5\pi}{6}$ (d) $\frac{\pi}{2}$

4. Which of the following is incorrect?

   (a) $|z_1 + z_2| \leq |z_1| + |z_2|$ (b) $|z_1 - z_2| \leq |z_1| + |z_2|$

   (c) $|z_1 - z_2| \geq |z_1| - |z_2|$ (d) $|z_1 + z_2| \geq |z_1| + |z_2|$

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

   (a) 0 (b) n (c) $< n$ (d) r

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

   (a) $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$ (b) $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$ (c) $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$ (d) $\tan^{-1}\left(\frac{1}{2}\right)$

7. If $x + y = k$ is a normal to the parabola $y^2 = 12x$, then the value of k is ....

   (a) 3 (b) −1 (c) 1 (d) 9

8. The vector equation $\vec{r}=(\hat{i}-2\hat{j}-\hat{k})+t(6\vec{j}-\hat{k})$ represents a straight line passing through the points ....

(a) (0, 6, –1) and (1, –2, –1)
(b) (0, 6, –1) and (–1, –4, –2)
(c) (1, –2, –1) and (1, 4, –2)
(d) (1, –2, –1) and (0, –6, 1)

9. The value of $(\hat{i}-\hat{j}, \hat{j}-\hat{k}, \hat{k}-\hat{i})$ is ....

(a) 0 (b) 1 (c) 2 (d) 3

10. A stone is thrown up vertically. The height it reaches at time t seconds is given by $x = 80t - 16t^2$. The stone reaches the maximum height in time t seconds is given by ....

(a) 2 (b) 2.5 (c) 3 (d) 3.5

11. The approximate change in the volume V of a cube of side x metres caused by increasing the side by 1% is ....

(a) $0.3\, xdx$ m^3 (b) $0.03\, x$ m^3 (c) $0.03\, x^2$ m^3 (d) $0.03\, x^3$m^3

12. The differential of y if $y=\sqrt{x^4+x^2+1}$

(a) $\frac{1}{2}(4x^3+2x)^{-\frac{1}{2}}dx$
(b) $\frac{1}{2}(x^4+x^2+1)^{-\frac{1}{2}}(4x^3+2x)dx$
(c) $\frac{1}{2}(4x^3+2x)^{-\frac{1}{2}}$
(d) $\frac{1}{2}(x^4+x^2+1)^{-\frac{1}{2}}(4x^3+2x)$

13. If $f(x)=\int_1^x \frac{e^{\sin u}}{u}du$, $x>1$ and $\int_1^3 \frac{e^{\sin x^2}}{x}dx=\frac{1}{2}[f(a)-f(1)]$, then one of the possible value of a is ....

(a) 3 (b) 6 (c) 9 (d) 5

14. If $\int_a^b f(x)dx$ is ....

(a) $2\int_0^a f(x)dx$ (b) $\int_a^b f(a-x)dx$ (c) $\int_a^b f(b-x)dx$ (d) $\int_a^b f(a+b-x)dx$

15. If $\sin x$ is the integrating factor of the linear differential equation $\frac{dy}{dx}$ + Py = Q, then P is ....

(a) $\log \sin x$ (b) $\cos x$ (c) $\tan x$ (d) $\cot x$

16. The general solution of the differential equation $\log\left(\frac{dy}{dx}\right)=x+y$ is............. .

(a) $e^x+e^y=c$ (b) $e^x+e^{-y}=c$ (c) $e^{-x}+e^y=c$ (d) $e^{-x}+e^{-y}=c$

17. Let X have a Bernoulli distribution with mean 0.4, then the variance of (2X – 3) is ....

(a) 0.24 (b) 0.48 (c) 0.6 (d) 0.96

18. Which of the following is a discrete random variable?

I. The number of cars crossing a particular signal in a day.
II. The number of customers in a queue to buy train tickets at a moment.
III. The time taken to complete a telephone call.

(a) I and II (b) II only (c) III only (d) II and III

19. Which one of the following is a binary operation on $\mathbb{N}$?
(*a*) Subtraction (*b*) Multiplication (*c*) Division (*d*) All the above

20. Which one is the contrapositive of the statement $(p \vee q) \rightarrow r$?
(*a*) $\neg r \rightarrow (\neg p \wedge \neg q)$ (*b*) $\neg r \rightarrow (\neg p \vee q)$
(*c*) $r \rightarrow (p \wedge q)$ (*d*) $p \rightarrow (q \vee r)$

+2 MATHS
STUDY MATERIAL

MATHS VOLUME – II

BOOK INSIDE ONE MARKS

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Chapter – 7 Application of differential calculus

1. The velocity v of a particle moving along a straight line when at a distance x from the origin is given by $a + bv^2 = x^2$ where a and b are constants. Then the acceleration is

1) $\frac{b}{x}$ 2) $\frac{a}{x}$ **3)** $\boldsymbol{\frac{x}{b}}$ 4) $\frac{x}{a}$

Hint : $a + bv^2 = x^2$

$$2b\frac{dv}{dt} = 2x$$

$$\frac{dv}{dt} = \frac{x}{b}$$

2. A spherical snowball is melting in such a way that its volume is decreasing at a rate of 1 cm^3 / min. The rate at which the diameter is decreasing when the diameter is 10 cm is

1) $\frac{-1}{50\pi}cm/min$ **2)** $\boldsymbol{\frac{1}{50\pi}cm/min}$ 3) $\frac{-11}{75\pi}cm/min$ 4) $\frac{-2}{75\pi}cm/min$

Hint : $V = \frac{4}{3}\pi r^3$ $\frac{dV}{dt} = -1$ $r = \frac{D}{2}$

Sub in volume formula and differentiate with respect to t

$\frac{dD}{dt} = \frac{-2}{\pi D^2}$ where D = 10cm

$$\frac{dD}{dt} = \frac{-1}{50\pi}$$

diameter is decreasing so

$$\frac{dD}{dt} = \frac{1}{50\pi}$$

3. The slope of the normal to the curve $y = 3x^2$ at the point whose x coordinate is 2 is

1) $\frac{1}{13}$ 2) $\frac{1}{14}$ **3)** $\boldsymbol{\frac{-1}{12}}$ 4) $\frac{1}{12}$

Hint : $\frac{dy}{dx} = 6x$

Slope of normal $= \frac{-1}{6x}$ sub x = 2 and we get Slope of normal $= \frac{-1}{12}$

4. The point on the curve $y = 2x^2 - 6x - 4$ at which the tangent is parallel to the x – axis is

1) $\left(\frac{5}{2}, \frac{-17}{2}\right)$ 2) $\left(\frac{-5}{2}, \frac{-17}{2}\right)$ 3) $\left(\frac{-5}{2}, \frac{17}{2}\right)$ **4)** $\boldsymbol{\left(\frac{3}{2}, \frac{-17}{2}\right)}$

Hint : tangent is parallel to the x – axis means $\frac{dy}{dx} = 0$

$$y = 2x^2 - 6x - 4$$

$$\frac{dy}{dx} = 4x - 6$$

$$x = \frac{3}{2}$$

5. The equation of the tangent to the curve $y = \frac{x^3}{5}$ at the point $\left(-1, -\frac{1}{5}\right)$ is

1) $5y + 3x = 2$ **2) $5y - 3x = 2$** 3) $3x - 5y = 2$ 4) $3x + 3y = 2$

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Hint : $\frac{dy}{dx} = \frac{3x^2}{5}$

At $\left(-1, -\frac{1}{5}\right)$ $m = \frac{dy}{dx} = \frac{3}{5}$

Equation of tangent $y - y_1 = m(x - x_1)$

Sub known values in above equation you get

$5y - 3x = 2$

6. The equation of the normal to the curve $\theta = \frac{1}{t}$ at the point $\left(-3, -\frac{1}{3}\right)$ is

1) $3\,\theta = 27\,t - 80$ 2) $5\,\theta = 27t - 80$

3) $3\,\theta = 27\,t + 80$ 4) $\theta = \frac{1}{t}$

Same as Q.No 5

Equation of normal $y - y_1 = \frac{-1}{m}(x - x_1)$

7. The angle between the curves $\frac{x^2}{25} + \frac{y^2}{9} = 1$ and $\frac{x^2}{8} - \frac{y^2}{8} = 1$ is

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

Hint : Option having $\frac{\pi}{2}$ so try for perpendicular

If $a^2 = b^2 + c^2 + d^2$

25 = 9 +8 +8 Hence it is true

8. The angle between the curve $y = e^{mx}$ and $y = e^{-mx}$ for $m > 1$ is

1) $\tan^{-1}\left(\frac{2m}{m^2-1}\right)$ 2) $\tan^{-1}\left(\frac{2m}{1-m^2}\right)$ 3) $\tan^{-1}\left(\frac{-2m}{1+m^2}\right)$ 4) $\tan^{-1}\left(\frac{2m}{m^2+1}\right)$

9. If the normal to the curve $x^{2/3} + y^{2/3} = a^{2/3}$ makes an angle θ with the x –axis then the slope of the normal is

1) $-\cot\theta$ **2) $\tan\theta$** 3) $-\tan\theta$ 4) $\cot\theta$

Hint : If any line (tangent or normal) makes and angle θ with the x – axis then the slope of normal is $\tan\theta$

10. If a and b are two roots of a polynomial f (x) = 0 then Rolle's theorem says that there exists atleast

1) one root between a and b for $f'(x) = 0$

2) two roots between a and b for $f'(x) = 0$

3) one root between a and b for $f''(x) = 0$

4) two roots between a and b for $f''(x) = 0$

11. What is the surface area of a sphere when the volume is increasing at the same rate as its radius?

[redacted] [redacted] [redacted]

1) 1 2) $\frac{1}{2\pi}$ 3) 4π 4) $\frac{4\pi}{3}$

Hint : $\frac{dV}{dt} = \frac{dr}{dt}$ $V = \frac{4}{3}\pi r^3$ $S = 4\pi r^2$

12. For what values of x is the rate of increase of $x^3 - 2x^2 + 3x + 8$ is twice the rate of increase of x

1) $\left(-\frac{1}{3}, -3\right)$ 2) $\left(\frac{1}{3}, 3\right)$ 3) $\left(-\frac{1}{3}, 3\right)$ **4) $\left(\frac{1}{3}, 1\right)$**

Hint : $(3x^2 - 4x + 3)dx = 2dx$

On solving you will get $x = \left(\frac{1}{3}, 1\right)$

13. Identify the correct statement:

i) a continuous function has local maximum then it has absolute maximum

ii) a continuous function has local minimum then it has absolute minimum

iii) a continuous function has absolute maximum then it has local maximum

iv) a continuous function has absolute minimum then it has local minimum

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

14. If $y = 6x - x^3$ and x increases at the rate of 5 unit per second, the rate of change of slope when $x = 3$ is

1) − 90 units / sec 2) 90 units / sec 3) 180 units / sec 4) − 180 units / sec

Hint : $\frac{dx}{dt} = 5$ **:** x = 3 $m = \frac{dy}{dx} = 6 - 3x^2$

$$\frac{dm}{dt} = -6x\frac{dx}{dt}$$

Sub known value $\frac{dm}{dt} = -90$

15. Identify the false statement:

1) all the stationary numbers are critical numbers

2) at the stationary point the first derivative is zero

3) at critical numbers the first derivative need not exist

4) all the critical numbers are stationary numbers

16. The gradient of the tangent to the curve $y = 8 + 4x - 2x^2$ at the point where the curve cuts the y-axis is

1) 8 **2) 4** 3) 0 4) − 4

Hint : point where the curve cuts the y-axis means $x = 0$

To find $\frac{dy}{dx}$ $at\ x = 0$

17. The Angle between the parabolas $y^2 = x$ and $x^2 = y$ at the origin is

[redacted] [redacted] [redacted]

1) $2\tan^{-1}\left(\frac{3}{4}\right)$ 2) $\tan^{-1}\left(\frac{4}{3}\right)$ **3)** $\boldsymbol{\frac{\pi}{2}}$ 4) $\frac{\pi}{4}$

18. For the curve $x = e^t \cos t\,;\, y = e^t \sin t$ the tangent line is parallel to the $x - axis$ when t is equal to

1) $\boldsymbol{-\frac{\pi}{4}}$ 2) $\frac{\pi}{4}$ 3) 0 4) $\frac{\pi}{2}$

Hint : $\frac{dy}{dx} = 0$

19. If a normal makes an angle θ with positive x −axis then the slope of the curve at the point where the normal is drawn is

1) − cot θ 2) tan θ 3) − tan θ 4) cot θ

Hint : m = Slope of tangent = tan θ

slope of normal = $\frac{-1}{m}$

20. The value of $'a'$ so that the curves $y = 3e^x$ and $y = \frac{a}{3}\, e^{-x}$ intersect orthogonally is

1) -1 **2) 1** 3) $\frac{1}{3}$ 4) 3

$m_1 = 3e^x$ $m_2 = -\frac{a}{3}\, e^{-x}$

$m_1 m_2 = -1$

21. If $s = t^3 - 4t^2 + 7$, the velocity when the acceleration is zero is

1) $\frac{32}{3}\ m/sec$ **2)** $\boldsymbol{\frac{-16}{3}\ m/sec}$ 3) $\frac{16}{3}\ m/sec$ 4) $\frac{-32}{3}\ m/sec$

Hint : $v = 3t^2 - 8t\,;\ a = 6t - 8$

acceleration is zero which means $6t - 8 = 0$

$v\ at\ t = \frac{4}{3}\ \ v = \frac{-16}{3}$

22. The statement "If f is continuous on a closed interval [a, b] then f attains an absolute maximum value f (c) and an absolute minimum value f(d) at some number c and d in [a , b]" is

1) The extreme value theorem 2) Fermat's theorem

3) Law of Mean 4) Rolle's theorem

23. The Rolle's constant for the function $y = x^2$ on $[-2, 2]$ is

1) $\frac{2\sqrt{3}}{3}$ **2) 0** 3) 2 4) -2

Hint : $c = \frac{a+b}{2} = 0$

24. $\lim_{x\to\infty} \frac{x^2}{e^x}$ is =

Hint : 1) 2 **2) 0** 3) ∞ 4) 1

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25. $\lim_{x\to 0} \frac{a^x - b^x}{c^x - d^x} =$

Hint : 1) ∞ 2) 0 3) $\log \frac{ab}{cd}$ **4) $\log \frac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)}$**

26. Which of the following function is increasing in $(0, \infty)$

1) e^x 2) $\frac{1}{x}$ 3) $-x^2$ 4) x^{-2}

Hint : e^x is always increasing function irrespective of interval

27. The function $y = \tan x - x$ is

1) an increasing function in $\left(0, \frac{\pi}{2}\right)$

2) a decreasing function in $\left(0, \frac{\pi}{2}\right)$

3) increasing in $\left(0, \frac{\pi}{4}\right)$ and decreasing in $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

4) decreasing in $\left(0, \frac{\pi}{4}\right)$ and increasing in $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

Hint : $y' = sec^2 x - 1 = tan^2 x > 0$ for $x \in \left(0, \frac{\pi}{2}\right)$

28. The curve $y = -e^{-x}$ is

1) concave upward for $x > 0$ 2) concave downward for $x > 0$

2) everywhere concave upward **4) everywhere concave downward**

Hint : $y'' = -e^{-x} < 0$

29. The point of inflexion of the curve $y = x^4$ is at

1) $x = 0$ 2) $x =$ 3) $x = 12$ **4) nowhere**

$y'' = 12x^2$

Hint : $y'' = 0$ $x = 0$

For x < 0 , $y'' > 0$ and for x > 0 , $y'' > 0$

Therefore no change of sign .

Hence it has no point of inflection

30. The curve $y = ax^3 + bx^2 + cx + d$ has a point of inflexion at $x = 1$ then

1) $a + b = 0$ 2) $a + 3b = 0$ **3) $3a + b = 0$** 4) $3a + b = 1$

Hint : The curve $y = ax^3 + bx^2 + cx + d$ has a point of inflexion at $x = 1$ means $y''(1) = 0$

$y'' = 6ax + 2b$

At x = 1 , $6a + 2b = 0$

31. The distance – time relationship of a moving body is given by y = F (t) then the acceleration of the body is the

1) gradient of the velocity / time graph 2) gradient of the distance / time graph

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3) gradient of the acceleration / distance graph   4) gradient of the velocity / distance graph

32. A continuous graph y = f (x)is such that $f'(x) \to \infty \; as \;\; x \to x_1, at \;\; (x_1, y_1)$. Then y = f (x) has a

1) vertical tangent $y = x_1$ 2) horizontal tangent $x = x_1$
3) vertical tangent $\boldsymbol{x = x_1}$ 4) horizontal tangent $y = y_1$

33. The curve y = f (x) and y = g (x) cut orthogonally if at the point of intersection

1) slope of f (x) = slope of g (x)   2) slope of f (x) + slope of g (x) = 0
3) slope of f (x) / slope of g (x) = −1   **4) [slope of f (x)] [slope of g (x)] = −1**

34. l ' Hopital's rule cannot be applied to $\frac{x+1}{x+3}$ as $x \to 0$ because $f(x) = x + 1 \; and \; g(x) = x + 3$ are

1) not continuous   2) not differentiable
3) not in the in determine form as $\boldsymbol{x \to 0}$ 4) in the in determine form as $x \to 0$

35. If $\lim_{x \to a} g(x) = b \;\; and \; f$ is continuous at $x = b$ then

1) $\lim_{x \to a} g\big(f(x)\big) = f(\lim_{x \to a} g(x))$ **2) $\boldsymbol{\lim_{x \to a} f\big(g(x)\big) = f[\lim_{x \to a} g(x)]}$**
3) $\lim_{x \to a} f\big(g(x)\big) = g(\lim_{x \to a} f(x))$ 4) $\lim_{x \to a} f\big(g(x)\big) \neq f(\lim_{x \to a} g(x))$

36. $\lim_{x \to 0} \frac{x}{\tan x} \; is$

1) 1   2) −1   3) 0   4) ∞

37. If the gradient of a curve changes from positive just before P to negative just after then "P" is a

1) minimum point   **2) maximum point**   3) inflection point   4) discontinuous point

38. If f has a local extremum at a and if f ′(a) exists then

1) f ′ (a) < 0   2) f ′ (a) > 0   **3) f ′ (a) = 0**   4) f ″ (a) = 0

39. The point that separates the convex part of a continuous curve from the concave part is

1) the maximum point   2) the minimum point   **3) the inflection**   4) critical point

40. x = x_0 is a root of even order for the equation f ′ (x) = 0 then x = x_0 is a

1) maximum point   2) minimum point   **3) inflection point**   4) critical point

41. If x_0 is the x - coordinate of the point of inflection of a curve y = f (x) then (Second derivative exists)

1) $f(x_0) = 0$ 2) $f'(x_0) = 0$ **3) $\boldsymbol{f''(x_0) = 0}$**   4) $f''(x_0) \neq 0$

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Chapter – 8 Differential And Partial Derivatives

1. If $u = x^y$ then $\frac{\partial u}{\partial x}$ is equal to

1) yx^{y-1} 2) $u \log x$ 3) $u \log y$ 4) xy^{x-1}

Hint : Treat y as constant $\frac{\partial u}{\partial x} = yx^{y-1}$

2. If $\sin^{-1}\left(\frac{x^4+y^4}{x^2+y^2}\right)$ and f = sin *u* then *f* is a homogeneous function of degree

1) 0 2) 1 **3) 2** 4) 4

Hint : For the function $\frac{x^4+y^4}{x^2+y^2}$, the numerator degree is 4 and the denominator degree is 2

Degree of f = 4 – 2 = 2

3. If $= \frac{1}{\sqrt{x^2+y^2}}$, then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to

1) $\frac{1}{2}u$ 2) u 3) $\frac{3}{2}u$ **4) $-u$**

Hint : The degree of u is - 1

4. If $x = r\cos\theta, y = r\sin\theta$, then $\frac{\partial r}{\partial x}$ is equal to

1) sec θ 2) sin θ **3) cos θ** 4) cosec θ

$$x^2 + y^2 = r^2$$

$$2x = 2r\frac{\partial r}{\partial x}$$

$$\frac{\partial r}{\partial x} = \frac{x}{r} = \frac{r\cos\theta}{r} = \cos\theta$$

5. Identify the true statements in the following:

(i) If a curve is symmetrical about the origin, then it is symmetrical about both axes.

(ii) If a curve is symmetrical about both the axes, then it is symmetrical about the origin.

(iii) A curve $f(x,y) = 0$ is symmetrical about the line $y = x$ if $f(x,y) = f(y,x)$.

(iv) For the curve $f(x,y) = 0$, if $f(x,y) = f(-y,-x)$, then it is symmetrical about the origin.

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

6. The percentage error in the 11th root of the number 28 is approximately ______ times the percentage error in 28.

1) $\frac{1}{28}$ **2) $\frac{1}{11}$** 3) 11 4) 28

Hint : The percentage error in the n[th] root of any number is approximately $\frac{1}{n}$ times the percentage error in that number .Therefore $\frac{1}{11}$ times

[redacted]

7. If $u = f\left(\frac{y}{x}\right)$ then $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y}$ is equal to

1) 0 2) 1 3) $2u$ 4) u

Hint : The degree of u is zero

8. If $u = f(x, y)$ then with usual notations, $u_{xy} = u_{yx}$ if

1) u is continuous 2) u_x is continuous

3) u_y is continuous **4) u, u_x, u_y are continuous**

9. If $u = f(x, y)$ is a differentiable function of x and y; x and y are differentiable functions of t then

1) $\frac{du}{dt} = \frac{\partial f}{\partial x}.\frac{\partial x}{\partial t} + \frac{\partial f}{\partial y}.\frac{\partial y}{\partial t}$ 2) $\frac{du}{dt} = \frac{\partial f}{\partial x}.\frac{dx}{dt} + \frac{\partial t}{\partial y}.\frac{\partial y}{\partial t}$

3) $\frac{du}{dt} = \frac{\partial f}{\partial x}.\frac{dx}{dt} + \frac{\partial f}{\partial y}.\frac{dy}{dt}$ 4) $\frac{\partial u}{\partial t} = \frac{\partial f}{\partial x}.\frac{\partial x}{\partial t} + \frac{\partial f}{\partial y}.\frac{\partial y}{\partial t}$

10. The differential on y of the function $y = \sqrt[4]{x}$ is

1) $\frac{1}{4}x^{-3/4}$ **2) $\frac{1}{4}x^{-3/4}\,dx$** 3) $x^{-3/4}\,dx$ 4) 0

11. The differential of y if $y = \sqrt{x^4 + x^2 + 1}$ is

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

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

12. The differential of $x \tan x$ *is*

1) $(x\,sec^2x + tan^2x)$ 2) $(x\,sec^2x - \tan x)dx$

3) $x\,sec^2x\,dx$ **4) $(x\,sec^2x + \tan x)dx$**

Chapter – 9 Application of integration

1. The value of $\int_0^{\frac{\pi}{2}} \frac{cos^{5/3}x}{cos^{5/3}x + sin^{5/3}x}dx$ is

1) $\frac{\pi}{2}$ **2) $\frac{\pi}{4}$** 3) 0 4) π

Hint : $I = f(x) = \int_0^{\frac{\pi}{2}} \frac{cos^{5/3}x}{cos^{5/3}x + sin^{5/3}x}dx$

$I = f(a - x) = \int_0^{\frac{\pi}{2}} \frac{sin^{5/3}x}{cos^{5/3}x + sin^{5/3}x}dx$

$2I = \int_0^{\frac{\pi}{2}} dx = \frac{\pi}{2}$

[redacted] [redacted] [redacted]

2. The value of $\int_0^{\frac{\pi}{2}} \frac{\sin x - \cos x}{1+\sin x \cos x} dx$ is

1) $\frac{\pi}{2}$ **2) 0** 3) $\frac{\pi}{4}$ 4) π

Hint : $I = f(x) \int_0^{\frac{\pi}{2}} \frac{\cos x - \sin x}{1 + \sin x \cos x} dx$

$2I = 0$

3. The value of $\int_0^1 x(1-x)^4 \; dx$ is

1) $\frac{1}{12}$ **2) $\frac{1}{30}$** 3) $\frac{1}{24}$ 4) $\frac{1}{20}$

Hint : $\int_0^1 x(1-x)^n \; dx = \frac{1}{(n+2)(n+1)}$

4. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} (\frac{\sin x}{2+cosx})dx$ is

1) 0 2) 2 3) log 2 4) log 4

Hint : Since given function is odd

5. The value of $\int_0^{\pi} sin^4x \, dx$ is

1) $3\pi/16$ 2) $3/16$ 3) 0 **4) $3\pi/8$**

6. The value of $\int_0^{\pi} sin^2x \, cos^3x \, dx$ is

1) π 2) $\pi/2$ 3) $\pi/4$ **4) 0**

$\int_0^{2a} f(x)dx = 0 \text{ , } If \; (2a - x) = -f(x)$

7. The area of the region bounded by the graph of $y = \sin x$ and $y = \cos x$ between $x = 0$ and $x = \frac{\pi}{4}$ is

1) $\sqrt{2} + 1$ **2) $\sqrt{2} - 1$** 3) $2\sqrt{2} - 2$ 4) $2\sqrt{2} + 2$

8. The area between the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and its auxillary circle is

1) $\pi b(a-b)$ 2) $2\pi a(a-b)$ **3) $\pi a(a-b)$** 4) $2\pi b(a-b)$

Hint : Area of ellipse πab

Area of auxillary circle $x^2 + y^2 = a^2$

Area between the circle and the ellipse is $\pi a^2 - \pi ab$

9. The area bounded by the parabola $y^2 = x$ and its latus rectum is

1) $\frac{4}{3}$ **2) $\frac{1}{6}$** 3) $\frac{2}{3}$ 4) $\frac{8}{3}$

[redacted] [redacted] [redacted]

The area bounded by the parabola and its latus rectum is $\frac{8a^2}{3}$ Here a = ¼

10. The volume of the solid obtained by revolving $\frac{x^2}{9}+\frac{y^2}{16}=1$ about the minor axis is

1) 48π 2) 64π 3) 32π 4) 128 π

Hint : Volume about minor axis , V = $\frac{4}{3}\pi a^2 b$ Here $a^2 = 16$, $b^2 = 9$

11. The volume, when the curve $y = \sqrt{3+x^2}$ from $x = 0$ to $x = 4$ is rotated about x-axis is

1) 100 π 2) $\frac{100}{9}\pi$ **3) $\boldsymbol{\frac{100}{3}\pi}$** 4) $\frac{100}{3}$

12. The volume generated when the region bounded by $y = x,\ y = 1, x = 0$ is rotated about y-axis is

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{2}$ **3) $\boldsymbol{\frac{\pi}{3}}$** 4) $\frac{2\pi}{3}$

Hint : Volume of cone V = $\frac{1}{3}\pi r^2 h$ = V $=\frac{1}{3}\pi(1)(1)=\frac{\pi}{3}$

13. Volume of solid obtained by revolving the area of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ about major and minor axes are in the ratio

1) $b^2 : a^2$ 2) $a^2 : b^2$ 3) $a : b$ **4) $\boldsymbol{b : a}$**

Volume about minor axis , V = $\frac{4}{3}\pi a^2 b$

Volume about major axis , V = $\frac{4}{3}\pi a b^2$

14. The volume generated by rotating the triangle with vertices at (0, 0), (3, 0) and (3, 3) about x-axis is

1) 18π 2) 2π 3) 36π **4) 9π**

Hint : Volume of cone V = $\frac{1}{3}\pi r^2 h$

15. $\int_0^{2a} f(x)dx = 2\int_0^a f(x)dx$ if ‘

1) $\boldsymbol{f(2a-x)=f(x)}$ 2) $f(a-x)=f(x)$

3) $f(x)=-f(x)$ 4) $f(-x)=f(x)$

16. $\int_0^{2a} f(x)dx = 0$ if

1) $f(2a-x)=f(x)$ **2) $\boldsymbol{f(2a-x)=-f(x)}$**

3) $f(x)=-f(x)$ 4) $f(-x)=f(x)$

17. If f (x) is an odd function then $\int_{-a}^{a} f(x)dx$ is

1) $2\int_0^a f(x)dx$ 2) $\int_0^a f(x)dx$ **3) 0** 4) $\int_0^a f(a-x)dx$

[redacted] [redacted] [redacted]

18. $\int_0^a f(x)dx + \int_0^a f(2a-x)dx =$

1) $\int_0^a f(x)dx$ 2) $2\int_0^a f(x)dx$ **3) $\int_0^{2a} f(x)dx$** 4) $\int_0^{2a} f(a-x)dx$

19. If f(x) is even then $\int_{-a}^a f(x)\,dx$ is

1) 0 **2) $2\int_0^a f(x)dx$** 3) $\int_0^a f(x)dx$ 4) $-2\int_0^a f(x)dx$

20. $\int_0^a f(x)dx$ is

1) $\int_0^a f(x-a)dx$ **2) $\int_0^a f(a-x)dx$** 3) $\int_0^a f(2a-x)dx$ 4) $\int_0^a f(x-2a)dx$

21. $\int_a^b f(x)dx$ is

1) $2\int_0^a f(x)dx$ 2) $\int_a^b f(a-x)dx$ 3) $\int_a^b f(b-x)dx$ **4) $\int_a^b f(a+b-x)dx$**

22. If n is a positive integer then $\int_0^\infty x^n e^{-ax}dx =$

1) $\frac{n!}{a^n}$ 2) $\frac{n+1\,!}{a^n}$ 3) $\frac{n+1\,!}{a^{n+1}}$ **4) $\frac{n\,!}{a^{n+1}}$**

23. If n is odd then $\int_0^{\pi/2} cos^n x\,dx$

1) $\frac{n}{n-1}\cdot\frac{n-2}{n-3}\cdot\frac{n-4}{n-5}\cdots\frac{\pi}{2}$ 2) $\frac{n-1}{n}\cdot\frac{n-3}{n-2}\cdot\frac{n-5}{n-4}\cdots\frac{1}{2}\frac{\pi}{2}$

3) $\frac{n}{n-1}\cdot\frac{n-2}{n-3}\cdot\frac{n-4}{n-5}\cdots\frac{3}{2}\cdot 1$ **4) $\frac{n-1}{n}\cdot\frac{n-3}{n-2}\cdot\frac{n-5}{n-4}\cdots\frac{2}{3}\cdot 1$**

24. If n is even then $\int_0^{\pi/2} sin^n x\,dx$ is

1) $\frac{n}{n-1}\cdot\frac{n-2}{n-3}\cdot\frac{n-4}{n-5}\cdots\frac{\pi}{2}$ **2) $\frac{n-1}{n}\cdot\frac{n-3}{n-2}\cdot\frac{n-5}{n-4}\cdots\frac{1}{2}\frac{\pi}{2}$**

3) $\frac{n}{n-1}\cdot\frac{n-2}{n-3}\cdot\frac{n-4}{n-5}\cdots\frac{3}{2}\cdot 1$ 4) $\frac{n-1}{n}\cdot\frac{n-3}{n-2}\cdot\frac{n-5}{n-4}\cdots\frac{2}{3}\cdot 1$

25. $\int_a^b f(x)dx =$

1) $-\int_a^b f(x)dx$ **2) $-\int_b^a f(x)dx$** 3) $-\int_b^a f(x)dx$ 4) $2\int_a^b f(x)dx$

26. The area bounded by the curve x = f (y), y-axis and the lines y = c and y = d is rotated about y-axis. Then the volume of the solid is

1) $\pi\int_c^d x^2dy$ 2) $\pi\int_c^d x^2dx$ 3) $\pi\int_c^d y^2dx$ 4) $\pi\int_c^d y^2dy$

27. $\int_0^\infty x^5e^{-4x}dx$ is

1) $\frac{6!}{4^6}$ 2) $\frac{6\,!}{4^5}$ **3) $\frac{5\,!}{4^6}$** 4) $\frac{5\,!}{4^5}$

[redacted] [redacted] [redacted]

28. $\int_0^{\infty} x^6 e^{-x/2}\, dx$

1) $\frac{6!}{2^7}$ 2) $\frac{6!}{2^6}$ 3) $2^6\ 6!$ **4) $2^7\ 6!$**

Chapter – 10 Ordinary Differential equation

1. The integrating factor of $\frac{dy}{dx} + 2\frac{y}{x} = e^{4x}$ is

1) $\log x$ **2) x^2** 3) e^x 4) x

Hint : $P = \frac{2}{x}$ $\int pdx = 2logx = logx^2$

$e^{\int pdx} = x^2$

2. If $\cos x$ is an integrating factor of the differential equation $\frac{dy}{dx} + Py = Q$ then $P =$

1) $-\cot x$ 2) $\cot x$ 3) $\tan x$ **4) $-\tan x$**

Hint : $e^{\int pdx} = \cos x \implies \int pdx = \log \cos x$

3. The integrating factor of $dx + xdy = e^{-y} sec^2 y dy$ is

1) e^x 2) e^{-x} **3) e^y** 4) e^{-y}

4. Integrating factor of $\frac{dy}{dx} + \frac{1}{x \log x} . y = \frac{2}{x^2}$ is

1) e^x **2) $\log x$** 3) $\frac{1}{x}$ 4) e^{-x}

5. Solution of $\frac{dy}{dx} + mx = 0$, where $m < 0$ is

1) $x = ce^{my}$ **2) $x = ce^{-my}$** 3) $x = my + c$ 4) $x = c$

6. $y = cx - c^2$ is the general solution of the differential equation

1) $(y')^2 - xy' + y = 0$ 2) $y'' = 0$

3) $y' = c$ 4) $(y')^2 + xy' + y = 0$

Hint : $y' = c$

$y = y'x - (y')^2$

7. The differential equation $\left(\frac{dx}{dy}\right)^2 + 5y^{1/3} = x$ is

1) of order 2 and degree 1 **2) of order 1 and degree 2**

3) of order 1 and degree 6 4) of order 1 and degree 3

8. The differential equation of all non-vertical lines in a plane is

[redacted] [redacted] [redacted]

1) $\frac{dy}{dx} = 0$ **2) $\frac{d^2y}{dx^2} = 0$** 3) $\frac{dy}{dx} = m$ 4) $\frac{d^2y}{dx^2} = m$

Non vertical lines $y = mx + c$

Hint : $y' = m : y'' = 0$

9. The differential equation of all circles with centre at the origin is

1) $x\,dy + y\,dx = 0$ 2) $x\,dy - y\,dx = 0$ 3) $x\,dx + y\,dy = 0$ 4) $x\,dx - y\,dy = 0$

$x^2 + y^2 = a^2$

10. The differential equation of the family of lines $y = mx$ is

1) $\frac{dy}{dx} = m$ **2) $ydx - xdy = 0$** 3) $\frac{d^2y}{dx^2} = 0$ 4) $ydx + x\,dy = 0$

11. The degree of the differential equation $\sqrt{1 + (\frac{dy}{dx})^{\frac{1}{3}}} = \frac{d^2y}{dx^2}$

1) 1 2) 2 3) 3 4) 6

To remove root , first square on both sides and after arranging , take cube on both sides to remove the radical $\frac{1}{3}$ so degree is 6

12. The differential equation satisfied by all the straight lines in xy plane is

1) $\frac{dy}{dx} = a\ constant$ **2) $\frac{d^2y}{dx^2} = 0$** 3) $y + \frac{dy}{dx} = 0$ 4) $\frac{d^2y}{dx^2} + y = 0$

Hint : $ax + by + c = 0$

$y'' = 0$

13. If $y = ke^{\lambda x}$ then its differential equation is

1) $\frac{dy}{dx} = \lambda y$ 2) $\frac{dy}{dx} = ky$ 3) $\frac{dy}{dx} + ky = 0$ 4) $\frac{dy}{dx} = e^{\lambda x}$

14. The differential equation obtained by eliminating a and b from $y = ae^{3x} + be^{-3x}$ is

1) $\frac{d^2y}{dx^2} + ay = 0$ **2) $\frac{d^2y}{dx^2} - 9y = 0$** 3) $\frac{d^2y}{dx^2} - 9\frac{dy}{dx} = 0$ 4) $\frac{d^2y}{dx^2} + 9x = 0$

15. The differential equation formed by eliminating A and B from the relation $y = e^x(A\cos x + B\sin x)$ is

1) $y_2 + y_1 = 0$ 2) $y_2 - y_1 = 0$

3) $y_2 - 2y_1 + 2y = 0$ 4) $y_2 - 2y_1 - 2y = 0$

16. If $\frac{dy}{dx} = \frac{x-y}{x+y}$ then

1) $2xy + y^2 + x^2 = c$ 2) $x^2 + y^2 - x + y = c$

3) $x^2 + y^2 - 2xy = c$ **4) $x^2 - y^2 - 2xy = c$**

Hint : $(x + y)dy = (x - y)dx$

$(xdy + ydx) + ydy - xdx = 0$

[redacted] [redacted] [redacted]

$d(xy) + ydy - xdx = 0$

17. If $f'(x)=\sqrt{x}$ and $f(1) = 2$ then $f(x)$ is

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

$f(x) = \frac{x^{3/2}}{\frac{3}{2}} + c$

18. On putting $y = vx$, the homogeneous differential equation $x^2dy + y(x + y)dx = 0$ becomes

1) $xdv + (2v + v^2)dx = 0$ 2) $vdx + (2x + x^2)dv = 0$

3) $v^2dx - (x + x^2)dv = 0$ 4) $vdv + (2x + x^2)dx = 0$

19. The integrating factor of the differential equation $\frac{dy}{dx} - y\tan x = \cos x$ is

1) $\sec x$ **2) $\cos x$** 3) $e^{\tan x}$ 4) $\cot x$

$p = -\tan x$

$e^{\int pdx} = e^{\log\cos x} = \cos x$

20. The order and degree of the differential equation are $y' + y^2 = x$

1) 2,1 **2) 1,1** 3) 1,0 4) 0,1

21. The order and degree of the differential equation are $\frac{d^2y}{dx^2} + x = \sqrt{y + \frac{dy}{dx}}$

1) 2,1 2) 1,2 3) 2,1/2 **4) 2,2**

22. The order and degree of the differential equation are $\frac{d^2y}{dx^2} - y + (\frac{dy}{dx} + \frac{d^3y}{dx^3})^{\frac{3}{2}} = 0$

1) 2,3 **2) 3,3** 3) 3,2 4) 2,2

23. The order and degree of the differential are $\sin x(dx + dy) = \cos\ x(dx - dy)$

1) 1,1 2) 0,0 3) 1,2 4) 2,1

24. The solution of a linear differential equation $\frac{dx}{dy} + Px = Q$ where P and Q are functions of y, is

1) $y(I.F) = \int(I.F)Q\ dx + c$ **2) $x(I.F) = \int(I.F)Q\ dy + c$**

3) $y(I.F) = \int(I.F)Q\ dy + c$ 4) $x(I.F) = \int(I.F)Q\ dx + c$

25. The solution of a linear differential equation $\frac{dy}{dx} + Py = Q$ where P and Q are functions of x, is

1) $y(I.F) = \int(I.F)Q\ dx + c$ 2) $x(I.F) = \int(I.F)Q\ dy + c$

[redacted] [redacted] [redacted]

3) $y(I.F) = \int (I.F)Q\, dy + c$ 4) $x(I.F) = \int (I.F)Q\, dx + c$

26. Identify the incorrect statement
1) The order of a differential equation is the order of the highest derivative occurring in it.
2) The degree of the differential equation is the degree of the highest order derivative which occurs in it (the derivatives are free from radicals and fractions)
3) $\frac{dy}{dx} = \frac{f_1(x,y)}{f_2(x,y)}$ is the first order first degree homogeneous differential equation
4) $\frac{dy}{dx} + xy = e^x$ is a linear differential equation in x.

Chapter – 11 Probability Distributions

1. If $f(x) = \begin{cases} kx^2 & , 0 < x < 3 \\ 0, & elsewhere \end{cases}$ is a probability density function then the value of k is
1) $\frac{1}{3}$ 2) $\frac{1}{6}$ **3) $\frac{1}{9}$** 4) $\frac{1}{12}$
Hint : $\int_0^3 kx^2 dx = 1 \Longrightarrow k\left[\frac{x^3}{3}\right]_0^3 = \frac{1}{9}$

2. If $f(x) = \frac{A}{\pi}\frac{1}{16+x^2}, -\infty < x < \infty$ Is a p.d.f of a continuous random variable X, then the value of A is
1) 16 2) 8 **3) 4** 4) 1
Hint : $\frac{A}{\pi}\int_{-\infty}^{\infty}\frac{1}{16+x^2}dx = 1$

3. X is a discrete random variable which takes the values 0, 1, 2 and $P(X = 0) = \frac{144}{169}$, $P(X = 1) = \frac{1}{169}$ then the value of $P(X = 2]$ is
1) $\frac{145}{169}$ 2) $\frac{24}{169}$ 3) $\frac{2}{169}$ 4) $\frac{143}{169}$
Hint : $P(X = 2]$= 1 – ($P(X = 0]$+ $P(X = 1]$)

4. A random variable X has the following p.d.f

X	0	1	2	3	4	5	6	7
$P(X = x)$	0	k	$2k$	$2k$	$3k$	k^2	$2k^2$	$7k^2 + k$

The value of k is
1) $\frac{1}{8}$ **2) $\frac{1}{10}$** 3) 0 4) -1 or $\frac{1}{10}$
Hint : $k + 2k + 2k + 3k + k^2 + 2k^2 + 7k^2 + k = 1$
$k = \frac{1}{10}$ $or - 1$ But k is non negative

[redacted] [redacted] [redacted]

5. X is a random variable taking the values 3, 4 and 12 with probabilities $\frac{1}{3}, \frac{1}{4}$ and $\frac{5}{12}$. Then $E(X)$ is

1) 5 **2) 7** 3) 6 4) 3

6. Variance of the random variable X is 4. Its mean is 2. Then $E(X^2)$ is

1) 2 2) 4 3) 6 **4) 8**

Hint : Var (X)= $E(X^2) - E(X)^2$

$E(X)^2 = 8$

7. Var ($4X$ + 3) is

1) 7 **2) 16 Var (X)** 3) 19 4) 0

Hint : Var ($4X$ + 3)= $a^2 Var(X) = 16\, Var\ (X)$

8. In 5 throws of a die, getting 1 or 2 is a success. The mean number of successes is

1) $\frac{5}{3}$ 2) $\frac{3}{5}$ 3) $\frac{5}{9}$ 4) $\frac{9}{5}$

Hint : Mean = np ; n = 5 . p = $\frac{1}{3}$: mean np = $\frac{5}{3}$

9. The mean of a binomial distribution is 5 and its standard deviation is 2. Then the value of n and p are

1) $\left(\frac{4}{5}, 25\right)$ 2) $\left(25, \frac{4}{5}\right)$ 3) $\left(\frac{1}{5}, 25\right)$ 4) $\left(25, \frac{1}{5}\right)$

Hint :$np = 5$; $\sqrt{npq} = 2 \rightarrow npq = 4$

Solving $q = \frac{4}{5}, p = \frac{1}{5}, n = 25$

$(n\,, p\,) = \left(25\,, \frac{1}{5}\right)$

10. If the mean and standard deviation of a binomial distribution are 12 and 2 respectively. Then the value of its parameter p is

1) $\frac{1}{2}$ 2) $\frac{1}{3}$ **3) $\frac{2}{3}$** 4) $\frac{1}{4}$

11. In 16 throws of a die getting an even number is considered a success.Then the variance of the successes is

1) 4 2) 6 3) 2 4) 256

Hint : $p = \frac{1}{2}; q = \frac{1}{2}$

$variance = npq = 4$

12. A box contains 6 red and 4 white balls. If 3 balls are drawn at random, the probability of getting 2 white balls without replacement, is

1) $\frac{1}{20}$ 2) $\frac{18}{125}$ 3) $\frac{4}{25}$ **4) $\frac{3}{10}$**

[redacted] [redacted] [redacted]

13. If 2 cards are drawn from a well shuffled pack of 52 cards, the probability that they are of the same colours without replacement, is

1) $\frac{1}{2}$ 2) $\frac{26}{51}$ **3)** $\mathbf{\frac{25}{51}}$ 4) $\frac{25}{102}$

14. A discrete random variable takes

1) only a finite number of values **2) all possible values between certain given limits**

3) infinite number of values 4) a finite or countable number of values

15. A continuous random variable takes

1) only a finite number of values 2) all possible values between certain given limits

3) infinite number of values 4) a finite or countable number of values

16. If X is a discrete random variable then $P(X \geq a) =$

1) $P(X < a)$ 2) $1 - p(X \leq a)$ **3)** $\mathbf{1 - P(X < a)}$ 4) 0

17. If X is a continuous random variable then $P(X \geq a) =$

1) $P(X < a)$ 2) $1 - P(X < a)$ 3) $P(X > a)$ **4)** $\mathbf{1 - p(X \leq a - 1)}$

18. If X is a continuous random variable then $P(a < X < b) =$

1) $P(a \leq X \leq b)$ **2)** $\mathbf{P(a < X \leq b)}$ 3) $P(a \leq X < b)$ 4) all the three above

19. A continuous random variable X has p.d.f . f(x) then

1) $\mathbf{0 \leq f(x) \leq 1}$ 2) $f(x) \geq 0$ 3) $f(x) \leq 1$ 4) $0 < f(x) < 1$

20. A discrete random variable X has probability, mass function p(x), then

1) $0 \leq p(x) \leq 1$ 2) $p(x) \geq 0$ 3) $p(x) \leq 1$ **4)** $\mathbf{0 < p(x) < 1}$

21. Mean and variance of binomial distribution are

1) nq, npq 2) np, $\sqrt{npq}$ 3)) np, np 4) np, npq

22. If X is a discrete random variable then which of the following is correct?

1) $0 \leq F(x) < 1$ 2) $F(-\infty) = 0 \ and \ F(\infty) \leq 1$

3) $\mathbf{P[X = x_n] = F(x_n) - F(x_n - 1)}$ 4) F(x) is a constant function

23. If X is a continuous random variable then which of the following is incorrect?

1) $F'(\text{x}) = f(\text{x})$ 2) $F(\infty) = 1 , F(-\infty) = 0$

3) $P[a \leq \text{x} \leq b] = F(b) - F(a)$ **4)** $P[a \leq \text{x} \leq b] \neq F(b) - F(a)$

24. Which of the following are correct?

i) $E(aX + b) = aE(X) + b$ ii) $\mu_2 = \mu_2' - (\mu_1')^2$

[redacted] [redacted] [redacted]

iii) μ_2 =variance iv) var $(aX + b) = a^2\, var(X)$

1) all 2) (i) , (ii) , (iii) 3) (ii) , (iii) **4) (i) , (iv)**

Chapter – 12 Discrete Mathematics

1. Which of the following are statements?

(i) May God bless you. (ii) Rose is a flower (iii) Milk is white. (iv) 1 is a prime number

1) (i), (ii), (iii) 2) (i), (ii), (iv) 3) (i), (iii), (iv) **4) (ii), (iii), (iv)**

2. If a compound statement is made up of three simple statements, then the number of rows in the truth table is

1) 8 2) 6 3) 4 4) 2

Hint : Number of rows = 2^n Here n = 3

3. If p is T and q is F, then which of the following have the truth value T?

(i) $p \vee q$ (ii) $\sim p \vee q$ (iii) $p \vee \sim q$ (iv) $p \wedge \sim q$

1) (i), (ii), (iii) 2) (i), (ii), (iv) **3) (i), (iii), (iv)** 4) (ii), (iii), (iv)

4. The number of rows in the truth table of $\sim [p \wedge (\sim q)]$ is

1) 2 **2) 4** 3) 6 4) 8

Hint : Here n = 2 : $2^2 = 4$

5. The conditional statement $p \rightarrow q$ is equivalent to

1) $p \vee q$ 2) $p \vee \sim q$ **3)** $\boldsymbol{\sim p \vee q}$ 4) $p \wedge q$

6. Which of the following is a tautology?

1) $p \vee q$ 2) $p \wedge q$ **3)** $\boldsymbol{p \vee \sim p}$ 4) $p \wedge \sim p$

7. Which of the following is a contradiction?

1) $p \vee q$ 2) $p \wedge q$ 3) $p \vee \sim p$ **4)** $\boldsymbol{p \wedge \sim p}$

8. $p \leftrightarrow q$ is equivalent to

1) $p \rightarrow q$ 2) $q \rightarrow p$ 3) $(p \rightarrow q) \vee (q \rightarrow p)$ **4)** $\boldsymbol{(p \rightarrow q) \wedge (q \rightarrow p)}$

10. In the set of integers with operation $*$ defined by $a * b = a + b - ab$, the value of $3 * (4 * 5)$ is

1) 25 2) 15 3) 10 4) 5

Hint : $3 * (4 * 5) = 3 * (4 + 5 - 20) = 3 * (-11) = 25$

11. The value of $[3] +_{11} ([5] +_{11} [6])$ is

1) [0] 2) [1] 3) [2] **4) [3]**

[redacted] [redacted] [redacted]

12. In the set of real numbers R, an operation * is defined by $a * b = \sqrt{a^2 + b^2}$. Then the value of $(3 * 4) * 5$ is

1) 5 **2) $5\sqrt{2}$** 3) 25 4) 50

13. $[3] +_8 [7]$ is

1) [10] 2) [8] 3) [5] **4) [2]**

14. In the set of integers under the operation $*$ defined by $a * b = a + b - 1$, the identity element is

1) 0 **2) 1** 3) a 4) b

Hint : $a * e = 1$

$a * e = a + e - 1$

$e = 1$

15. Which of the following are statements ?

i.Chennai is the capital of Tamil Nadu. ii.The earth is a planet.

iii.Rose is a flower iv.Every triangle is an isosceles triangle

1) all 2) (i) and (ii) 3) (ii) and (iii) 4) (iv) only

16. Which of the following are not statements ?

i. Three plus four is eight ii. The sun is a planet

iii. Switch on the light iv. Where are you going ?

1) (i) and (ii) 2) (ii) and (iii) **3) (iii) and (iv)** 4) (iv) only

17. The truth values of the following statements are

i. Ooty is in Tamilnadu and 3 + 4 = 8 ii. Ooty is in Tamilnadu and 3 + 4 = 7

iii. Ooty is in Kerala and 3 + 4 = 7 iv. Ooty is in Kerala and 3 + 4 = 8

1) F,T,F,F 2) F,F,F,T 3) T,T,F,F 4) T,F,T,F

18. The truth values of the following statements are

i) Chennai is in India or $\sqrt{2}$ is an integer. ii) Chennai is in India or $\sqrt{2}$ is an irrational number

iii) Chennai is in China or $\sqrt{2}$ is an integer iv) Chennai is in China or $\sqrt{2}$ is an irrational number

1) T F T F 2) T F F T 3) F T F T **4) T T F T**

19. Which of the following are not statements ?

i. All natural numbers are integers. ii. A square has five sides

iii. The sky is blue iv. How are you ?

1) (iv) only 2) (i) and (ii) 3) (i) (ii) and (iii) 4) (iii) and (iv)

20. Which of the following are statements?

i. 7 + 2 < 10 ii. The set of rational numbers is finite

[redacted] [redacted] [redacted]

iii. How beautiful you are   iv. Wish you all success.

1) (iii) (iv)   **2) (i) , (ii)**   3) (i) , (iii)   4) (ii) , (iv)

21. The truth values of the following statements are

i. All the sides of a rhombus are equal in length   ii. $1+\sqrt{19}$ is an irrational number

iii. Milk is white   iv. The number 30 has four prime factors.

1) T T T F   2) T T T T   3) T F T F   4) F T T T

22. The truth values of the following statements are

i) Paris is in France   ii) sinx is an even function

iii) Every square matrix is non-singular   iv) Jupiter is a planet

1) T F F T   2) F T F T   3) F T T F   4) F F T T

23. Let p be " Kamala is going to school " and q be " There are twenty students in the class ". " Kamala is not going to school or there are twenty students in the class " stands for

1) $p \vee q$ 2) $p \wedge q$ 3) $\sim p$ **4) $\sim p \vee q$**

24. If p stands for the statement " Sita likes reading " and q for the statement " Sita likes playing ". " Sita likes neither reading not playing " stands for

1) $\sim p \wedge \sim q$ 2) $p \wedge \sim q$ 3) $\sim p \wedge q$ 4) $p \wedge q$

25. If p is true and q is unknown then

1) $\sim p$ is true   2) $p \vee (\sim p) is$ false   3) $p \wedge (\sim p)$ is true   **4) $p \vee q$ is true**

26. If p is true and q is false then which of the following statements is not true ?

1) $p \rightarrow q$ is false   2) $p \vee q$ is true   3) $p \wedge q$ is false   **4) $p \leftrightarrow q$ is true**

27. Which of the following is not true?

1) Negation of a negation of a statement is the statement itself

2) If the last column of its truth table contain only T then it is tautology

3) If the last column of its truth table contains only F then it is contradiction

4) If p and q are any two statements then $p \leftrightarrow q$ is a tautology

28. $'+'$ is not a binary operation on

1) N   2) Z   3) C   **4) $Q-\{0\}$**

29. $'-'$ is a binary operation on

1) N   2) $Q-\{0\}$ 3) $R-\{0\}$ **4) Z**

30. $'\div'$ is a binary operation on

1) N   2) R   3) Z   **4) $C-\{0\}$**

+2 MATHS
STUDY MATERIAL

MATHS VOLUME -I (1 ,2 , 5 , 6)

BOOK INSIDE ONE MARKS

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Chapter 1 – Applications of Matrices and Determinants

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

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

Ans : R_2 and R_1 are proportional Therefore rank is 1

2. The rank of the diagonal matrix $\begin{bmatrix}-1 & & & & \\ & 2 & & & \\ & & 0 & & \\ & & & -4 & \\ & & & & 0\end{bmatrix}$

1) 0 2) 2 **3) 3** 4) 5

Ans : The matrix has only three non zero rows .Therefore Rank is 3

3. If $A = [2\ 0\ 1]$, then rank of AA^T is

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

Ans : Order of A and A^T is 1×3 and 3×1 .The order of AA^T is 1×1 .Rank is 1

4. If $A = \begin{bmatrix}1\\ 2\\ 3\end{bmatrix}$, then the rank of AA^T is

1) 3 2) 0 **3) 1** 4) 2

Ans : $AA^T = \begin{bmatrix}1 & 2 & 3\\ 2 & 4 & 6\\ 3 & 6 & 9\end{bmatrix}$ R_2 and R_3 are proportional to R_1. Therefore rank is 1

5. If the rank of the matrix $\begin{bmatrix}\lambda & -1 & 0\\ 0 & \lambda & -1\\ -1 & 0 & \lambda\end{bmatrix}$ is 2, then λ is

1) 1 2) 2 3) 3 4) any real number

Ans : Rank is 2 means determinant value is 0 . $\lambda^3 - 1 = 0$

6. If A is a scalar matrix with scalar $k \neq 0$,of order 3, then A^{-1} is

1) $\frac{1}{k^2}I$ 2) $\frac{1}{k^3}I$ **3) $\frac{1}{k}I$** 4) kI

Ans : adjA = k^{n-1} I . Here n = 3 . $|A| = k^3$. Therefore $A^{-1} = \frac{1}{k}I$

7. If the matrix $\begin{bmatrix}-1 & 3 & 2\\ 1 & k & -3\\ 1 & 4 & 5\end{bmatrix}$ has an inverse then the values of k

1) k is any real number 2) $k = -4$ **3) $k \neq -4$** 4) $k \neq 4$

Ans : It has inverse means determinant $\neq 0$ .i.e $7k - 28 \neq 0$

8. If A is a square matrix of order n then $|adj\ A|$ is

1) $|A|^2$ 2) $|A|^n$ **3) $|A|^{n-1}$** 4) $|A|$

Ans : A(adj A) = $|A|I$

[redacted] [redacted] [redacted]

Taking determinant on both sides

$|A|\ |adj\ A| = \ |A|^n\ |I|$

$|adj\ A| = |A|^{n-1}$

9. If A is a matrix of order 3, then $\det(kA)$

1) $k^3\ \det(A)$ 2) $k^2\ \det(A)$ 3) $k\ \det(A)$ 4) $\det(A)$

Ans :.Order of A is 3

10. If I is the unit matrix of order n, where $k \neq 0$ is a constant, then $adj(kI) =$

1) $k^n(adj\ I)$ 2) $k\ (adj\ I)$ 3) $k^2(adj\ I)$ **4) $k^{n-1}(adj\ I)$**

11. Which of the following statement is correct regarding homogeneous system

1) always inconsistent 2) has only trivial solution

3) has only non-trivial solutions

4) has only trivial solution only if rank of the coefficient matrix is equal to the number of unknowns

12. If $\rho(A) = r$ then which of the following is correct ?

1) all the minors of order r which does not vanish

2) has atleast one minor of order r which does not vanish

3) A has atleast one (r+1) order minor which vanishes

4) all (r+1) and higher order minors should not vanish

13. In echelon form, which of the following is incorrect?

1) Every row of A which has all its entries 0 occurs below every row which has a non-zero entry

2) The first non-zero entry in each non-zero row is 1

3) The number of zeroes before the first non-zero element in a row is less than the number of such zeroes in the next row

4) Two rows can have same number of zeroes before the first non-zero entry

14. Every homogeneous system

1) is always consistent 2) has only trivial solution

3) has infinitely many solutions 4) need not be consistent

15. In the system of 3 linear equations with three unknowns, in the non- homogeneous system $\rho(A) = \rho(A, B) = 2$ then the system

1) has unique solution

2) reduces to 2 equations and has infinitely many solution

3) reduces to a single equations and has infinitely many solution

4) is inconsistent

16. In the homogeneous system with three unknowns, $\rho(A)$ =number of unknowns then the system has

1) only trivial solution 2) reduces to 2 equations and has infinitely many solution

[redacted] [redacted] [redacted]

3) reduces to a single equations and has infinitely many solution 4) is inconsistent

Chapter – 2 Complex numbers

1. The value of $[\frac{-1+i\sqrt{3}}{2}]^{100} + [\frac{-1+i\sqrt{3}}{2}]^{100}$ is

1) 2 2) 0 **3) -1** 4) 1

Ans : $\omega^{100} + (\omega^2)^{100} = \omega + \omega^2 = -1$

2. If $(m-5) + i(n+4)$ is the complex conjugate of $(2m+3) + i(3n-2)$, then (n, m) are

1) $\boldsymbol{-\frac{1}{2}, -8}$ 2) $-\frac{1}{2}, 8$ 3) $\frac{1}{2}, -8$ 4) $\frac{1}{2}, 8$

Ans : $(m-5) + i(n+4) = (2m+3) - i(3n-2)$,

3. If $x^2 + y^2 = 1$ then the value of $\frac{1+x+iy}{1+x-iy}$ is

1) $x - iy$ 2) $2x$ 3) $-2iy$ **4)** $\boldsymbol{x + iy}$

Ans : $x^2 + y^2 = 1$ $|z| = 1$ $\bar{z} = \frac{1}{z}$

$$\frac{1+x+iy}{1+x-iy} = \frac{1+z}{1+\bar{z}} = \frac{1+z}{1+\left(\frac{1}{z}\right)} = z$$

4. If $a = 3 + i$ and $z = 2 - 3i$ then the points on the Argand diagram representing $az, 3az \ and -az$ are

1) Vertices of a right angled triangle (2) Vertices of an equilateral triangle

(3) Vertices of an isosceles triangle **(4) Collinear**

Ans : If one complex number is multiplied by a real number then its moves on a straight line

Here az is a complex number .It is multiplied by 3 and – 1

They are lying on a straight line i.e collinear

5. If *z* represents a complex number then arg (*z*) + arg ($\bar{z}$) is

1) $\frac{\pi}{4}$ 2) $\frac{\pi}{2}$ 3) 0 4) $\frac{\pi}{4}$

Ans : arg (*z*) =- arg ($\bar{z}$) arg (*z*) + arg ($\bar{z}$) = 0

6. If the amplitude of a complex number is $\frac{\pi}{2}$ then the number is

1) purely imaginary 2) purely real

3) 0 4) neither real nor imaginary

7. If the point represented by the complex number *iz* is rotated about the origin through the angle $\frac{\pi}{2}$ in the counter clockwise direction then the complex number representing the new position is

1) *iz* 2) – *iz* **3) − *z*** 4) *z*

Ans : Rotating about the origin through $\frac{\pi}{2}$ in the counter clockwise means multiplying the given number by I .Therefore new position is iz.i = -z

8. The polar form of the complex number $(i^{25})^3$ is

[redacted] [redacted] [redacted]

1) $\cos\frac{\pi}{2} + i\sin\frac{\pi}{2}$ 2) $\cos\pi + i\sin\pi$ 3) $\cos\pi - i\sin\pi$ **4) $\cos\frac{\pi}{2} - i\sin\frac{\pi}{2}$**

Ans : $i^{75} = i^3 = -i = \cos\frac{\pi}{2} - i\sin\frac{\pi}{2}$

9. If P represents the variable complex number z and if $|2z-1| = 2|z|$ then the locus of P is

1) the straight line $x = \frac{1}{4}$ 2) the straight line $y = \frac{1}{4}$

3) the straight line $z = \frac{1}{2}$ 4) the circle $x^2 + y^2 - 4x - 1 = 0$

Ans : $|2z-1| = 2|z|$ $\left|z - \frac{1}{2}\right| = |z - 0|$

10. If $z_n = \cos\frac{n\pi}{3} + i\sin\frac{n\pi}{3}$ then $z_1\, z_2 \ldots z_6$ is

1) 1 **2) -1** 3) i 4) $-i$

Ans : $z_1\, z_2 \ldots z_6 = cis\left(\frac{\pi}{3} + \frac{2\pi}{3} + \pi + \frac{4\pi}{3} + \frac{5\pi}{3} + 2\pi\right) = cis\,(7\pi) = -1$

11. If $-\bar{z}$ lies in the third quadrant then z lies in the

1) first quadrant 2) second quadrant 3) third quadrant **4) fourth quadrant**

Ans : $-\bar{z}$ lies in the third quadrant then $\bar{z}$ lies in the Ist quadrant

Z lies in 4th quadrant

12. If ω is a cube root of unity then the value of $(1-\omega+\omega^2)^4 + (1+\omega-\omega^2)^4$ is

1) 0 2) 32 **3) -16** 4) -32

Ans : $1 + \omega + \omega^2 = 0$

13. If ω is the nth root of unity then

1) $1 + \omega^2 + \omega^4 + \cdots = \omega + \omega^3 + \omega^5 + \cdots$ 2) $\omega^n = 0$

3) $\omega^n = 1$ 4) $\omega = \omega^{n-1}$

14. If ω is the cube root of unity then the value of $(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^8)$ is

1) 9 2) – 9 3) 16 4) 32

Ans : $1 + \omega + \omega^2 = 0$

15. The cube roots of unity are

1) in G.P with common ratio ω 2) in G.P with common difference ω^2

3) in A.P with common difference ω 4) in A.P with common difference ω^2

16. The arguments of nth roots of a complex number differ by

1) $\frac{2\pi}{n}$ 2) $\frac{\pi}{n}$ 3) $\frac{3\pi}{n}$ 4) $\frac{4\pi}{n}$

17. Which of the following statements is correct?

1) negative complex numbers exists 2) order relation does not exist in real number

3) order relation exists in complex numbers **4) $(1+i) > (3-2i)$ is meaningless**

18. Which of the following are correct?

i) $Re(Z) \le |Z|$ ii) $Im(Z) \ge |Z|$ iii) $|\bar{Z}| = |Z|$ iv) $(\overline{Z^n}) = (\bar{Z})^n$

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

[redacted] [redacted] [redacted]

19. The value of $\bar{\bar{Z}} + \bar{Z}$ is

1) $2\,Re(Z)$ 2) $Re(Z)$ 3) $Im(Z)$ 4) $2\,Im(Z)$

20. The value of $Z - \bar{Z}$ is

1) $2\,Im(Z)$ **2) $2i\,Im(Z)$** 3) $Im(Z)$ 4) $i\,Im(Z)$

21. The value of $Z\bar{Z}$ is

1) $|Z|$ **2) $|Z|^2$** **3)** $2|Z|$ 4) $2\,|Z|^2$

22. If $|Z - Z_1| = |Z - Z_2|$ then the locus of Z is

1) a circle with centre at the origin 2) a circle with centre at Z_1

3) a straight line passing through the origin

4) is a perpendicular bisector of the line joining Z_1 and Z_2

23. The principal value of argZ lies in the interval

1) $\left[0, \frac{\pi}{2}\right]$ **2) $(-\pi, \pi]$** 3) $[0, \pi]$ 4) $(-\pi, 0]$

24. If Z_1 and Z_2 are any two complex numbers then which one of the following is false

1) $Re(Z_1 + Z_2) = Re(Z_1) + Re(Z_2)$ 2) $Im(Z_1 + Z_2) = Im(Z_1) + Im(Z_2)$

3) $arg(Z_1 + Z_2) = arg(Z_1) + arg(Z_2)$ 4) $|Z_1 Z_2| = |Z_1| + |Z_2|$

25. The fourth roots of unity are

1) $1 \pm i, -1 \pm i$ 2) $\pm i, 1 \pm i$ **3) $\pm 1, \pm i$** 4) $1, -1$

26. The fourth roots of unity form the vertices of

1) an equilateral triangle **2) a square** 3) a hexagon 4) a rectangle

27. Cube roots of unity are

1) $1, \frac{-1 \pm i\sqrt{3}}{2}$ 2) $i, -1 \pm \frac{i\sqrt{3}}{2}$ 3) $1, \frac{1 \pm i\sqrt{3}}{2}$ 4) $i, \frac{1 \pm i\sqrt{3}}{2}$

28. Geometrical interpretation of $\bar{Z}$ is

1) reflection of Z on real axis 2) reflection of Z on imaginary axis

3) rotation of Z about origin 4) rotation of Z about origin through $\frac{\pi}{2}$ in clockwise direction

29. Identify the correct statement

1) Sum of the moduli of two complex numbers is equal to their modulus of the sum

2) Modulus of the product of the complex numbers is equal to sum of the moduli

3) Arguments of the product of two complex numbers is the product of their arguments

4) Arguments of the product of two complex numbers is equal to the sum of their arguments.

30. Which of the following is not true?

1) $\overline{Z_1 + Z_2} = \overline{Z_1} + \overline{Z_2}$ 2) $\overline{Z_1\,Z_2} = \overline{Z_1}\,\overline{Z_2}$ 3) $Re(z) = \frac{\bar{Z}+z}{2}$ **4) $Im(z) = \frac{\bar{Z}-z}{2i}$**

31. If Z_1 and Z_2 are complex numbers then which of the following is meaningful?

1) $Z_1 < Z_2$ 2) $Z_1 > Z_2$ 3) $Z_1 \geq Z_2$ **4) $Z_1 \neq Z_2$**

[redacted] [redacted] [redacted]

32. Which of the following is incorrect?
1) $Re(Z) \leq |Z|$ 2) $Im(Z) \leq |Z|$ 3) $Z\bar{Z} = |\bar{Z}|^2$ **4)$\boldsymbol{Re(Z) \geq |Z|}$**

33. Which of the following is incorrect?
1) $|Z_1+Z_2| \leq |Z_1| + |Z_2|$ 2) $|Z_1-Z_2| \leq |Z_1| + |Z_2|$
3) $|Z_1-Z_2| \geq |Z_1| - |Z_2|$ **4) $\boldsymbol{|Z_1+Z_2| \geq |Z_1| + |Z_2|}$**

34. Which of the following is incorrect regarding nth roots of unity?
1) the number of distinct roots is n
2) the roots are in G.P. with common ratio $cis\ \frac{2\pi}{n}$
3) the arguments are in A.P. with common difference $\frac{2\pi}{n}$
4) product of the roots is 0 and the sum of the roots is ± 1

35. Which of the following are true?
i) If n is a positive integer then $(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$
ii) If n is a negative integer then $(\cos\theta + i\sin\theta)^n = \cos n\theta - i\sin n\theta$
iii) If n is a fraction then $\cos n\theta + i\sin n\theta$ is one of the values of $(\cos\theta + i\sin\theta)^n$.
iv) If n is a negative integer then $(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$
1) (i) , (ii) , (iii), (iv) **2) (i), (iii), (iv)** 3) (i), (iv) 4) (i) only

Chapter – 5 Two Dimensional Analytical geometry

1. The axis of the parabola $y^2 - 2y + 8x - 23 = 0$ is
1) y = -1 2) x = -3 3) x = 3 **4) y = 1**
Ans : $(y – 1)^2 = -8 (x – 3)$
y-1 = 0

2. $16x^2 - 3y^2 - 32x - 12y - 44 = 0$ represents
1) an ellipse 2) a circle 3) a parabola **4) a hyperbola**
x^2 and y^2 sign are opposite .Therefore it is hyperbola

3. The line $4x + 2y = c$ is a tangent to the parabola $y^2 = 16x$ then c is
1) -1 2) -2 3) 4 4) -4
Ans : c = a/m
c = c/2 m = - 2

4. The point of intersection of the tangents at $t_1 = t$ and $t_2 = 3t$ to the parabola $y^2 = 8x$ is
1) $\boldsymbol{(6t^2, 8t)}$ 2) $(8t, 6t^2)$ 3) $(t^2, 4t)$ 4) $(4t, t^2)$
Ans : $[at_1t_2 , a (t_1 + t_2)]$
a = 2 $t_1 = t$ and $t_2 = 3t$

5. The length of the latus rectum of the parabola $y^2 - 4x + 4y + 8 = 0$ is
1) 8 2) 6 **3) 4** 4) 2
Ans : $(y + \ )^2 = -4 (x + \ )$

a = 1 Length of latus rectum = 4a

6. The directrix of the parabola $y^2 = x + 4$ is

1) $x = \frac{15}{4}$ 2) $x = -\frac{15}{4}$ **3)** $\boldsymbol{x = -\frac{17}{4}}$ 4) $x = \frac{17}{4}$

Ans : The directrix is X = -a : x + 4 = a where a = $\frac{1}{4}$

7. The length of the latus rectum of the parabola whose vertex is (2,-3) and the directrix $x = 4$ is

1) 2 2) 4 3) 6 **4) 8**

Ans : x = a = 2 : 4a = 8

8. The line $2x + 3y + 9 = 0$ touches the parabola $y^2 = 8x$ at the point

1) (0,-3) 2) (2,4) 3) $\left(-6, \frac{9}{2}\right)$ **4)** $\boldsymbol{\left(\frac{9}{2}, -6\right)}$

Ans : $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$ a = 2 m = -2/3

9. The eccentricity of the conic $9x^2 + 5y^2 - 54x - 40y + 116 = 0$ is

1) $\frac{1}{3}$ **2)** $\boldsymbol{\frac{2}{3}}$ 3) $\frac{4}{9}$ 4) $\frac{2}{\sqrt{5}}$

Ans : It is an ellipse .

$e = \sqrt{1 - \frac{S}{G}}$ S – smaller coefficient G – greater coefficient

10. The straight line $2x - y + c = 0$ is a tangent to the ellipse $4x^2 + 8y^2 = 32$ if c is

1) $\pm 2\sqrt{3}$ **2)** $\boldsymbol{\pm 6}$ 3) 36 4) ± 4

Ans : $c^2 = a^2m + b^2$ $a^2 = 8$, $b^2 = 4$, m = 2

11. The radius of the director circle of the conic $9x^2 + 16y^2 = 144$ is

1) $\sqrt{7}$ 2) 4 3) 3 **4) 5**

Ans : Director circle is $x^2 + y^2 = a^2 + b^2$

12. The eccentricity of the hyperbola whose latus rectum is equal to half of its conjugate axis is

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

Ans : $\frac{2b^2}{a} = b$ a = 2b $\frac{b^2}{a^2} = \frac{1}{4}$

$e = \sqrt{1 + \frac{b^2}{a^2}}$

13. The line $5x - 2y + 4k = 0$ is a tangent to $4x^2 - y^2 = 36$ then k is

1) $\frac{4}{9}$ 2) $\frac{2}{3}$ **3)** $\boldsymbol{\frac{9}{4}}$ 4) $\frac{81}{16}$

Ans : $c^2 = a^2m + b^2$

$k^2 = \frac{81}{16}$

14. If the centre of the ellipse is (2,3) one of the foci is (3,3) then the other focus is

[redacted] [redacted] [redacted]

1) (1,3) 2) (-1,3) 3) (1,-3) 4) (-1,-3)

15. Centre of the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ is

1) (0,0) 2) (5,0) 3) (3,5) 4) (0,5)

16. The point of contact of the tangent $y = mx+ c$ and the parabola $y^2 = 4ax$ is

1) $\left(\boldsymbol{\frac{a}{m^2},\frac{2a}{m}}\right)$ 2) $\left(\frac{2a}{m^2},\frac{a}{m}\right)$ 3) $\left(\frac{a}{m},\frac{2a}{m^2}\right)$ 4) $\left(\frac{-a}{m^2},\frac{-2a}{m}\right)$

17. The point of contact of the tangent $y = mx+c$ and the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

1) $\left(\frac{b^2}{c},\frac{a^2m}{c}\right)$ **2)** $\left(\boldsymbol{\frac{-a^2m}{c},\frac{b^2}{c}}\right)$ 3) $\left(\frac{a^2m}{c},\frac{-b^2}{c}\right)$ 4) $\left(\frac{-a^2m}{c},\frac{-b^2}{c}\right)$

18. The point of contact of the tangent $y = mx+ c$ and the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is

1) $\left(\frac{am^2}{c},\frac{b^2}{c}\right)$ 2) $\left(\frac{a^2m}{c},\frac{b^2}{c}\right)$ **3)** $\left(\boldsymbol{\frac{-a^2m}{c},\frac{-b^2}{c}}\right)$ 4) $\left(\frac{-am^2}{c},\frac{-b^2}{c}\right)$

19. The true statements of the following are

i) Two tangents and 3 normal can be drawn to a parabola from a point

ii) Two tangents and 4 normal can be drawn to an ellipse from a point

iii) Two tangents and 4 normal can be drawn to an hyperbola from a point

iv) Two tangents and 4 normal can be drawn to an R.H. from a point

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

20. The condition that the line $lx + my + n = 0$ may be normal to the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ is

1) $al^3 + 2alm^2 + m^2n = 0$ 2) $\frac{a^2}{l^2}+\frac{b^2}{m^2}=\frac{(a^2+b^2)^2}{n^2}$

3) $\boldsymbol{\frac{a^2}{l^2}+\frac{b^2}{m^2}=\frac{(a^2-b^2)^2}{n^2}}$ 4) $\frac{a^2}{l^2}-\frac{b^2}{m^2}=\frac{(a^2+b^2)^2}{n^2}$

21. The condition that the line $lx + my + n = 0$ may be normal to the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is

1) $al^3 + 2alm^2 + m^2n = 0$ 2) $\frac{a^2}{l^2}+\frac{b^2}{m^2}=\frac{(a^2+b^2)^2}{n^2}$

3) $\frac{a^2}{l^2}+\frac{b^2}{m^2}=\frac{(a^2-b^2)^2}{n^2}$ **4)** $\boldsymbol{\frac{a^2}{l^2}-\frac{b^2}{m^2}=\frac{(a^2+b^2)^2}{n^2}}$

22. The condition that the line $lx + my + n = 0$ may be normal to the parabola $y^2 = 4ax$ is

1) $\boldsymbol{al^3 + 2alm^2 + m^2n = 0}$ 2) $\frac{a^2}{l^2}+\frac{b^2}{m^2}=\frac{(a^2+b^2)^2}{n^2}$

3) $\frac{a^2}{l^2}+\frac{b^2}{m^2}=\frac{(a^2-b^2)^2}{n^2}$ 4) $\frac{a^2}{l^2}-\frac{b^2}{m^2}=\frac{(a^2+b^2)^2}{n^2}$

23. The point of intersection of tangents at 't_1' and 't_2' to the parabola $y^2 = 4ax$ is

1) $(a(t_1+t_2), at_1t_2)$ **2)** $\boldsymbol{(at_1t_2, a(t_1+t_2))}$

3) $(at^2, 2at)$ 4) $(at_1t_2, a(t_1-t_2))$

[redacted] [redacted] [redacted]

Chapter – 6 Application of Vector algebra

1. If $\vec{u} = \vec{a} \times (\vec{b} \times \vec{c}) + \vec{b} \times (\vec{c} \times \vec{a}) + \vec{c} \times (\vec{a} \times \vec{b})$, then

1) u is a unit vector 2) $\vec{u} = \vec{a} + \vec{b} + \vec{c}$ **3) $\vec{u} = \vec{0}$** 4) $\vec{u} \neq \vec{0}$

Ans : RHS is always zero

2. If $\vec{a} \times (\vec{b} \times \vec{c}) + \vec{b} \times (\vec{c} \times \vec{a}) + \vec{c} \times (\vec{a} \times \vec{b}) = \vec{x} \times \vec{y}$ then

1) $\vec{x} = \vec{0}$ 2) $\vec{y} = \vec{0}$

3) $\vec{x}$ *and* $\vec{y}$ *are parallel* **4) $\vec{x} = \vec{0}$ or $\vec{y} = \vec{0}$ or $\vec{x}$ *and* $\vec{y}$ *are parallel***

Ans : L.H.S = 0 $\vec{x} \times \vec{y} = 0$

3. If $\vec{a} \times (\vec{b} \times \vec{c}) = (\vec{a} \times \vec{b}) \times \vec{c}$ for non-coplanar vectors $\vec{a}, \vec{b}, \vec{c}$ then

1) $\vec{a}$ *parallel to* $\vec{b}$ 2) $\vec{b}$ *parallel to* $\vec{c}$

3) $\vec{c}$ *parallel to* $\vec{a}$ 4) $\vec{a} + \vec{b} + \vec{c} = \vec{0}$

4. If a line makes $45°, 60°$ with positive direction of axes x and y then the angle it makes with the z axis is

1) $30°$ 2) $90°$ 3) $45°$ **4) $60°$**

Ans : $cos^2\alpha + cos^2\beta + cos^2\gamma = 1$

$\gamma = 60°$

5. If $[\vec{a} \times \vec{b}, \ \vec{b} \times \vec{c}, \ \ \vec{c} \times \vec{a}] = 64$ then $[\vec{a}, \vec{b}, \vec{c}]$ *is*

1) 32 **2) 8** 3) 128 4) 0

Ans : $= [\vec{a}, \vec{b}, \vec{c}]^2$

6. If $[\vec{a} + \vec{b}, \ \vec{b} + \vec{c}, \ \ \vec{c} + \vec{a}] = 8$ then $[\vec{a}, \vec{b}, \vec{c}]$ is

1) 4 2) 16 3) 32 4) -4

Ans : $[\vec{a} + \vec{b}, \ \vec{b} + \vec{c}, \ \ \vec{c} + \vec{a}] = 2[\vec{a}, \vec{b}, \vec{c}]$

7. The value of $[\vec{i} + \vec{j}, \ \vec{j} + \vec{k}, \ \ \vec{k} + \vec{i}]$ is equal to

1) 0 2) 1 **3) 2** 4) 4

Ans : $[\vec{i} + \vec{j}, \ \vec{j} + \vec{k}, \ \ \vec{k} + \vec{i}] = 2[\vec{i}, \ \vec{j}, \ \ \vec{k}]$

8. The shortest distance of the point (2,10,1) from the plane $\vec{r}.(3\vec{i} - \vec{j} + 4\vec{k}) = 2\sqrt{26}$ is

1) $2\sqrt{26}$ 2) $\sqrt{26}$ **3) 2** 4) $\frac{1}{\sqrt{26}}$

Ans : Distance of the point from plane is $\left|\frac{ax+by+bz+d}{\sqrt{a^2+b^2+c^2}}\right|$

Point (x , y , z) = (2 , 10 , 1) (a , b , c) = (3 , -1 , 4) d = -2$\sqrt{26}$

9. The vector $(\vec{a} \times \vec{b}) \times (\vec{c} \times \vec{d})$ is

1) perpendicular to $\vec{a}, \vec{b}, \vec{c}$ *and* $\vec{d}$ 2) parallel to the vectors $(\vec{a} \times \vec{b})$ *and* $(\vec{c} \times \vec{d})$

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3) parallel to the line of intersection of the plane containing $\vec{a}$ *and* $\vec{b}$ and the plane containing $\vec{c}$ *and* $\vec{d}$

4) perpendicular to the line of intersection of the plane containing $\vec{a}$ *and* $\vec{b}$ and the plane containing $\vec{c}$ *and* $\vec{d}$

10. If $\vec{a}, \vec{b}, \vec{c}$ are a right handed triad of mutually perpendicular vectors of magnitude a, b, c then the value of $[\vec{a} \ \ \vec{b} \ \ \vec{c}]$ is

1) $a^2b^2c^2$ 2) 0 3) $\frac{1}{2}abc$ **4) abc**

Ans : They are mutually perpendicular . the box prduct becomes the volume of a cuboid

11. If $\vec{a}, \vec{b}, \vec{c}$ are non-coplanar and $[\vec{a} \times \vec{b}, \ \vec{b} \times \vec{c}, \ \ \vec{c} \times \vec{a}] = [\vec{a} + \vec{b}, \ \vec{b} + \vec{c}, \ \ \vec{c} + \vec{a}]$ then $[\vec{a}, \vec{b}, \vec{c}]$ is

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

Ans : $[\vec{a}, \ \vec{b}, \ \ \vec{c}]^2 = 2[\vec{a}, \ \vec{b}, \ \ \vec{c}]$

12. $\vec{r} = s\vec{i} + t\vec{j}$ is the equation of

1) a straight line joining the points $\vec{i}$ *and* $\vec{j}$ **2) xoy plane**

3) yoz plane 4) zox plane

Ans : $\vec{r}$ is made up of $\vec{i}$ *and* $\vec{j}$

13. If the magnitude of moment about the point $\vec{j} + \vec{k}$ of a force $\vec{i} + a\vec{j} - \vec{k}$ acting through the point $\vec{i} + \vec{j}$ is $\sqrt{8}$ then the value of a is

1) 1 **2) 2** 3) 3 4) 4

Ans : $\vec{r} = (\vec{i} + \vec{j}) - (\vec{j} + \vec{k}) = \vec{i} - \vec{k}$ $\qquad \vec{F} = \vec{i} + a\vec{j} - \vec{k}$

$\vec{r} \times \vec{F} = a\ (\vec{i} + \vec{k})$

Taking modulus you will get a = 2

14. The point of intersection of the line $\vec{r} = (\vec{i} - \vec{k}) + t(3\vec{i} + 2\vec{j} + 7\vec{k})$ and the plane $\vec{r}.(\vec{i} + \vec{j} - \vec{k}) = 8$ is

1) (8,6,22) **2) (-8,-6,-22)** 3) (4,3,11) 4) (-4,-3,-11)

Ans : Line : $\frac{x-1}{3} = \frac{y}{2} = \frac{z+1}{7}$ Plane is x + y -z -8 = 0

Choose the point which satisfies the above equation

15. The equation of the plane passing through the point (2,1,-1) and the line of intersection of the planes $\vec{r}.(\vec{i} + 3\vec{j} - \vec{k}) = 0$ and $\vec{r}.(\vec{j} + 2\vec{k}) = 0$ is

1) $x + 4y - z = \mathbf{0}$ **2) $x + 9y + 11z = 0$**

3) $2x + y - z + 5 = 0$ 4) $2x - y + z = 0$

Ans : The required plane is (x + 3y -k) + λ (y + 2k) = 0

[redacted] [redacted] [redacted]

It passes through (2 , 1 , -1) λ = 6

$x + 9y + 11z = 0$

16. The point of intersection of the lines $\frac{x-6}{-6} = \frac{y+4}{4} = \frac{z-4}{-8}$ *and* $\frac{x+1}{2} = \frac{y+2}{4} = \frac{z+3}{-2}$ is

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

Ans : Select the point which satisfies both equations separately . (o , 0 , -4) satisfies both

17. The following lines are $\frac{x-1}{2} = \frac{y-1}{-1} = \frac{z}{1}$ *and* $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z-1}{2}$

1) parallel 2) intersecting **3) skew** 4) perpendicular

Ans : Given two lines are neither perpendicular nor parallel

$[\vec{a}_2 - \vec{a}_1, \vec{u}, \vec{v}] \neq 0$They are not intersecting

18. If $\vec{a}, \vec{b}, \vec{c}$ are three mutually perpendicular unit vectors, then $|\vec{a} + \vec{b} + \vec{c}| =$

1) 3 2) 9 3) $3\sqrt{3}$ **4) $\sqrt{3}$**

19. The angle between the line $\bar{r} = \bar{a} + t\bar{b}$ and the plane $\bar{r}.\bar{n} = q$ is connected by the relation.

1) $\cos\theta = \frac{\vec{a}.\vec{n}}{q}$ 2) $\cos\theta = \frac{\vec{b}.\vec{n}}{|\vec{b}||\vec{n}|}$ 3) $\sin\theta = \frac{\vec{a}.\vec{b}}{|\vec{n}|}$ **4) $\sin\theta = \frac{\vec{b}.\vec{n}}{|\vec{b}||\vec{n}|}$**

20. The d.c.s of a vector whose direction ratios are 2,-3,-6 are

1) $\left(\frac{2}{7}, \frac{-3}{7}, \frac{-6}{7}\right)$ 2) $\left(\frac{2}{49}, \frac{3}{49}, \frac{-6}{49}\right)$ 3) $\left(\frac{\sqrt{2}}{7}, \frac{\sqrt{3}}{7}, \frac{-\sqrt{6}}{7}\right)$ 4) $\left(\frac{2}{7}, \frac{3}{7}, \frac{6}{7}\right)$

21. The distance from the origin to the plane $\vec{r}.(2\vec{i} - \vec{j} + 5\vec{k}) = 7$ is

1) $\frac{7}{\sqrt{30}}$ 2) $\frac{\sqrt{30}}{7}$ 3) $\frac{30}{7}$ 4) $\frac{7}{30}$

Ans : Distance from origin to plane is $\left|\frac{d}{\sqrt{a^2+b^2+c^2}}\right|$

(a , b , c) = (2 , -1 , 5) d = 7

22. The vector equation of a plane passing through a point where P, V is $\vec{a}$ and perpendicular to a vector $\vec{n}$ is

1) $\vec{r}.\vec{n} = \vec{a}.\vec{n}$ 2) $\vec{r} \times \vec{n} = \vec{a} \times \vec{n}$ 3) $\vec{r} + \vec{n} = \vec{a} + \vec{n}$ 4) $\vec{r} - \vec{n} = \vec{a} - \vec{n}$

23. The vectors equation of a plane whose distance from the origin is p and perpendicular to a vector $\vec{n}$ is

1) $\vec{r}.\vec{n} = p$ 2) $\vec{r}.\hat{n} = q$ 3) $\vec{r} \times \vec{n} = p$ **4) $\vec{r}.\hat{n} = p$**

24. The non-parametric vector equation of a plane passing through a point whose P. V is$\vec{a}$ and parallel to $\vec{u}$ and $\vec{v}$ is

1) $[\vec{r} - \vec{a}, \vec{u}, \vec{v}] = 0$ 2) $[\vec{r}, \vec{u}, \vec{v}] = 0$ 3) $[\vec{r}, \vec{a}, \vec{u} \times \vec{v}] = 0$ 4) $[\vec{a}, \vec{u}, \vec{v}] = 0$

25. The non parametric vector equation of a plane passing through the point whose P. V s are $\vec{a}$ and parallel to $\vec{u}$ *and* $\vec{v}$ is

1) **$[\vec{r} - \vec{a} \ \ \vec{b} - \vec{a} \ \ \vec{v}] = 0$** 2) $[\vec{r} \ \ \vec{b} - \vec{a} \ \ \vec{v}] = 0$ 3) $[\vec{a} \ \ \vec{b} \ \ \vec{v}] = 0$ 4) $[\vec{r} \ \ \vec{a} \ \ \vec{b}] = 0$

[redacted] [redacted] [redacted]

26. The non-parametric vector equation of a plane passing through three points whose P. Vs are $\vec{a}, \vec{b}, \vec{c}$ is

1) $[\vec{\boldsymbol{r}} - \vec{\boldsymbol{a}} \ \ \vec{\boldsymbol{b}} - \vec{\boldsymbol{a}} \ \ \vec{\boldsymbol{c}} - \vec{\boldsymbol{a}}] = \mathbf{0}$ 2) $[\vec{r}\ \vec{a}\ \vec{b}] = 0$ 3) $[\vec{r}\ \vec{b}\ \vec{c}] = 0$ 4) $[\vec{a}\ \vec{b}\ \vec{c}] = 0$

27. The vector equation of a plane passing through the line of intersection the planes $\bar{r}.\overline{n_1} = q_1$ *and* $\bar{r}.\overline{n_2} = q_2$ is

1) $(\vec{\boldsymbol{r}}.\overrightarrow{\boldsymbol{n_1}} - \boldsymbol{q_1}) + \boldsymbol{\lambda}(\vec{\boldsymbol{r}}.\overrightarrow{\boldsymbol{n_2}} - \boldsymbol{q_2}) = \mathbf{0}$

2) $\vec{r}.\overrightarrow{n_1} + \vec{r}.\overrightarrow{n_2} = q_1 + \lambda q_2$

3) $\vec{r} \times \overrightarrow{n_1} + \vec{r} \times \overrightarrow{n_2} = q_1 + q_2$

4) $\vec{r} \times \overrightarrow{n_1} - \vec{r} \times \overrightarrow{n_2} = q_1 + q_1$

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VOLUME 1 - CREATIVE 1 MARK

Date : 21-Nov-19

12th Standard

Maths

Reg.No. :

Time : 02:50:00 Hrs

Total Marks : 170

170 x 1 = 170

1) The system of linear equations x + y + z = 6, x + 2y + 3z =14 and 2x + 5y + λz =μ (λ, μ ∈ R) is consistent with unique solution if

(a) λ = 8 (b) λ = 8, μ ≠ 36 **(c) λ ≠ 8** (d) none

2) If the system of equations x = cy + bz, y = az + cx and z = bx + ay has a non - trivial solution then

(a) $a^2 + b^2 + c^2 = 1$ (b) abc ≠ 1 (c) a + b + c =0 **(d) $a^2 + b^2 + c^2 + 2abc = 1$**

3) Let A be a 3 x 3 matrix and B its adjoint matrix If |B|=64, then |A|=

(a) ±2 (b) ±4 **(c) ±8** (d) ±12

4) If A^T is the transpose of a square matrix A, then

(a) $|A| \neq |A^T|$ **(b) $|A| = |A^T|$** (c) $|A| + |A^T| = 0$ (d) $|A| = |A^T|$ only

5) The number of solutions of the system of equations 2x+y = 4, x - 2y = 2, 3x + 5y = 6 is

(a) 0 (b) 1 (c) 2 (d) infinitely many

6) If A is a square matrix that IAI = 2, than for any positive integer n, $|A^n|$ =

(a) 0 (b) 2n (c) 2^n (d) n^2

7) The system of linear equations x + y + z = 2, 2x + y - z = 3, 3x + 2y + kz = has a unique solution if

(a) k ≠ 0 (b) -1 < k < 1 (c) -2 < k < 2 (d) k=0

8) If A is a square matrix of order n, then |adj A| =

(a) $|A|^{n-1}$ (b) $|A|^{n-2}$ (c) $|A|^n$ (d) None

9) If the system of equations x + 2y - 3x = 2, (k + 3) z = 3, (2k + 1) y + z = 2. is inconsistent then k is

(a) $-3, -\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) 1 (d) 2

10) If $A = \begin{pmatrix} cosx & sinx \\ -sinx & cosx \end{pmatrix}$ and A(adj A) $= \lambda \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ then λ is

(a) sinx cosx **(b) 1** (c) 2 (d) none

11) If A is a matrix of order m x n, then ρ (A) is

(a) m (b) n **(c) ≤ min (m,n)** (d) ≥ min (m,n)

12) The system of equations x + 2y + 3z = 1, x - y + 4z = 0, 2x + y + 7z = 1 has

(a) One solution (b) Two solution (c) No solution **(d) Infinitely many solution**

13) If ρ (A) = ρ ([A/B]) = number of unknowns, then the system is

(a) consistent and has infinitely many solutions (b) consistent (c) inconsistent **(d) consistent and has unique solution**

14) Which of the following is not an elementary transformation?

(a) $R_i \leftrightarrow R_j$ (b) $R_i \longrightarrow 2R_i + R_j$ (c) $C_j \longrightarrow C_j + C_i$ **(d) $R_i \longrightarrow R_i + C_j$**

15) If ρ (A) = r then which of the following is correct?

(a) all the minors of order n which do not vanish **(b) 'A' has at least one minor "of order r which does not vanish and all higher order minors vanish** (c) 'A' has at least one (r + 1) order minor which vanish (d) all (r + 1) and higher order minors should not vanish

16) Every homogeneous system ______

(a) Is always consistent(b) Has only trivial solution(c) Has infinitely many solution(d) Need not be consistent

17) If ρ (A) $\neq \rho$ ([AIB]), then the system is

(a) consistent and has infinitely many solutions(b) consistent and has a unique solution(c) consistent**(d) inconsistent**

18) In the non - homogeneous system of equations with 3 unknowns if ρ (A) = ρ ([AIB]) = 2, then the system has _______

(a) unique solution**(b) one parameter family of solution**(c) two parameter family of solutions(d) in consistent

19) Cramer's rule is applicable only when ______

(a) $\Delta \neq 0$(b) $\Delta = 0$(c) $\Delta = 0, \Delta_x = 0$(d) $\Delta_x = \Delta_y = \Delta_z = 0$

20) In a homogeneous system if ρ (A) =ρ ([A|0]) < the number of unknouns then the system has ________

(a) trivial solution(b) only non - trivial solution(c) no solution**(d) trivial solution and infinitely many non - trivial solutions**

21) In the system of equations with 3 unknowns, if $\Delta = 0$, and one of Δ_x, Δ_y of Δ_z is non zero then the system is ______

(a) Consistent **(b) inconsistent** (c) consistent with one parameter family of solutions (d) consistent with two parameter family of solutions

22) In the system of liner equations with 3 unknowns If ρ (A) = ρ ([A|B]) =1, the system has ________

(a) unique solution (b) inconsistent **(c) consistent with 2 parameter -family of solution** (d) consistent with one parameter family of solution.

23) If A = [2 0 1] then the rank of AA^T is ______

(a) 1(b) 2(c) 3(d) 0

24) If A is a non-singular matrix then $|A^{-1}|$= ______

(a) $\left|\frac{1}{A^2}\right|$(b) $\frac{1}{|A^2|}$(c) $\left|\frac{1}{A}\right|$**(d) $\frac{1}{|A|}$**

25) In a square matrix the minor M_{ij} and the' co-factor A_{ij} of and element a_{ij} are related by _____

(a) $A_{ij} = -M_{ij}$(b) $A_{ij} = M_{ij}$**(c) $A_{ij} = (-1)^{i+j} M_{ij}$**(d) $A_{ij} = (-1)^{i-j} M_{ij}$

26) The value of $(1+i)(1+i^2)(1+i^3)(1+i^4)$ is

(a) 2**(b) 0**(c) 1(d) i

27) If $\sqrt{a+ib}$ =x+iy, then possible value of $\sqrt{a-ib}$ is

(a) x^2+y^2(b) $\sqrt{x^2+y^2}$(c) x+iy**(d) x-iy**

28) If, $i^2 = -1$, then $i^1 + i^2 + i^3 + ...+$ up to 1000 terms is equal to

(a) 1(b) -1(c) i**(d) 0**

29) If z=$\cos\frac{\pi}{4}$ +i $\sin\frac{\pi}{6}$, then

(a) |z| =1, arg(z) =$\frac{\pi}{4}$(b) |z| =1, arg(z) =$\frac{\pi}{6}$(c) |z|=$\frac{\sqrt{3}}{2}$, arg(z)=$\frac{5\pi}{24}$**(d) $|z| = \frac{\sqrt{3}}{2}$, arg (z) =$\tan^{-1}\left(\frac{1}{\sqrt{2}}\right)$**

30) If a=cosθ + i sinθ, then $\frac{1+a}{1-a}$ =

(a) $\cot\frac{\theta}{2}$(b) cot θ**(c) $i\cot\frac{\theta}{2}$**(d) $i\tan\frac{\theta}{2}$

31) The principal value of the amplitude of (1+i) is

(a) $\frac{\pi}{4}$(b) $\frac{\pi}{12}$(c) $\frac{3\pi}{4}$(d) π

32) The least positive integer n such that $\left(\frac{2i}{1+i}\right)^n$ is a positive integer is

(a) 16**(b) 8**(c) 4(d) 2

33) If a = 1+i, then a^2 equals

(a) 1-i**(b) 2i**(c) (1+i)(1-i)(d) i-1

34) If z = $\frac{1}{(2+3i)^2}$ then |z| =

(a) $\frac{1}{13}$ (b) $\frac{1}{5}$ (c) $\frac{1}{12}$ (d) none of these

35) If z=1-cosθ + i sinθ, then |z| =

(a) $2\sin\frac{1}{3}$ (b) $2\cos\frac{\theta}{2}$ **(c)** $2|\sin\frac{\theta}{2}|$ (d) $2|\cos\frac{\theta}{2}|$

36) If $z=\frac{1}{1-\cos\theta-i\sin\theta}$, the Re(z) =

(a) 0 **(b)** $\frac{1}{2}$ (c) $\cot\frac{\theta}{2}$ (d) $\frac{1}{2}\cot\frac{\theta}{2}$

37) If $x+iy=\frac{3+5i}{7-6i}$, they y =

(a) $\frac{9}{85}$ (b) $-\frac{9}{85}$ **(c)** $\frac{53}{85}$ (d) none of these

38) The amplitude of $\frac{1}{i}$ is equal to

(a) 0 (b) $\frac{\pi}{2}$ **(c)** $-\frac{\pi}{2}$ (d) π

39) The value of $(1+i)^4 + (1-i)^4$ is

(a) 8 (b) 4 **(c) -8** (d) -4

40) The complex number z which satisfies the condition $\left|\frac{1+z}{1-z}\right|=1$ lies on

(a) circle $x^2+y^2=1$ **(b) x-axis** (c) y-axis (d) the lines x+y=1

41) If z = a + ib lies in quadrant then $\frac{z}{\bar{z}}$ also lies in the III quadrant if

(a) a > b > 0 (b) a < b < 0 **(c) b < a < 0** (d) b > a > 0

42) $\frac{1+e^{-i\theta}}{1+e^{i\theta}}$ =

(a) cosθ + i sinθ **(b) cosθ - i sinθ** (c) sinθ - i cosθ (d) sinθ + icosθ

43) If $z^n = \cos\frac{n\pi}{3} + i\sin\frac{n\pi}{3}$, then $z_1, z_2 \ldots z_6$ is

(a) 1 **(b) -1** (c) i (d) -i

44) If x =cosθ + i sinθ, then the value of $x^n+\frac{1}{x^n}$ is

(a) 2 cosθ (b) 2i sin nθ (c) 2i sin nθ (d) 2i cos nθ

45) If ω is the cube root of unity, then the value of $(1-\omega)(1-\omega^2)(1-\omega^4)(1-\omega^8)$ is

(a) 9 (b) -9 (c) 16 (d) 32

46) The points represented by 3 - 3i, 4 - 2i, 3 - i and 2 - 2i form _____ in the argand plane.

(a) collinear points (b) Vertices of a parallelogram (c) Vertices of a rectangle **(d) Vertices of a square**

47) $(1+i)^3$ = ______

(a) 3 + 3i (b) 1 + 3i (c) 3 - 3i **(d) 2i - 2**

48) $\frac{(\cos\theta+i\sin\theta)^6}{(\cos\theta-i\sin\theta)^5}$ = ________

(a) cos 11θ - isin 11θ **(b) cos 11θ + isin 11θ** (c) cosθ + i sinθ (d) $\cos\frac{6\theta}{5} + i\sin\frac{6\theta}{5}$

49) If a =cosα + i sinα, b= -cosβ + i sinβ then $\left(ab-\frac{1}{ab}\right)$ is _________

(a) -2i sin(α - β) (b) 2i sin(α - β) (c) 2 cos(α - β) (d) -2 cos(α - β)

50) The conjugate of $\frac{1+2i}{1-(1-i)^2}$ is _______

(a) $\frac{1+2i}{1-(1-i)^2}$ **(b)** $\frac{5}{1-(1-i)^2}$ (c) $\frac{1-2i}{1+(1+i)^2}$ (d) $\frac{1+2i}{1+(1-i)^2}$

51) The modular of $\frac{(-1+i)(1-i)}{1+i\sqrt{3}}$ is ______

(a) $\sqrt{2}$ (b) 2 **(c) 1** (d) $\frac{1}{2}$

52) The value of $\frac{(cos45^0+isin45^0)^2(cos30^0-isin30^0)}{cos30^0+isin30^0}$ is

(a) $\frac{1}{2}+i\frac{\sqrt{3}}{2}$ (b) $\frac{1}{2}-i\frac{\sqrt{3}}{2}$ (c) $-\frac{\sqrt{3}}{2}+\frac{1}{2}$ **(d)** $\mathbf{\frac{\sqrt{3}}{2}+\frac{1}{2}}$

53) If x=cosθ + i sinθ, then $x^n+\frac{1}{x^n}$ is ______

(a) 2 cos nθ (b) 2 i sin nθ (c) 2^n cosθ (d) 2^n i sinθ

54) If z_1, z_2, z_3 are the vertices of a parallelogram, then the fourth vertex z_4 opposite to z_2 is _____

(a) $z_1 + z_2 - z_2$ (b) $z_1 + z_2 - z_3$ (c) $z_1 + z_2 - z_3$ (d) $z_1 - z_2 - z_3$

55) If $x_r=cos\left(\frac{\pi}{2^r}\right)+isin\left(\frac{\pi}{2^r}\right)$ then $x_1, x_2 \ldots x_\infty$ is

(a) -∞ (b) -2 **(c) -1** (d) 0

56) If a, b, c ∈ Q and p +√q (p,q ∈ Q) is an irrational root of $ax^2+bx+c=0$ then the other root is

(a) -p+√q (b) p-iq **(c) p-√q** (d) -p-√q

57) The quadratic equation whose roots are ∝ and β is

(a) (x - ∝)(x -β) =0 (b) (x - ∝)(x + β) =0 (c) $\propto+\beta=\frac{b}{a}$ (d) $\propto.\beta=\frac{-c}{a}$

58) Ifj(x) = 0 has n roots, thenf'(x) = 0 has __________ roots

(a) n **(b) n -1** (c) n+1 (d) (n-r)

59) If x is real and $\frac{x^2-x+1}{x^2+x+1}$ then

(a) $\frac{1}{3}$ ≤k≤ (b) k≥5 (c) k≤0 (d) none

60) Let a > 0, b > 0, c > 0. h n both th root of th quatlon ax^2+b+C= 0 are

(a) real and negative **(b) real and positive** (c) rational numb rs (d) none

61) The equation $\sqrt{x+1}-\sqrt{x-1}=\sqrt{4x-1}$ has

(a) no solution (b) one solution (c) two solution (d) more than one solution

62) lf the root of the equation $x^3 +bx^2+cx-1=0$ form an Increasing G.P, then

(a) one of the roots is 2 **(b) one of the rots is 1** (c) one of the rots is -1 (d) one of the rots is -2

63) For real x, the equation $\left|\frac{x}{x-1}\right|+|x|=\frac{x^2}{|x-1|}$ has

(a) one solution (b) two solution **(c) at least two solution** (d) no solution

64) If the equation ax2+ bx+c=0(a > 0) has two roots ∝ and β such that ∝< - 2 and β > 2, then

(a) b2-4ac=0 (b) b^2 - 4ac < 0 **(c) b^2 - 4ac > 0** (d) b^2 - 4ac≥0

65) If $(2+\sqrt{3})x^2-2x+1+(2-\sqrt{3})x^2-2x-1=\frac{2}{2-\sqrt{3}}$ then x=

(a) 0,2 (b) 0,1 (c) 0,3 (d) 0, √3

66) If ∝, β, ɤ are the roots of the equation $x^3-3x+11=0$, then ∝+β+ɤ is __________.

(a) 0 (b) 3 (c) -11 (d) -3

67) If ∝, β,ɤ are the roots of 9x3-7x+6=0, then ∝ β ɤ is __________

(a) $\frac{-7}{9}$ (b) $\frac{7}{9}$ (c) 0 **(d) $\frac{-2}{3}$**

68) If x^{2} - hx - 21 = 0 and x^2 - 3hx + 35 = 0 (h > 0) have a common root, then h = ___________

(a) 0 (b) 1 **(c) 4** (d) 3

69) If ax^2 + bx + c = 0, a, b, c E R has no real zeros, and if a + b + c < 0, then __________

(a) c > 0 **(b) c< 0** (c) c=0 (d) c≥0

70) If p(x) = ax^2 + bx + c and Q(x) = $-ax^2$ + dx + c where ac ≠ 0 then p(x). Q(x) = 0 has at least _______ real roots.

(a) no(b) 1**(c) 2**(d) infinite

71) If $tan^{-1}\left\{\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}}\right\} = \alpha$ then $x^2 =$

(a) $sin2\alpha$(b) $sin\alpha$(c) $cos2\alpha$(d) $cos\alpha$

72) If $sin^{-1}x - cos^{-1}x = \frac{\pi}{6}$ then

(a) $\frac{1}{2}$**(b) $\frac{\sqrt{3}}{2}$**(c) $\frac{-1}{2}$(d) none of these

73) The number of solutions of the equation $tan^{-1}2x + tan^{-1}3x = \frac{\pi}{4}$

(a) 2(b) 3(c) 1(d) none

74) If $\alpha = tan^{-1}\left(tan\frac{5\pi}{4}\right)$ and $\beta = tan^{-1}\left(-tan\frac{2\pi}{3}\right)$ then

(a) $4\alpha = 3\beta$ (b) $3\alpha = 4\beta$(c) $\alpha - \beta = \frac{7\pi}{12}$(d) none

75) The number of real solutions of the equation $\sqrt{1+cos2x} = 2sin^{-1}(sinx), -\pi < x < \pi$ is

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

76) ·If $\alpha = tan^{-1}\left(\frac{\sqrt{3}}{2y-x}\right), \beta = tan^{-1}\left(\frac{2x-y}{\sqrt{3}y}\right)$ then $\alpha - \beta$

(a) $\frac{\pi}{6}$(b) $\frac{\pi}{3}$(c) $\frac{\pi}{2}$(d) $\frac{-\pi}{3}$

77) $tan^{-1}\left(\frac{1}{4}\right) + tan^{-1}\left(\frac{2}{11}\right) =$

(a) 0(b) $\frac{1}{2}$(c) -1(d) none

78) If $tan^{-1}(3)+tan^{-1}(x)=tan^{-1}(8)$ then x=

(a) 5**(b) $\frac{1}{5}$**(c) $\frac{5}{14}$(d) $\frac{14}{5}$

79) The value of $cos^{-1}\left(\frac{cos5\pi}{3}\right) + sin^{-1}\left(\frac{sin5\pi}{3}\right)$ is

(a) $\frac{\pi}{2}$(b) $\frac{5\pi}{3}$(c) $\frac{10\pi}{3}$**(d) 0**

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

(a) $\frac{6}{15}$(b) $\frac{24}{25}$(c) $\frac{4}{5}$**(d) $\frac{-24}{25}$**

81) If $4cos^{-1}x + sin^{-1}x = \pi$ then x is

(a) $\frac{3}{2}$ (b) $\frac{1}{\sqrt{2}}$ **(c)** $\frac{\sqrt{3}}{2}$ (d) $\frac{2}{\sqrt{3}}$

82) If $tan^{-1}\left(\frac{x+1}{x-1}\right) + tan^{-1}\left(\frac{x-1}{x}\right) = tan^{-1}(-7)$ then x Is

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

83) If $cos^{-1}x > x > sin^{-1}x$ then

(a) $\frac{1}{\sqrt{2}} < x \le 1$ (b) $0 \le x < \frac{1}{\sqrt{2}}$ (c) $-1 \le x < \frac{1}{\sqrt{2}}$ (d) $x > 0$

84) In a ΔABC if C is a right angle, then $tan^{-1}\left(\frac{a}{b+c}\right) + tan^{-1}\left(\frac{b}{c+a}\right) =$

(a) $\frac{\pi}{3}$ **(b)** $\frac{\pi}{4}$ (c) $\frac{5\pi}{2}$ (d) $\frac{\pi}{6}$

85) $cot\left(\frac{\pi}{4} - cot^{-1}3\right)$

(a) 7 (b) 6 (c) 5 (d) none

86) If $\tan^{-1}(\cot\theta) = 2\theta$, then θ = _____________

(a) ± 3 (b) $\pm\frac{\pi}{4}$ **(c)** $\pm\frac{\pi}{6}$ (d) none

87) The domain of $\cos^{-1}(x^2 - 4)$ is______

(a) [3, 5] (b) [-1, 1] **(c)** $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$ (d) [0, 1]

88) The value of $\tan\left(cos^{-1}\frac{3}{5} + tan^{-1}\frac{1}{4}\right)$ is ______

(a) $\frac{19}{8}$ **(b)** $\frac{8}{19}$ (c) $\frac{19}{12}$ (d) $\frac{3}{4}$

89) The value of $\sin(2(\tan^{-1} 0.75)$ is___________

(a) 0.75 (b) 1.5 **(c) 0.96** (d) $\sin^{-1}(1.5)$

90) If x > 1,then $2tan^{-1}x + sin^{-1}\left(\frac{2x}{1+x^2}\right)$ ________

(a) $4\tan^{-1}x$ (b) 0 (c) $\frac{\pi}{2}$ **(d) π**

91) If $\theta = sin^{-1}\left(sin(-60^0)\right)$ then one of the possible values of θ is _________

(a) $\frac{\pi}{3}$ (b) $\frac{\pi}{2}$ (c) $\frac{2\pi}{3}$ (d) $\frac{-2\pi}{3}$

92) The value of $sin^{-1}\left(cos\frac{33\pi}{5}\right)$ is_______

(a) $\frac{3\pi}{5}$ **(b)** $\frac{-\pi}{10}$ (c) $\frac{\pi}{10}$ (d) $\frac{7\pi}{5}$

93) If x < 0, y < 0 such that xy = 1, then $\tan^{-1}(x) + \tan^{-1}(y)$ =_____

(a) $\frac{\pi}{2}$ **(b) $\frac{-\pi}{2}$** (c) $-\pi$ (d) none

94) The pricipal value of $\sin^{-1}\left(\frac{-1}{2}\right)$ is _________

(a) $\frac{\pi}{6}$ (b) $\frac{-\pi}{6}$ (c) $\frac{\pi}{3}$ (d) $\frac{-\pi}{3}$

95) $\tan^{-1}\left(\tan\frac{9\pi}{8}\right)$

(a) $\frac{9\pi}{8}$ (b) $\frac{9\pi}{8}$ **(c) $\frac{\pi}{8}$** (d) $\frac{-\pi}{8}$

96) If (0, 4) and (0, 2) are the vertex and focus of a parabola then its equation is

(a) $x^2 + 8y = 32$ (b) $y^2 + 8x = 32$ (c) $x^2 - 8y = 32$ (d) $y^2 - 8x = 32$

97) The equation of the directrix of the parabola $y^2 + 4y + 4x + 2 = 0$ is

(a) x = -1 (b) x = 1 (c) $x = \frac{-3}{2}$ **(d) $x = \frac{3}{2}$**

98) Equation of tangent at (-4, -4) on $x^2 = -4y$ is

(a) 2x - y + 4 = 0 (b) 2x + y - 4 = 0 (c) 2x - y - 12 = 0 (d) 2x + y + 4 = 0

99) $y^2 - 2x - 2y + 5 = 0$ is a

(a) circle (b) parabola (c) ellipse (d) hyperbola

100) If a parabolic reflector is 20 em in diameter and 5 em deep, then its focus is

(a) (0,5) **(b) (5,0)** (c) (10,0) (d) (0, 10)

101) The eccentricity of the ellipse $9x^2 + 5y^2 - 30y = 0$ is

(a) $\frac{1}{3}$ **(b) $\frac{2}{3}$** (c) $\frac{3}{4}$ (d) none of these

102) The length of the latus rectum of the ellipse $\frac{x^2}{36} + \frac{y^2}{49} = 1$ is

(a) $\frac{98}{6}$ **(b) $\frac{72}{7}$** (c) $\frac{72}{14}$ (d) $\frac{98}{12}$

103) If the distance between the foci is 2 and the distance between the direction is 5, then the equation of the ellipse is

(a) $6x^2 + 10y^2 = 5$ **(b) $6x^2 + 10y^2 = 15$** (c) $x^2 + 3y^2 = 10$ (d) none

104) In an ellipse, the distance between its foci is 6 and its minor axis is 8, then e is

(a) $\frac{4}{5}$ (b) $\frac{1}{\sqrt{52}}$ **(c) $\frac{3}{5}$** (d) $\frac{1}{2}$

105) The equation $7x^2 - 6\sqrt{3}\ xy + 13y^2 - 4\sqrt{3}\ x - 4y - 12 = 0$ represents

(a) parabola **(b) ellipse** (c) hyperbola (d) rectangular hyperbola

106) The distance between the foci of a hyperbola is 16 and e = $\sqrt{2}$ Its equation is

(a) $x^2 - y^2 = 32$ (b) $y^2 - x^2 = 32$ **(c) $x^2 - y^2 = 16$** (d) $y^2 - x^2 = 16$

107) If the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{144} - \frac{y^2}{81} = \frac{1}{25}$ coincide then b^2 is

(a) 1 (b) 5 **(c) 7** (d) 9

108) When the eccentricity of a ellipse becomes zero, then it becomes a

(a) straight line **(b) circle** (c) point (d) parabola

109) The director circle of the ellipse $\frac{x^2}{9} - \frac{y^2}{5} = 1$ is

(a) $x^2 + y^2 = 4$ (b) $x^2 + y^2 = 9$ (c) $x^2 + y^2 = 45$ **(d) $x^2 + y^2 = 14$**

110) The auxiliary circle of the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ is

(a) $x^2 + y^2 = 25$ (b) $x^2 + y^2 = 16$ (c) $x^2 + y^2 = 41$ (d) $x^2 + y^2 = 5$

111) The length of the diameter of a circle with centre (1, 2) and passing through (5, 5) is

(a) 5 (b) $\sqrt{45}$ **(c) 10** (d) $\sqrt{50}$

112) If (1, -3) is the centre of the circle $x^2 + y^2 + ax + by + 9 = 0$ its radius is

(a) $\sqrt{10}$ **(b) 1** (c) 5 (d) $\sqrt{19}$

113) The area of the circle $(x - 2)^2 + (y - k)^2 = 25$ is

(a) 25π (b) 5π (c) 10π (d) 25

114) The equation of tangent at (1, 2) to the circle $x^2 + y^2 = 5$ is

(a) x+y=3 **(b) x + 2y = 3** (c) x- y= 5 (d) x - 2y = 5

115) If y = 2x + c is a tangent to the circle $x^2 + y^2 = 5$, then c is

(a) ±5 (b) $\pm\sqrt{5}$ (c) $\pm 5\sqrt{2}$ (d) $\pm 2\sqrt{5}$

116) The line y = mx +1 is a tangent to the parabola $y^2 = 4x$ if m = ______________

(a) 1 (b) 2 (c) 3 (d) 4

117) The angle between the tangents drawn from (1, 4) to the parabola $y^2 = 4x$ is __________

(a) $\frac{\pi}{2}$ **(b) $\frac{\pi}{3}$** (c) $\frac{\pi}{5}$ (d) $\frac{\pi}{5}$

118) In an ellipse $5x^2 + 7y^2 = 11$, the point (4, -3) lies _________ the ellipse

(a) on **(b) outside** (c) inside (d) none

119) If e_1, e_2 are eccentricities of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and the hyperbola $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ then

(a) $e_1^2 - e_2^2 = 1$ **(b) $e_1^2 + e_2^2 = 1$** (c) $e_1^2 - e_2^2 = 2$ (d) $e_1^2 - e_2^2 = 2$

120) The equation of the director circle of the hyperbola $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is ___________

(a) $x^2 + y^2 = a^2 + b^2$ (b) $x^2 + y^2 = a^2$ (c) $x^2 + y^2 = b^2$ **(d) $x^2 + y^2 = a^2 - b^2$**

121) The number of normals to the hyperbola $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ from an external point is

(a) 2 (b) 4 (c) 6 **(d) 5**

122) The point of contact of $y^2 = 4ax$ and the tangent y = mx + c is

(a) $\left(\frac{2a}{m^2}, \frac{a}{m}\right)$ **(b) $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$** (c) $\left(\frac{a}{m}, \frac{2a}{m^2}\right)$ (d) $\left(\frac{-a}{m^2}, \frac{-2a}{m}\right)$

123) If B, B_1 are the ends of minor axis, F_1, F_2 are foci of the ellipse $\frac{x^2}{8} + \frac{y^2}{4} = 1$ then area of $F_1BF_2B^1$ is

(a) 16 **(b) 8** (c) $16\sqrt{2}$ (d) $32\sqrt{2}$

124) The length of major and minor axes of $4x^2 + 3y^2 = 12$ are ____________

(a) 4, $2\sqrt{3}$ (b) 2, $\sqrt{3}$ (c) $2\sqrt{3}$, 4 (d) $\sqrt{3}$, 2

125) The tangent at any point P on the ellipse $\frac{x^2}{6} + \frac{y^2}{3} = 1$ whose centre C meets the major axis at T and PN is the perpendicular to the major axis; The CN CT = ______________

(a) $\sqrt{6}$ (b) 3 (c) $\sqrt{3}$ **(d) 6**

126) The locus of the point of Inter eetton of perpendicular tangents to the hyperbela $\frac{x^2}{16} + \frac{y^2}{9} = 1$ is __________

(a) $x^2+y^2= 25$ (b) $x^2 +y^2 = 4$. (c) $x^2 +y^2 = 3$ **(d) $x^2+y^2=7$**

127) If t_1 and t_2 are the extremities of any focal chord of $y^2 = 4ax$ then t_1t_2 is ______________

(a) -1 (b) 0 (c) ±1 (d) $\frac{1}{2}$

128) The locus of the foot of perpendicular from the focus on any tangent to $y^2 = 4ax$ is

(a) $x^2 + y^2 = a^2 - b^2$ (b) $x^2 + y^2 = a^2$ (c) $x^2 + y^2 = a^2 - b^2$ **(d) $x = 0$**

129) Th point of curve $y = 2x^2 - 6x - 4$ at which the targent is parallel to x - axis is

(a) $\left(\frac{5}{2}, \frac{-7}{12}\right)$ (b) $\left(\frac{-5}{2}, \frac{-7}{2}\right)$ (c) $\left(\frac{-5}{2}, \frac{17}{12}\right)$ **(d) $\left(\frac{3}{2}, \frac{-7}{2}\right)$**

130) The locus of the point of intersection of perpendicular tangents of the parabola $y^2 = 4ax$ is

(a) latus rectum **(b) directrix** (c) tangent at the vertex (d) axis of the parabola

131) The vector, d$\hat{i} + \hat{j} + 2\hat{k}$, $\hat{i} + \lambda\hat{j} - \hat{k}$ t and $2\hat{i} - \hat{j} + \lambda\hat{k}$ are co-planar if

(a) $\lambda = -2$ (b) $\lambda = 1+\sqrt{3}$ (c) $\lambda = 1 - \sqrt{3}$ **(d) $\lambda = -2, 1 \pm \sqrt{3}$**

132) Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three non- coplanar vectors and let $\vec{p}, \vec{q}, \vec{r}$ be the vectors defined by the relations

$\vec{P} = \frac{\vec{b}\times\vec{c}}{[\vec{a}\vec{b}\vec{c}]}, \vec{q} = \frac{\vec{c}\times\vec{a}}{[\vec{a}\vec{b}\vec{c}]}, \vec{r} = \frac{\vec{a}\times\vec{b}}{[\vec{a}\vec{b}\vec{c}]}$ Then the value of $\left(\vec{a}+\vec{b}\right).\vec{p} + \left(\vec{b}+\vec{c}\right).\vec{q} + \left(\vec{c}+\vec{a}\right).\vec{r} =$

(a) 0 (b) 1 (c) 2 **(d) 3**

133) The number of vectors of unit length perpendicular to the vectors $\left(\hat{i} + \hat{j}\right)$ and $\left(\hat{j} + \hat{k}\right)$ is

(a) 1 **(b) 2** (c) 3 (d) ∞

134) If $\vec{d} = \vec{a} \times \left(\vec{b} \times \vec{c}\right) + \vec{b} \times \left(\vec{c} \times \vec{a}\right) + \vec{c} \times \left(\vec{a} + \vec{b}\right)$, then

(a) $\left|\vec{d}\right|$ (b) $\vec{d} = \vec{a} + \vec{b} + \vec{c}$ **(c) $\vec{d} = \vec{0}$** (d) a, b, c are coplanar

135) If $\vec{a}$ and $\vec{b}$ are two unit vectors, then the vectors $\left(\vec{a} + \vec{b}\right) \times \left(\vec{a} \times \vec{b}\right)$ is parallel to the vector

(a) $\vec{a} - \vec{b}$ (b) $\vec{a} + \vec{b}$ (c) $2\vec{a} - \vec{b}$ (d) $2\vec{a} + \vec{b}$

136) The area of the parallelogram having diagonals $\vec{a} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} - 3\hat{j} + 4\hat{k}$ is

(a) 4 (b) $2\sqrt{3}$ (c) $4\sqrt{3}$ **(d) $5\sqrt{3}$**

137) If $\vec{a}, \vec{b}$ and $\vec{c}$ are any three vectors, then $\vec{a} \times \left(\vec{b} \times \vec{c}\right) = \vec{a} \times \left(\vec{b} \times \vec{c}\right)$ if and only if

(a) $\vec{b}, \vec{c}$ are collinear **(b) $\vec{a}$ and $\vec{c}$ are collinear** (c) $\vec{a}$ and $\vec{b}$ are collinear (d) none

138) The volume of the parallelepiped whose sides are given by $\vec{OA} = 2\hat{i} - 3\hat{j}$, $\vec{OB} = \hat{i} + \hat{j} - \hat{k}$ and $\vec{OC} = 3\hat{i} - \hat{k}$ is

(a) $\frac{4}{13}$ **(b) 4** (c) $\frac{2}{7}$ (d) $\frac{4}{9}$

139) If $\left|\vec{a}\right| = \left|\vec{b}\right| = 1$ such that $\vec{a} + 2\vec{b}$ and $5\vec{a} - \vec{b}$ are perpendicular to each other, then the angle between $\vec{a}$ and $\vec{b}$ is

(a) 45^o **(b) 60^o** (c) $\cos^{-1}\left(\frac{1}{3}\right)$ (d) $\cos^{-1}\left(\frac{2}{7}\right)$

140) The angle between the vector $3\hat{i} + 4\hat{j} + 5\hat{k}$ and the z-axis is

(a) 30^o (b) 60^o **(c) 45^o** (d) 90^o

141) The p.v, OP of a point P make angles 60^o and 45^o with X and Y axis respectively. The angle of inclination of $\vec{OP}$ with z-axis is

(a) 75^o **(b) 60^o** (c) 45^o (d) 3

142) If $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$, $\vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$, $\vec{c} = 3\hat{i} + \hat{j}$ then $\vec{a} + \left(-\vec{b}\right)$ will be perpendiculur to $\vec{c}$ only when t =

(a) 5 (b) 4 (c) 3 **(d) $\frac{7}{3}$**

143)

If θ is the angle between the vectors $\vec{a}$ and $\vec{b}$, then sinθ is

(a) $\frac{\vec{a}.\vec{b}}{|\vec{a}|\,|\vec{b}|}$ (b) $\frac{|\vec{a}\times\vec{b}|}{\vec{a}.\vec{b}}$ **(c)** $\sqrt{1-\left(\frac{\vec{a}.\vec{b}}{|\vec{a}|\,|\vec{b}|}\right)^2}$ (d) 0

144) If the vector $\hat{i}+\hat{j}+2\hat{k}$, $-\hat{i}+2\hat{k}$ and $2\hat{i}+x\hat{j}-y\hat{k}$ are mutually orthogonal, then the values of x, y, z are

(a) (10, 4, 1) (b) (-10, 4, 1) (c) (-10, -4, $\frac{1}{2}$) **(d) (-10, 4, $\frac{1}{2}$)**

145) If $\vec{a} = |\vec{a}|\vec{e}$ then $\vec{e}.\vec{e}$

(a) 0 (b) e **(c) 1** (d) $\vec{0}$

146) The value of $|\vec{a}+\vec{b}|^2 + |\vec{a}-\vec{b}|^2$ is

(a) $2\left(|\vec{a}|^2+|\vec{b}|^2\right)$ (b) $4\,\vec{a}.\vec{b}$ (c) $2\left(|\vec{a}|^2-|\vec{b}|^2\right)$ (d) $4\,|\vec{a}|^2|\vec{b}|^2$

147) If $\vec{p}\times\vec{q} = 2\hat{i}+3\hat{j}$, $\vec{r}\times\vec{s} = 3\hat{i}+2\hat{k}$ then $\vec{p}.\left(\vec{q}\left(\vec{r}\times\vec{s}\right)\right)$ is

(a) 9 **(b) 6** (c) 2 (d) 5

148) If the work done by a force $\vec{F} = \hat{i}+m\hat{j}-\hat{k}$ in moving the point of application from(1, 1, 1) to (3, 3, 3) along a straight line is 12 units, then m is

(a) 5 (b) 2 (c) 3 **(d) 6**

149) The two planes 3x + 3y - 3z - 1 = 0 and x + y - z + 5 = 0 are

(a) mutually perpendicular **(b) parallel** (c) inclined at 45° (d) inclined at 30

150) The straight lines $\frac{x-3}{2} = \frac{y+5}{4} = \frac{z-1}{-13}$ and $\frac{x+1}{3} = \frac{y-4}{5} = \frac{z+2}{2}$ are

(a) parallel **(b) perpendicular** (c) inclined at 45° (d) none

151) For what value of $(\vec{a})$ will the straight lines $\frac{x+2}{a} = \frac{y}{3} = \frac{z-1}{4}$ and $\frac{x-3}{a} = \frac{y-1}{4} = \frac{z-7}{a}$ be perpendicular?

(a) 1 **(b) 2** (c) 3 (d) -3

152) If $\left[\vec{a}, \vec{b}, \vec{c}\right]$=3 and $|\vec{c}| = 1$ then $\left|\left(\vec{b}\times\vec{c}\right)\times\left(\vec{c}\times\vec{a}\right)\right|$ is

(a) 1 **(b) 3** (c) 6 (d) 9

153) If $\lambda\hat{i}+2\lambda\hat{j}+2\lambda\hat{k}$ is a unit vector, then the value of λ is

(a) $\pm\frac{1}{3}$ (b) $\pm\frac{1}{4}$ (c) $\pm\frac{1}{9}$ (d) $\frac{1}{2}$

154) For any three vectors $\vec{a}, \vec{b}$ and $\vec{c}$, $\left(\vec{a}+\vec{b}\right).\left(\vec{b}+\vec{c}\right)\times\left(\vec{c}+\vec{a}\right)$ is

(a) 0 (b) $\left[\vec{a}, \vec{b}, \vec{c}\right]$ **(c) $2\left[\vec{a}, \vec{b}, \vec{c}\right]$** (d) $\left[\vec{a}, \vec{b}, \vec{c}\right]^2$

155) If the vectors $a\hat{i}+\hat{j}+\hat{k}$, $\hat{i}+b\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+c\hat{k}$ (a ≠ b ≠ c ≠ 1) are coplaner, then $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c} =$

(a) 0 **(b) 1** (c) 2 (d) $\frac{abc}{(1-a)(1-b)(1-c)}$

156) The angle between the planes 2x + y - z = 9 and x + 2y + z = 7 is____________

(a) $\cos^{-1}$ (5/6) (b) $\cos^{-1}$ (5/36) **(c) $\cos^{-1}$ (1/2)** (d) $\cos^{-1}$ (1/12)

157) The unit normal vector to the plane 2x + 3y + 4z = 5 is ______________

(a) $\frac{2}{\sqrt{29}}\hat{i}+\frac{3}{\sqrt{29}}\hat{j}+\frac{4}{\sqrt{29}}\hat{k}$ (b) $\frac{2}{\sqrt{29}}\hat{i}-\frac{3}{\sqrt{29}}\hat{j}+\frac{4}{\sqrt{29}}\hat{k}$ (c) $\frac{2}{\sqrt{29}}\hat{i}-\frac{3}{\sqrt{29}}\hat{j}-\frac{4}{\sqrt{29}}\hat{k}$ (d) $\frac{2}{5}\hat{i}+\frac{3}{5}\hat{j}+\frac{4}{5}\hat{k}$

158)

The work done by the force $\vec{F} = \hat{i} + \hat{j} + \hat{k}$ acting on a particle, if the particle is displaced from A(3, 3, 3) to the point B(4, 4, 4) is _______________ units

(a) 2 **(b) 3** (c) 4 (d) 7

159) The angle between the vectors $\hat{i} - \hat{j}$ and $\hat{j} - \hat{k}$ is _______________

(a) $\frac{\pi}{3}$ (b) $\frac{-2\pi}{3}$ (c) $\frac{-\pi}{3}$ **(d) $\frac{2\pi}{3}$**

160) The unit normal vectors to the plane 2x - y + 2z = 5 are _______________

(a) $2\hat{i} - \hat{j} + 2\hat{k}$ (b) $\frac{1}{3}\left(2\hat{i} - \hat{j} + 2\hat{k}\right)$ (c) $-\frac{1}{3}\left(2\hat{i} - \hat{j} + 2\hat{k}\right)$ **(d) $\pm\frac{1}{3}\left(2\hat{i} - \hat{j} + 2\hat{k}\right)$**

161) The distance from the origin to the plane $\vec{r}.\left(2\hat{i} - \hat{j} + 5\hat{k}\right) = 7$ is _____________

(a) $\frac{7}{\sqrt{30}}$ (b) $\frac{\sqrt{30}}{7}$ (c) $\frac{30}{7}$ (d) $\frac{7}{30}$

162) If $\vec{a}, \vec{b}, \vec{c}$ are mutually $\perp^r$ unit vectors, then $\left|\vec{a} + \vec{b} + \vec{c}\right|$ is ______________

(a) 3 (b) 9 (c) $3\sqrt{3}$ **(d) $\sqrt{3}$**

163) Let $\vec{u}, \vec{v}, \vec{w}$ be vectors such that $\vec{u} + \vec{v} + \vec{w} = \vec{0}$. If $\left|\vec{u}\right| = 3$, $\left|\vec{v}\right| = 4$, $\left|\vec{w}\right| = 5$ then $\vec{u}.\vec{v} + \vec{v}.\vec{w} + \vec{w}.\vec{u}$ is _____________

(a) 25 **(b) -25** (c) 5 (d) $\sqrt{5}$

164) The length of the $\perp^r$ from the origin to plane $\vec{r}.\left(3\hat{i} + 4\hat{j} + 12\hat{k}\right) = 26$ is ____________

(a) 2 (b) $\frac{1}{2}$ (c) 26 (d) $\frac{26}{169}$

165) If $\left|\vec{a} \times \vec{b}\right| = \vec{a}.\vec{b}$, then the angle between the vector $\vec{a}$ and $\vec{b}$ is ____________

(a) $\frac{\pi}{4}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{2}$

166) The value of $\left|\vec{a} + \vec{i}\right|^2 + \left|\vec{a} + \vec{j}\right|^2 + \left|\vec{a} + \vec{k}\right|^2$ if $|a| = 1$ is _________________

(a) 0 (b) 1 **(c) 2** (d) 3

167) If $\vec{a}, \vec{b}, \vec{c}$ are three non - coplanar vectors, then $\frac{\vec{a}.\vec{b}\times\vec{c}}{\vec{c}\times\vec{a}.\vec{b}} + \frac{\vec{b}.\vec{a}\times\vec{c}}{\vec{c}.\vec{a}\times\vec{b}} =$ ____________

(a) 0 (b) 1 (c) -1 (d) $\frac{\vec{a}.\vec{b}\times\vec{c}}{\vec{b}\times\vec{c}.\vec{c}}$

168) If $\vec{d} = \lambda\left(\vec{a} \times \vec{b}\right) + \mu\left(\vec{b} \times \vec{c}\right) + \omega\left(\vec{c} \times \vec{a}\right)$ and $\left|\vec{c} \times \vec{a}\right| = \frac{1}{8}$ then λ + μ + ω is ____________

(a) 0 (b) 1 (c) 8 **(d) $8\vec{d}.\left(\vec{a} + \vec{b} + \vec{c}\right)$**

169) The area of the parallelogram having diagonals $\vec{a} = 3\hat{i} + \hat{j} - 2\hat{k}$ and $\vec{b} = \hat{i} - 3\hat{j} + 4\hat{k}$ is ______________

(a) 4 (b) $2\sqrt{3}$ (c) $4\sqrt{3}$ **(d) $5\sqrt{3}$**

170) Let $\vec{a}, \vec{b},$ and $\vec{c}$ be three vectors having magnitudes 1, 1, 2 respectively.

If $\vec{a} \times \left(\vec{a} \times \vec{c}\right) + \vec{b} = 0$ then the acute angle between $\vec{a}$ and $\vec{c}$ is ___________________

(a) 0 (b) $\frac{\pi}{3}$ **(c) $\frac{\pi}{6}$** (d) $\frac{2\pi}{3}$

31 x 2 = 62

171) The rank of any 3 x 4 matrix is

(1) May be 1

(2) May be 2

(3) May be 3

(4) Maybe 4

Answer : May be 4

172) If A is symmetric then

(1) $A^T = A$

(2) adj A is symmetric

(3) adj $(A^T) = (\text{adj } A)^T$

(4) A is orthogonal

Answer : A is orthogonal

173) If A is a non-singular matrix of odd order them

1) Order of A is 2m + 1

(2) Order of A is 2m + 2

(3) |adj AI is positive

(4) IAI $\neq$ 0

Answer : Order of A is 2m + 2

174) If A is a orthogonal matrix, then

(1) $AA^T = A^T A = I$

(2) A is non-singular

(3) IAI= 0

(4) $A^{-1} = A^T$

Answer : IAI = 0

175) A matrix which is obtained from an identity matrix by applying only one elementary transformation is

(1) Identity matrix

(2) Elementary matrix

(3) Square matrix

(4) Equivalent to identify matrix

Answer : Identity matrix

176) $i^{-1} =$

(i) $\frac{1}{i}$

(ii) i

(iii) -i

(4) $\frac{1}{i^2}$

Answer : i

177) When z =x+iy, then iz is

(1) x-iy

(2) i(x+iy)

(3) -y+ix

(4) Rotation ofz by 90° in the counter clockwise direction

Answer : x-iy

178) (1+3i) (1-3i)

(i) $(1)^2 - (3i)^2$

(2) 1 + 9

(3) 10

(4) -8

Answer : -8

179) If z=x+iy, then $z\bar{z}$ =

(i) (x+iy) (x-iy)

(2) $|z|^2$

(3) $x^2 + y^2$

(4) |z|

Answer : |z|

180) The princlple argumentofa complex number.

(1) θ = α

(2) θ = -α

(3) $\frac{\pi}{2} - \alpha$

(4) θ = α - π

Answer : $\frac{\pi}{2} - \alpha$

181) Application of De Moivre's theorem.

(1) $(\sin\theta + i\cos\theta)^n = \sin n\theta + i\cos n\theta$

(2) $(\cos\theta + i\sin\theta)^n = \cos n\theta + i\sin n\theta$

(3) $(\cos\theta + i\sin\theta)^{-n} = \cos n\theta - i\sin n\theta$

(4) $(\cos\theta - i\sin\theta)^{-n} = \cos n\theta + i\sin n\theta$

Answer : $(\sin\theta + i\cos\theta)^n = \sin n\theta + i\cos n\theta$

182) 1) $x + \frac{1}{x} = 2$

2) $ax^2+bx+c=0$

3) $\sqrt{x} + \frac{1}{\sqrt{x}} = 4$

4) $ax^2 + \frac{b}{x} + c = 0$

Answer : 4) $ax^2 + \frac{b}{x} + c = 0$

183) (1) $2x^2 + 7x - 2x + 7 = 0$

(2) $6x^2 - 6x^3 + 5 = 0$

(3) $-5 + 6x + 5x^2 - 6x^3 = 0$

(4) $9x^4 - 5x^3 + 5x^2 - 9 = 0$

Answer : (2) $6x^2 - 6x^3 + 5 = 0$

184) (1) $\left(\frac{3}{5}\right)^x = x - x^2 - 9$

(2) sin x = 4

(3) tan x= 1

(4) cos x=7

Answer : (3) tan x= 1

185) If≠ 0, then $\frac{p}{2x} = \frac{a}{a+c} + \frac{b}{x-c}$ has two equal roots then p = _________

(1) $p = (\sqrt{a} - \sqrt{b})^2$

(2) $(\sqrt{a} + \sqrt{b})^2$

(3) $\left(\sqrt{a} \pm \sqrt{b}\right)^2$

(4) 0

Answer : (4) 0

186) Ifax + by = 1, $Cx^2 + dy^2 = 1$ have only one solution, then

(1) $\frac{a^2}{c} + \frac{b^2}{d} = 1$

(2) $x = \frac{a}{c}$

(3) $x = \frac{c}{a}$

(4) $x = \frac{b}{d}$

Answer : (3) $x = \frac{c}{a}$

187) (1) Domain is $(-\infty, -1] \cup [1, \infty)$

(2) Range is $\left(\frac{-\pi}{2}, \frac{\pi}{2}\right) - \{0\}$

(3) Odd function

(4) Periodic function

Answer : Periodic function

188) (1 tan(tan-1x)= x if $x \epsilon R$

(2) $sin^{-1}\left(\frac{1}{x}\right) = cosec \quad x \quad if \quad x\epsilon R(-4/1)$

(3) $cos^{-1}\left(\frac{1}{x}\right) = sec \quad x \quad if \quad x\epsilon R(-1/1)$

(4)

$$\tan^{-1}\left(\frac{1}{x}\right) = \begin{cases} \cot^{-1} x, & \text{if} \quad x > 0 \\ -A + \cot^{-1} & \text{if} \quad x < 0 \end{cases}$$

Answer : tan(tan-1x)= x if $x \epsilon R$

189)

(1) The x-intercept is 1 and the y-intercept is $\frac{\pi}{2}$

(2) It is an even function

(3) Not symmetric with respect to origin

(4) Not symmetric with respect to y-axis

Answer : It is an even function

190) (1) $sin^{-1}x = cos^{-1}\sqrt{1-x^2}$ if $0 \le x \le 1$

(2) $sin^{-1}x = -cos^{-1}\sqrt{1-x^2}$ if $-1 \le x \le 0$

(3) $cos^{-1}x = sin^{-1}\sqrt{1+x^2}$ if $0 \le x \le 1$

(4) $cos^{-1}x = sin^{-1}\sqrt{1-x^2}$ if $0 \le x \le 1$

Answer : $cos^{-1}x = sin^{-1}\sqrt{1-x^2}$ if $0 \le x \le 1$

191) (1) $\cot(\cot^{-1}(+600)) = -600$

(2) $\cot(\cot^{-1}(1782)) = 1782$

(3) $cot\left(cot^{-1}\left(\frac{-17}{9}\right)\right) = \frac{-17}{9}$

(4) $cot(cot^{-1}(\sqrt{3}) = \sqrt{3}$

Answer : $\cot(\cot^{-1}(+600)) = -600$

192) (1) x = a cos θ, y = a sin θ

(2) θ

(3) $0 \le \theta \le 2\pi$

(4) (a cos θ, b sin θ)

Answer : (4) (a cos θ, b sin θ) ; 1, 2, 3 are parametric form of a circle

193) (1) $y^2 = 4ax$

(2) $c = \frac{a}{m}$

(3) $c^2 = a^2(1+m^2)$

(4) $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$

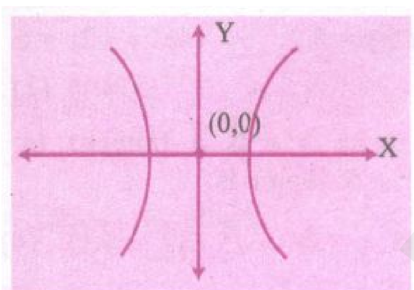
Answer : (3) $c^2 = a^2(1+m^2)$ 1,2,4 are related to parabola

194) (1) Transverse axis is parallel to x-axis

(2) Direction are $x = \pm \frac{a}{e}$

(3) Centre is (0, 0)

(4) Transverse axis parallel to y-axis



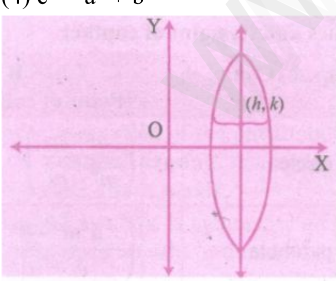
Answer : (4) Transverse axis parallel to y-axis

195) (1) Major axi parallel to x-axis

(2) $c^2 \equiv a^{2} - b^2$

(3) Foci are a units right and a units left of centre

(4) $c^2 = a^2 + b^2$



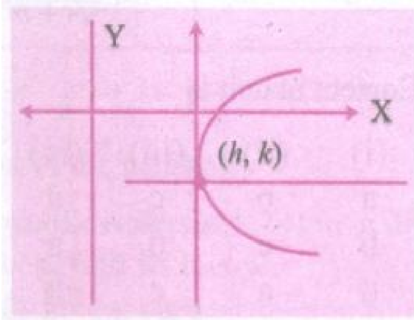
Answer : (4) $c^2 = a^2 + b^2$

196) (1) Vertex (h, k)

(2) Equation of directrix is x = h + a

(3) Axis of symmetry is y = k

(4) Length of latus rectum = 4a



Answer : (2) Equation of directrix is x = h + a

197) (1) displacement

(2) length

(3) weight

(4) velocity

Answer : (4) velocity

198) For any non-zero vectors $\vec{a}$ and $\vec{b}$ $\vec{a} \times \vec{b}$ is

(1) cross product of $\vec{a}$ and $\vec{b}$

(2) $|\vec{a}|\ |\vec{b}|$ sinθ

(3) $|\vec{a}|\ |\vec{b}|$ sinθ $\hat{n}$

(4) $-\left(\vec{b} \times \vec{a}\right)$

Answer : (2) $|\vec{a}|\ |\vec{b}|$ sinθ

199) For any non-zero vectors $\vec{a}, \vec{b}$ and $\vec{c}$, $\left(\vec{a} \times \vec{b}\right).\vec{c}$ is __________

(1) $\vec{a}.\left(\vec{b} \times \vec{c}\right)$

(2) $\left(\vec{b} \times \vec{a}\right).\vec{c}$

(3) $\left(\vec{b} \times \vec{c}\right).\vec{a}$

(4) $\left(\vec{c} \times \vec{a}\right).\vec{b}$

Answer : (2) $\left(\vec{b} \times \vec{a}\right).\vec{c}$

200) $\vec{a}, \vec{b}$ and $\vec{c}$ are said to be coplanar if

(1) $\left[\vec{a}, \vec{b}, \vec{c}\right]=0$

(2) $\vec{a}, \vec{b}, \vec{c}$ lie on the same plane

(3) They are either parallel or intersecting

(4) Skew lines

Answer : (4) Skew lines

201) The equation of the plane at a distance p from the origin and perpendicular to the unit normal vector $\hat{d}$ is

(1) $\vec{r}.\vec{d} = p$

(2) $\vec{r}.\hat{d} = p$

(3) $\vec{r}.\vec{d} = q$ where $q = p\left|\vec{d}\right|$

(4) $\vec{r}.\dfrac{\vec{d}}{|d|} = p$

Answer : (1) $\vec{r}.\vec{d} = p$