Sir Cv Raman Coaching Centre – Idappadi,Salem -637101

Xll Mathematics First Term Model Question Paper – 2026

Total Mark : 50m ,, Time : 3 Hrs

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Section – A (10 X 1 = 10 M)

Choose The Correct Best Answer

1. 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) $2A^{-1}$

2. 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

3. 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

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

5. 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

6. 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) $1+n^2$

7.

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

8.

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

9.

$\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right)$ 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) $\tan^{-1}\left(\frac{1}{2}\right)$

10.

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

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

Section – B (5 X 2 = 10 M)

Answer Any Five Question

11.

If A is a non-singular matrix of odd order, prove that $|\text{adj } A|$ is positive.

12.

Verify the property $\left(A^T\right)^{-1} = \left(A^{-1}\right)^T$ with $A = \begin{bmatrix} 2 & 9 \\ 1 & 7 \end{bmatrix}$.

13. Prove that $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ is orthogonal.

14. A chemist has one solution which is 50% acid and another solution which is 25% acid. Howmuch each should be mixed to make 10 litres of a 40% acid solution ? (Use Cramer's rule toBsolve the problem)

15. Simplify $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3$. into rectangular form

16.

If $z_1 = 3+4i$, $z_2 = 5-12i$, and $z_3 = 6+8i$, find $|z_1|, |z_2|, |z_3|, |z_1+z_2|, |z_2-z_3|$, and $|z_1+z_3|$.

17.Prove that a straight line and parabola cannot intersect at more than two points

18.Solve the equation : $x^4 - 14x^2 + 45 = 0$.

Section – C (5 x 3 = 15 M)
Answer Any Five Question

19. Given $A=\begin{bmatrix}1 & -1\\ 2 & 0\end{bmatrix}$, $B=\begin{bmatrix}3 & -2\\ 1 & 1\end{bmatrix}$ and $C=\begin{bmatrix}1 & 1\\ 2 & 2\end{bmatrix}$, find a matrix X such that $AXB=C$.

20. Find the inverse of each of the following by Gauss-Jordan method

$$\begin{bmatrix}1 & 2 & 3\\ 2 & 5 & 3\\ 1 & 0 & 8\end{bmatrix}$$

21. Four men and 4 women can finish a piece of work jointly in 3 days while 2 men and 5 women can finish the same work jointly in 4 days. Find the time taken by one man alone and that of one woman alone to finish the same work by using matrix inversion method.

22. An amount of ` 65,000 is invested in three bonds at the rates of 6 8 %, % and 9% per annum respectively. The total annual income is ` 4,800. The income from the third bond is ` 600 more than that from the second bond. Determine the price of each bond. (Use Gaussian elimination method.)

23. Find the values of the real numbers x and y, if the complex numbers $(3-i)x-(2-i)y+2i+5$ and $2x+(-1+2i)y+3+2i$ are equal

24. Write $\frac{3+4i}{5-12i}$ in the $x+iy$ form, hence find its real and imaginary parts.

25. Find the square root of 6-8i

26. Obtain the condition that the roots of $x^3+px^2+qx+r=0$ are in A.P.

Section – D (3 X 5 = 15 M)
Answer All Question

27. a) Let z_1, z_2, and z_3 be complex numbers such that $|z_1|=|z_2|=|z_3|=r>0$ and $z_1+z_2+z_3\neq 0$. Prove that $\left|\frac{z_1z_2+z_2z_3+z_3z_1}{z_1+z_2+z_3}\right|=r$.

(or)

b) Find the product $\frac{3}{2}\left(\cos\frac{\pi}{3}+i\sin\frac{\pi}{3}\right)\cdot 6\left(\cos\frac{5\pi}{6}+i\sin\frac{5\pi}{6}\right)$ in rectangular from.

28.a) A family of 3 people went out for dinner in a restaurant. The cost of two dosai, three idlies and two vadais is ` 150. The cost of the two dosai, two idlies and four vadais is ` 200. The cost of five dosai, four idlies and two vadais is ` 250. The family has ` 350 in hand and they ate 3 dosai and six idlies and six vadais. Will they be able to manage to pay the bill within the amount they had

(or)

b) In a T20 match, a team needed just 6 runs to win with 1 ball left to go in the last over. The last ball was bowled and the batsman at the crease hit it high up. The ball traversed along a path in a vertical plane and the equation of the path is $y=ax^2+bx+c$ with respect to a xy -

coordinate system in the vertical plane and the ball traversed through the points $(10,8),(20,16),(40,22)$ can you conclude that the team won the match? Justify your answer. (All distances are measured in metres and the meeting point of the plane of the path with the farthest boundary line is (70,0)

29.a) The prices of three commodities A B , and C are ` x y , and z per units respectively. A person P purchases 4 units of B and sells two units of A and 5 units of C . Person Q purchases 2 units of C and sells 3 units of A and one unit of B . Person R purchases one unit of A and sells 3 unit of B and one unit of C . In the process, P Q , and R earn ` 15,000, ` 1,000 and ` 4,000 respectively. Find the prices per unit of A B , and C . (Use matrix inversion method to solve the problem.)

(or)

b) Solve the equation $(2x-3)(6x-1)(3x-2)(x-2)-5=0$.

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