SIR CV RAMAN COACHING CENTRE –IDAPPADI, SALEM – 2025

Xll- MATHS ,UNIT [1 ,2 AND 6] ,, MODEL QUESTION PAPER -2025

PREPARED BY Dr.G.THIRUMOORTHI,M.Sc,B.Ed,Ph.D ,PHYSICS

thiruphysics1994@gmail.com, 8610560810,8883610465

TOTAL MARK : 50M

SECTION – A (25 X 2 = 50M)

Answer any 25 questions

1. Find the inverse (if it exists) of the following $\begin{bmatrix} -2 & 4 \\ 1 & -3 \end{bmatrix}$
2. Prove that $t\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ is orthogonal
3. Verify the propert $\left(A^T\right)^{-1} = \left(A^{-1}\right)^T$ with $A = \begin{bmatrix} 2 & 9 \\ 1 & 7 \end{bmatrix}$.
4. Reduce the matrix $\begin{bmatrix} 3 & -1 & 2 \\ -6 & 2 & 4 \\ -3 & 1 & 2 \end{bmatrix}$ to a row-echelon form
5. Find the rank of the following matrices by minor method $\begin{bmatrix} 2 & -4 \\ -1 & 2 \end{bmatrix}$
6. Solve the following system of linear equations, using matrix inversion method: $5x+2y=3,\ 3x+2y=5$.
7. 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 ?
8. If A is non-singular, then A^{-1} is also non-singular and $(A^{-1})^{-1} = A$.
9. If A is a non-singular matrix of odd order, prove that $|\text{adj } A|$ is positive
10. If A is symmetric, prove that adj A is also symmetric
11. Simplify the following: $\sum_{n=1}^{10} i^{n+50}$
12. Evaluate the following if $z = 5-2i$ and $w = -1+3i$ (i) $z+w$
13. show that If $z_1 = 1-3i,\ z_2 = -4i$, and $z_3 = 5$, (i) $(z_1+z_2)+z_3 = z_1+(z_2+z_3)$

14. Find z^{-1}, if $z=(2+3i)(1-i)$.
15. . If $z=x+iy$ find the following in rectangular form. (i) $\mathrm{Re}(i\bar{z})$
16. Write the following in the rectangular form: (i) $\overline{(5+9i)+(2-4i)}$
17. Find the following (i) $\left|\overline{(1+i)}(2+3i)(4i-3)\right|$
18. Which one of the points $i, -2+i,$ and 3 is farthest from the origin?
19. Find the square root of $6-8i$.
20. Find the modulus of the following complex numbers (i) $(1-i)^{10}$
21. If $\vec{a}=-3\hat{i}-\hat{j}+5\hat{k}, \vec{b}=\hat{i}-2\hat{j}+\hat{k}, \vec{c}=4\hat{j}-5\hat{k}$, find $\vec{a}\cdot(\vec{b}\times\vec{c})$.
22. Show that the vectors $\hat{i}+2\hat{j}-3\hat{k}, 2\hat{i}-\hat{j}+2\hat{k}$ and $3\hat{i}+\hat{j}-\hat{k}$ are coplanar
23. If $\vec{a},\vec{b},\vec{c}$ are three vectors, prove that $[\vec{a}+\vec{c}, \vec{a}+\vec{b}, \vec{a}+\vec{b}+\vec{c}]=[\vec{a},\vec{b},\vec{c}]$.
24. The volume of the parallelepiped whose co terminus edges are $7\hat{i}+\lambda\hat{j}-3\hat{k}, \hat{i}+2\hat{j}-\hat{k}, -3\hat{i}+7\hat{j}+5\hat{k}$ is 90 cubic units. Find the value of λ.
25. If the vectors $a\hat{i}+a\hat{j}+c\hat{k}, \hat{i}+\hat{k}$ and $c\hat{i}+c\hat{j}+b\hat{k}$ are coplanar, prove that c is the geometric mean of a and b.
26. Show that the points (2, 3, 4), (1,4,5) – and (8,1,2) are collinear.
27. Find the acute angle between the planes $\vec{r}\cdot\left(2\hat{i}+2\hat{j}+2\hat{k}\right)=11$ and $4x-2y+2z=15$.
28. Prove that $[\vec{a}-\vec{b}, \vec{b}-\vec{c}, \vec{c}-\vec{a}]=0$.
29. If $\vec{a},\vec{b},\vec{c},\vec{d}$ are coplanar vectors, show that $(\vec{a}\times\vec{b})\times(\vec{c}\times\vec{d})=\vec{0}$.
30. Determine whether the three vector $2\hat{i}+3\hat{j}+\hat{k}, \hat{i}-2\hat{j}+2\hat{k}$ and $3\hat{i}+\hat{j}+3\hat{k}$ are coplanar

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