XII MATHS FULL PORTION -2025-E/M .

SIR .CV. RAMAN COACHING CENTRE – IDAPPADI, SALEM -637101

XII- MATHS FULL PORTION QUESTION PAPER [2& 3] -2025

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TOTAL MARK : 100 M TIME : 3 HRS

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SECTION – A (17 X 2 = 34 M)

I.ANSWER ANY 17 QUESTIONS .

1. Find the rank of the following matrices by minor method

$$\begin{bmatrix} 2 & -4 \\ -1 & 2 \end{bmatrix}$$

2. Simplify the following:

$$\sum_{n=1}^{10} i^{n+50}$$

3.

Which one of the points i, $-2+i$, and 3 is farthest from the origin?

4.Solve the equation $x^3-3x^2-33x+35=0$

5. Find $\tan^{-1}\left(-\sqrt{3}\right)$

6.A circle of radius 3 units touches both the axes. Find the equations of all possible circles formed in the general form

7 Find the vertex, focus, equation of directrix and length of the latus rectum of the following:

$y^2=16x$

8.Identify the type of conic section for each of the equations.

$11x^2-25y^2-44x+50y-256=0$

9. If $2\hat{i}-\hat{j}+3\hat{k},\ 3\hat{i}+2\hat{j}+\hat{k},\ \hat{i}+m\hat{j}+4\hat{k}$ are coplanar, find the value of m

10. Prove that $[\vec{a}-\vec{b},\ \vec{b}-\vec{c},\ \vec{c}-\vec{a}]=0$

11. If the volume of a cube of side length x is $v = x^3$ Find the rate of change of the volume with respect to x when $x = 5$ units

12. Compute the value of ' ' c satisfied by the Rolle's theorem for the function $f(x)=x^2(1-x)^2, x\in[0,1]$.

13. Evaluate $\lim_{x\to\infty}\left(\frac{e^x}{x^m}\right), m\in N$

14. Prove that the function $f(x)=x^2-2x-3$ is strictly increasing in $(2,\infty)$

15. Show that the percentage error in the n th root of a number is approximately 1/n times the percentage error in the number

16. Evaluate $\int_0^{\frac{\pi}{2}}(\sin^2 x+\cos^4 x)dx$

17. For each of the following differential equations, determine its order, degree (if exists)

$$y\left(\frac{dy}{dx}\right)=\frac{x}{\left(\frac{dy}{dx}\right)+\left(\frac{dy}{dx}\right)^3}$$

18. Find the differential equation for the family of all straight lines passing through the origin

19. Two balls are chosen randomly from an urn containing 6 white and 4 black balls. Suppose that we win ` 30 for each black ball selected and we lose ` 20 for each white ball selected. If X denotes the winning amount, find the values of X and number of points in its inverse images

20. Find the acute angle between the planes $\vec{r}\cdot(2\hat{i}+2\hat{j}+2\hat{k})=11$ and $4x-2y+2z=15$.

21. Prove that $[\vec{a}\times\vec{b}, \vec{b}\times\vec{c}, \vec{c}\times\vec{a}]=[\vec{a},\vec{b},\vec{c}]^2$.

22. If $\vec{a},\vec{b},\vec{c}$ are three vectors, prove that $[\vec{a}+\vec{c}, \vec{a}+\vec{b}, \vec{a}+\vec{b}+\vec{c}]=[\vec{a},\vec{b},\vec{c}]$.

23. Find the monic polynomial equation of minimum degree with real coefficients having $2-\sqrt{3}i$ as a root

24. Show that the equation $2x^2-6x+7=0$ cannot be satisfied by any real values of x.

25. Show that the equation $z^2=\bar{z}$ has four solutions.

SECTION – B (22 X 3= 66 M)

II.ANSWER ANY 22 QUESTIONS .

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

27. If $A=\begin{bmatrix}4 & 3\\ 2 & 5\end{bmatrix}$, find x and y such that $A^2+xA+yI_2=O_2$. Hence, find A^{-1}.

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

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

30.Find z^{-1}, if $z=(2+3i)(1-i)$

31.If $z_1=2-i$ and $z_2=-4+3i$, find the inverse of z_1z_2 and $\frac{z_1}{z_2}$.

32. Find the square roots of 5 – 12 i

33.Show that $|z+2-i|<2$ represents interior points of a circle. Find its centre and radius

34 Find the modulus and principal argument of the following complex numbers. $\sqrt{3}+i$

35.Solve the equation $6x^4-5x^3-38x^2-5x+6=0$ if it is known that $\frac{1}{3}$ is a solution.

36. Find the exact number of real zeros and imaginary of the polynomial $x^9+9x^7+7x^5+5x^3+3x$.

37.Find the principal value of $\sin^{-1}(2)$ if it exists.

38. For what value of x does $\sin x=\sin^{-1}x$?

39.Find the vertices, foci for the hyperbola $9x^2-16y^2=144$.

40. A concrete bridge is designed as a parabolic arch. The road over bridge is $40m$ long and the maximum height of the arch is $15m$. Write the equation of the parabolic arch.

41.Find the point of intersection of the lines $\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4}$ and $\frac{x-4}{5}=\frac{y-1}{2}=z$.

42 Find the distance between the planes $\vec{r}\cdot(2\hat{i}-\hat{j}-2\hat{k})=6$ and $\vec{r}\cdot(6\hat{i}-3\hat{j}-6\hat{k})=27$

43.Find the acute angle between the planes $\vec{r}\cdot(2\hat{i}+2\hat{j}+2\hat{k})=11$ and $4x-2y+2z=15$

44. Prove by vector method that if a line is drawn from the centre of a circle to the midpoint of a chord, then the line is perpendicular to the chord.

45. Find the magnitude and direction cosines of the torque of a force represented by $3\hat{i}+4\hat{j}-5\hat{k}$ about the point with position vector $2\hat{i}-3\hat{j}+4\hat{k}$ acting through a point whose position vector is $4\hat{i}+2\hat{j}-3\hat{k}$.

46.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 $\vec{a}\cdot(\vec{b}\times\vec{c})$.

47.Suppose X is the number of tails occurred when three fair coins are tossed once simultaneously. Find the values of the random variable X and number of points in its inverse images.

48.Two balls are chosen randomly from an urn containing 6 white and 4 black balls. Suppose that we win ` 30 for each black ball selected and we lose ` 20 for each white ball selected. If X denotes the winning amount, find the values of X and number of points in its inverse images.

49.Form the differential equation by eliminating the arbitrary constants A and B from $y = A\cos x + B\sin x$.

50 Find the differential equations of the family of all the ellipses having foci on the y -axis and centre at the origin.

51. Solve : $\frac{dy}{dx}=(3x+y+4)^2$.

52.Solve $\frac{dy}{dx}+2y=e^{-x}$.

53.Prove that among all the rectangles of the given area square has the least perimeter

54.Find the local maximum and minimum of the function x^2y^2 on the line $x+y=10$.

55. Evaluate the following limits, if necessary use l'Hôpital Rule $\lim_{x\to\infty}\left(1+\frac{1}{x}\right)^x$

56.Evaluate $\int_0^1 e^{-2x}(1+x-2x^3)\,dx$.

57.Evaluate the following $\int_0^{\frac{\pi}{2}} \sin^3\theta\cos^5\theta\,d\theta$

58.Find the differential equation of the family of (i) all non-vertical lines in a plane (ii) all nonhorizontal lines in a plane.

59.Two fair coins are tossed simultaneously (equivalent to a fair coin is tossed twice). Find the probability mass function for number of heads occurred.

60.The mean and variance of a binomial variate X are respectively 2 and 1.5. Find $P(X=0)$

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