

RTK
XII - Std

FIRST REVISION TEST - 2025

MATHEMATICS

Time : 3.00 Hrs

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Marks : 90

Part - I

Note : i. Answer all the questions :-

20 X 1 = 20

- If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ and $\lambda A^{-1} = A$ then the value of λ is
a) 17 b) 14 c) 19 d) 21
- 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) $2A^{-1}$
- 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) $2 |z|^2$
- If z is a complex number such that $|z - 2i| = |z + 2i|$, then the locus of z is
a) real axis b) imaginary axis c) circle d) ellipse
- If 3 and -2 are two roots of $6x^4 - 5x^3 - 38x^2 - 5x + 6 = 0$ then the other two roots are
a) -3, 2 b) $-\frac{1}{3}, \frac{1}{2}$ c) $-\frac{1}{3}, -\frac{1}{2}$ d) $\frac{1}{3}, \frac{-1}{2}$
- $\sin^{-1}(2\cos^2 x - 1) + \cos^{-1}(1 - 2\sin^2 x) = ?$
a) $\frac{\pi}{2}$ b) $\frac{\pi}{3}$ c) $\frac{\pi}{4}$ d) $\frac{\pi}{6}$
- If $|x| < 1$, then the value of $\sin(\tan^{-1} x)$ is
a) $\frac{x}{\sqrt{1-x^2}}$ b) $\frac{1}{\sqrt{1-x^2}}$ c) $\frac{1}{\sqrt{1+x^2}}$ d) $\frac{x}{\sqrt{1+x^2}}$
- If (11, 2) is one end of the diameter of the circle $x^2 + y^2 - 8x - 4y + c = 0$ then the other end of the diameter is
a) (3, 5) b) (-3, 2) c) (11, -8) d) (5, 3)
- The perpendicular distance 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
- If $p(x, y)$ is any point on the conic $16x^2 + 25y^2 = 400$ and F_1, F_2 are foci then the value of $PF_1 + PF_2$ is
a) 8 b) 6 c) 10 d) 12



11. $\lim_{x \rightarrow 0} \frac{x - \sin x}{x^2} =$
 a) 0 b) 1 c) 2 d) $\frac{1}{2}$
12. The volume of the parallelepiped whose coterminal edges are $\vec{a}, \vec{b}$ and $\vec{c}$ is 90 cubic units then the value of $[\vec{a} + \vec{b}, \vec{b} + \vec{c}, \vec{c} + \vec{a}]$ is θ
 a) 90 cubic units b) 8100 cubic units c) 180 cubic units d) 270 cubic units
13. The number which satisfy the Rolle's theorem for the function $f(x) = x^3 - 3x^2, x \in [0, 3]$
 a) 1 b) $\sqrt{2}$ c) $\frac{\sqrt{3}}{2}$ d) 2
14. If $f(x, y, z) = xy + yz + zx$ then the value of $f_x - f_z$
 a) $z - x$ b) $y - z$ c) $x - z$ d) $y - x$
15. $\int_0^1 (5x + 4) dx =$
 a) $\frac{5}{2}$ b) $\frac{9}{2}$ c) $\frac{13}{2}$ d) $\frac{15}{2}$
16. $\int_0^\infty e^{-3x} x^2 dx =$
 a) $\frac{7}{27}$ b) $\frac{5}{27}$ c) $\frac{4}{27}$ d) $\frac{2}{27}$
17. The solution of the differential equation $2x \frac{dy}{dx} - y = 3$ represents
 a) Straight lines b) Circles c) Parabola d) Ellipse
18. 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) $e^{-x} + e^{-y} = c$
19. Which of the following statement has truth value T.
 a) $\sin x$ is an even function
 b) Every square matrix is a non singular matrix
 c) Product of a complex number and its conjugate is purely imaginary
 d) $\sqrt{5}$ is an irrational number
20. If $f(x) = \begin{cases} 2x, & 0 \leq x \leq a \\ 0, & \text{other value of } x \end{cases}$ is a probability density function of a random variable x , then the value of a is
 a) 1 b) 2 c) 3 d) 4

PART - II

Note : 1. Answer seven questions. 2. Question number 30 is compulsory :- $7 \times 2 = 14$

21. Find the value of $\cos^{-1}\left(\cos\left(\frac{7\pi}{6}\right)\right)$.
22. Prove that $\begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$ is an orthogonal matrix.
23. Find the square root of $-5 - 12i$.
24. Find the foci of the hyperbola $9x^2 - 16y^2 = 144$.
25. Find the acute angle between the two straight lines. $2x = 3y = z$ and $6x = -y = -4z$.
26. If $g(x, y) = xe^y + 3x^2 y$ then find g_{xx} .
27. Evaluate $\int_{-\pi/2}^{\pi/2} x^3 \cos x dx$.
28. If $y = e^{mx}$ is a solution of the differential equation $y' + 2y = 0$ then find the value of m .
29. An unbiased coin is tossed 100 times of the random variable X represents the number of heads appears then find the mean of x using Binomial distributions.
30. Verify that whether the binary operation is defined as $a * b = a^b, \forall a, b \in N$ has associative property?

Part - III

Note : 1. Answer any seven questions.

2. Question number 40 is compulsory :-

$7 \times 3 = 21$

31. Find the rank of the matrix $\begin{bmatrix} 2 & -2 & 4 & 3 \\ -3 & 4 & -2 & -1 \\ 6 & 2 & -1 & 7 \end{bmatrix}$ by reducing it to a row echelon form.
32. If $|z| = 3$ then show that $7 \leq |z + 6 - 8i| \leq 13$.
33. Solve $x^3 - 5x^2 - 4x + 20 = 0$.
34. Find the centre and radius of the circle $3x^2 + (a + 1)y^2 + 6x - 9y + a + 4 = 0$.
35. Find the equation of the plane which passes through $(3, 4, -1)$ and parallel to the plane $2x - 3y + 5z + 7 = 0$ and find the distance between these planes.
36. Solve $\frac{dy}{dx} = e^{x+y} + x^2 e^{x^3+y}$.
37. Prove that $f(x) = x - \sin x$ is an increasing function in the real number line R . and the absolute maximum and absolute minimum.
38. Show that $p \rightarrow q$ and $q \rightarrow p$ are not equivalent.
39. If the mean and variance of a binomial random variable X and 2 and 1.5 respectively then find the value of $p(X = 0)$.

40. Evaluate $\int_0^1 |5x-3| dx$.

PART - IV

Note : Answer all the questions :-

7 X 5 = 35

41. a) Solve $6x^4 - 35x^3 + 62x^2 - 35x + 6 = 0$. (OR)
 b) Find the Maclaurin's expansion for $\log(1+x)$ in $-1 < x \leq 1$ up to four non zero terms.
42. a) Investigate for what values of λ and μ the system of linear equations $x+2y+z=7$, $x+y+\lambda z=\mu$, $x+3y-5z=5$ has (i) no solution (ii) a unique solution (iii) an infinite number of solutions: (OR)
 b) Find all cube roots of $\sqrt{3} + i$.
43. a) Find the vertices and foci of the hyperbola $4x^2 - 24x - 25y^2 + 250y - 489 = 0$. (OR)
 b) Find the non parametric vector and Cartesian equations of a plane which passes through $(1, -2, 4)$ and perpendicular to the plane $x + 2y - 3z = 11$ and parallel to the straight line $\frac{x+7}{3} = \frac{y+3}{-1} = \frac{z}{1}$.
44. a) The equation of electromotive force for an electric circuit containing resistance and self inductance is $E = Ri + L \frac{di}{dt}$, where E is the electromotive force is given to the circuit, R the resistance and L, the coefficient of induction. Find the current i at time t when $E = 0$. (OR)
 b) Prove by vector method that $\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$
45. a) Find the absolute extrema of the function $f(x) = 3x^4 - 4x^3$ on the given interval $[-1; 2]$. (OR)
 b) Find the area of the region bounded by $y = \cos x$, $y = \sin x$, the lines $x = \frac{\pi}{4}$ and $x = \frac{5\pi}{4}$.
46. a) If $u = \sec^{-1} \left(\frac{x^3 - y^3}{x + y} \right)$ then prove that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 2 \cot u$. (OR)
 b) Prove that $P \rightarrow (\neg q \vee r) \equiv \neg P \vee (\neg q \vee r)$ by using truth table.
47. a) If $f(x) = \begin{cases} ke^{-x/3}, & x > 0 \\ 0, & x \leq 0 \end{cases}$ is a probability density function of a random variable X, then find.
 i) the value of K. ii) the distribution function of X. (OR)
 b) Evaluate $\sin \left(\sin^{-1} \left(\frac{3}{5} \right) + \sec^{-1} \left(\frac{5}{4} \right) \right)$.