FIRST REVISION TEST - 2025

☆ **Standard XII** Reg.No. □□□□□□

MATHEMATICS

Time : 3.00 hrs **Part – I** *Marks : 90*

I. Choose the correct answer: **20 x 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. 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 solution if

   a) $\lambda = 7, \mu \neq -5$ b) $\lambda = -7, \mu = 5$ c) $\lambda \neq 7, \mu \neq -5$ d) $\lambda = 7, \mu = -5$

3. The polynomial $x^3 + 2x + 3$ has

   a) on negative and two real roots b) One positive and two imaginary roots
   c) three real roots d) no solution

4. The number of real numbers in $[0,2\pi]$ satisfying $\sin^4 x - 2\sin^2 x + 1$ is

   a) 2 b) 4 c) 1 d) ∞

5. If $\sin^{-1}x + \sin^{-1}y = \frac{2\pi}{3}$ then $\cos^{-1}x + \cos^{-1}y$ is

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

6. If z is a complex number such that $z \in C\backslash R$ and $z + \frac{1}{z} \in R$ then $|z|$ is

   a) 0 b) 1 c) 2 d) 3

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

   a) $2x + 1 = 0$ b) $x = -1$ c) $2x - 1 = 0$ d) $x = 1$

8. The y-intercept of the straight line passing through (1,3) and perpendicular to $2x - 3y + 1 = 0$ is

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

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

   a) $\frac{1}{e}$ b) $\frac{1}{2e}$ c) $\frac{1}{e^2}$ d) $\frac{4}{e^4}$

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

    a) $-4\sqrt{3}$ b) -4 c) $\frac{\sqrt{3}}{12}$ d) $4\sqrt{3}$

11. If we measure the side of a cube to be 4 cm with an error of 0.1cm 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
12. If $f(x, y, z) = xy + yz + zx$, $f_x - f_z$ is equal to
a) $z - x$ b) $y - z$ c) $x - z$ d) $y - x$
13. The solution of $\frac{dy}{dx} + Py = 0$ is
a) $y = ce^{\int P dx}$ b) $y = ce^{-\int P dx}$ c) $x = ce^{\int P dy}$ d) $x = ce^{-\int P dy}$
14. The solution of the differential equation $2x\frac{dy}{dx} - y = 3$
a) straight lines b) circle c) parabola d) ellipse
15. 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
16. 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 value of k
a) ±3 b) ±6 c) –3, 9 d) 3, –9
17. 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
18. If $P(X = 0) = 1 - P(X = 1)$, if $E(X) = 3\, Var(X)$ then $P(X = 0)$ is
a) $2/3$ b) $2/5$ c) $1/5$ d) $1/3$
19. The operation * defined by $a * b = \frac{ab}{7}$ is not a binary operation on
a) Q^+ b) Z c) R d) C
20. If a compound statement involves 3 simple statements, then the number of rows in the truth table is
a) 9 b) 8 c) 6 d) 3

Part - II

II. **Answer any 7 questions. (Q.No.30 is compulsory)** 7 x 2 = 14

21. Find the rank of the matrices by minor method $\begin{bmatrix} 1 & -2 & -1 & 0 \\ 3 & -6 & -3 & 1 \end{bmatrix}$
22. Simplify $i^1 i^2 i^3 \ldots\ldots\ldots\, i^{2000}$
23. If $y = 2\sqrt{2x} + c$ is the tangent to the circle $x^2 + y^2 = 16$, find the value of c
24. Find a polynomial equation of minimum degree with rational coefficients having 2i+3 as a root
25. Find the distance between the parallel lines $12x + 5y = 7$ and $12x + 5y + 7 = 0$
26. Write the maculaurin series expansion of the function e^x
27. Show that the differential equation of the family of curves $y = Ae^x + Be^{-x}$ where A and B are arbitrary constant is $y'' - y = 0$

28. Solve : $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$

29. Determine whether the function is homogeneous or not .If it so, find the degree of $f(x, y) = x^2y + 6x^3 + 7$

30. Let $A = \begin{pmatrix} 0 & 1 \\ 1 & 1 \end{pmatrix}, B = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$ be two Boolean matrices of the same type .Find $A \wedge B, A \vee B$

Part - III

III. Answer any 7 questions. (Q.No.40 is compulsory) **7 x 3 = 21**

31. If $|z| = 3$, show that $7 \leq |z + 6 - 8i| \leq 13$
32. Prove that a straight line and parabola cannot intersect at more than two points.
33. Show that $y = ae^{-3x} + b$, where a and b are arbitrary constants, is a solution of the differential equation $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} = 0$
34. If $u(x, y, z) = \log(x^3 + y^3 + z^3)$, find $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z}$
35. A particle moves so that the distance moved is according to the law $s(t) = \frac{t^3}{3} - t^2 + 3$. At what time the velocity and acceleration are zero.
36. Find the magnitude and the direction cosines of the torque about the point (2,0,–1) of a force $2\hat{i} + \hat{j} - \hat{k}$ whose line of action passes through the origin.
37. Evaluate : $\int_{-4}^{4} |x + 3|\, dx$
38. If $x \sim B(n, p)$ such that $4p(x = 4) = p(x = 2)$ and n=6. Find the distribution mean and standard deviation of x.
39. Show that $p \to q$ and $q \to p$ are not equivalent.
40. Find the inverse of $\begin{vmatrix} 2 & -1 \\ 5 & -2 \end{vmatrix}$ by Gauss–Jordan method

Part - IV

IV. Answer all the questions. **7 x 5 = 35**

41. a) On lighting a rocket cracker it gets projected in a parabolic path and reaches a maximum height of 4m when it is 6m away from the point of projection. Finally it reaches the ground 12m away from the starting point. Find the angle of projection.

(OR)

b) Evaluate : $\lim_{x \to \pi/2} (\sin x)^{\tan x}$

42. a) If $u = \sin^{-1}\left[\frac{x+y}{\sqrt{x}+\sqrt{y}}\right]$ show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{1}{2}\tan u$ *(OR)*

b) Solve : $\left(1+2e^{x/y}\right)dx + 2e^{x/y}\left(1-\frac{x}{y}\right)dy = 0$

43. a) If $z = x + iy$ and $\arg\left(\frac{z-i}{z+2}\right) = \frac{\pi}{4}$, show that $x^2 + y^2 + 3x - 3y + 2 = 0$

(OR)

b) Find the area of the region bounded between the curves $y = \sin x$ and $y = \cos x$ and the lines $x = 0$ and $x = \pi$

44. a) Find the non–parametric form of vector equation and Cartesian equation of the plane passing through the point (1, –2, 4) and perpendicular to the plane $x + 2y - 3z = 11$ and parallel to the line $\frac{x+7}{3} = \frac{y+3}{-1} = \frac{z}{1}$

(OR)

b) A multiple choice examination has ten questions, each question has four distractors with exactly one correct answer. Suppose a student answers by guessing and if x denotes the number of correct answers find (i) binomial distribution (ii) probability that the student will get seven correct answers (iii) the probability of getting at least one correct answer.

45. a) Solve : $(2x - 1)(x + 3)(x - 2)(2x + 3) + 20 = 0$

(OR)

b) Identify the type of conic and find centre, foci, vertices, and directrices of $18x^2 + 12y^2 - 144x + 48y + 120 = 0$

46. a) Solve $\cot^{-1}x - \cot^{-1}(x+2) = \frac{\pi}{12}$, $x > 0$

(OR)

b) Prove that the ellipse $x^2 + 4y^2 = 8$ and the hyperbola $x^2 - 2y^2 = 4$ intersect orthogonally

47. a) Prove by vector method that the perpendiculars (attitudes) from the vertices to the opposite sides of a triangle are concurrent.

(OR)

b) A boy is walking along the path $y = ax^2 + bx + c$ through the points (–6, 8) (–2, –12) and (3, 8). He wants to meet his friend at P(7, 60) will be meet his friend? (use Gaussian elimination method).

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