

MATHEMATICS-I(B)
Pre final Examination -2026
SET-B

Time:3Hours

Max.Marks:75

SECTION-A

10×2=20

I. Very Short Answer Type Question:

- (i) Answer All questions.
(ii) Each question carries TWO marks.

1. Find the value of y , if the line joining $(3, y)$ and $(2, 7)$ is parallel to the line joining the points $(-1, 4)$ and $(0, 6)$
2. Find the length of the perpendicular drawn from the point $(3, 4)$ to the line $3x - 4y + 10 = 0$.
3. The centroid of the triangle whose vertices are $(5, 4, 6)$, $(1, -1, 3)$ and $(4, 3, 2)$
4. Find the equation of the plane whose intercept X, Y, Z - axes are $1, 2, 4$ respective .
5. Compute $\lim_{x \rightarrow 3} \frac{e^x - e^3}{x - 3}$
6. Compute $\lim_{x \rightarrow \infty} \frac{3x^2 + 4x + 5}{2x^3 + 3x - 7}$
7. Find the derivative of $x \tan^{-1} x$
8. Find the derivative of $\log(\sin^{-1}(e^x))$
9. Find dy and Δy of $y = 5x^2 + 6x + 6$ at $x = 2$ when $\Delta x = 0.001$
10. Verify Rolle's Theorem for the function $y = f(x) = x^2 - 1$ on $[-1, 1]$.

SECTION-B

5×4=20

II. Short Answer Type Question:

- (i) Answer Any FIVE questions.
(ii) Each question carries FOUR marks

11. Find the equation of locus of a point P such that the distance of P from the origin is twice the distance of p from $A(1, 2)$
12. When the axes are rotated through an angle 45° , the transformed equation of a curve is $17x^2 - 16xy + 17y^2 = 225$. Find the original equation of the curve
13. Find the value of x , If the slope of the line passing through $(2, 5)$ and $(x, 3)$ is 2 .
14. Compute $\lim_{x \rightarrow 0} \frac{1 - \cos(mx)}{1 - \cos(nx)}$
15. Find the derivative of $ax^2 + bx + c$ from the first principle
16. The diameter of the sphere is measured to be 40 cm . If an error of 0.02 cm is made in it , then Find the approximate error in volume and surface area of the sphere
17. At time t , the distance s of a particle moving in a straight line is given by $S = -4t^2 + 2t$. Find the average velocity between $t = 2$ sec and $t = 8$ sec

SECTION-C

5×7=35

III. Long Answer Type Question:

(i) Answer **Any FIVE** questions.

(ii) Each question carries **SEVEN** marks

18. If p and q are the lengths of the perpendiculars from the origin to the straight lines $x \sec(\alpha) + y \operatorname{cosec}(\alpha) = a$ and $x \cos(\alpha) - y \sin(\alpha) = a \cos 2\alpha$, prove that $4p^2 + q^2 = a^2$
19. Show that the product of the perpendicular distance from the origin to the pair of straight lines represented by $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$ is $\frac{|c|}{\sqrt{(a-b)^2 + 4h^2}}$
20. Find the condition for the chord $lx + my = 1$ of the circle $x^2 + y^2 = a^2$ (whose centre is the origin) to subtend a right angle at the origin.
21. Find the angle between two diagonals of a cube
22. If $x^y + y^x = a^b$ then $\frac{dy}{dx} = - \left[\frac{yx^{y-1} + y^x \log y}{x^y \log x + xy^{x-1}} \right]$
23. Find the angle between the curves $x+y+2=0$, $x^2 + y^2 - 10y = 0$
24. If the curved surface of right circular cylinder inscribed in a sphere of radius r is maximum show that the height of the cylinder is $\sqrt{2} r$