

Aimstutorial Model guess paper-3

MATHS - 1B

(Board of Intermediate Education Model Paper)

SECTION - A

I. Answer ALL the following Very Short Answer Questions:

[10 x 2 = 20]

1. Transform the equation $\sqrt{3}x + y = 4$ in to (i) slope intercept form (ii) Intercept form
2. Find the value of P if the straight lines $3x + 7y - 1 = 0$ and $7x - py + 3 = 0$ are mutually perpendicular.
3. Show that the points $(1, 2, 3)$, $(7, 0, 1)$, $(-2, 3, 4)$ are collinear.
4. Reduce the equation $x + 2y - 3z - 6 = 0$ of the plane to the normal form.
5. Compute the limit of $\lim_{x \rightarrow 3} \frac{x^2 - 8x + 15}{x^2 - 9}$
6. Evaluate $\lim_{x \rightarrow 0} \frac{e^x - \sin x - 1}{x}$
7. Find the derivative of $\sin^{-1}(3x - 4x^3)$ with respect of 'x'
8. If $2x^2 - 3xy + y^2 + x + 2y - 8 = 0$ then find $\frac{dy}{dx}$.
9. Find dy and Δy of $y = f(x) = x^2 + x$ at $x = 10$ when $\Delta x = 0.1$
10. Find the length of subtangent at a point on the curve $y = b \sin\left(\frac{x}{a}\right)$

SECTION - B

II. Answer any FIVE of the following Short Answer Questions:

[5 x 4 = 20]

11. Find the equation of locus of a point, the sum of whose distance from $(0, 2)$ and $(0, -2)$ is 6.
12. When the origin is shifted to the point $(2, 3)$ the transformed equation of a curve is $x^2 + 3xy - 2y^2 + 17x - 7y - 11 = 0$. Find the original equation of curve.
13. Find the equation of the straight line parallel to the line $3x + 4y = 7$ and passing through the point of intersection of the lines $x - 2y - 3 = 0$, $x + 3y - 6 = 0$.
14. Check the continuity of 'f' given by $f(x) = \begin{cases} 4 - x^2 & \text{if } x \leq 0 \\ x - 5 & \text{if } 0 < x \leq 1 \\ 4x^2 - 9 & \text{if } 1 < x < 2 \\ 3x + 4 & \text{if } x \geq 2 \end{cases}$ at points $x = 0, 1, 2$
15. $X = a(\cos t + \sin t)$, $y = a(\sin t - t \cos t)$ find $\frac{dy}{dx}$.
16. Find the equation of tangent and normal to the curve $y = 2 \cdot e^{\frac{-x}{3}}$ at the point where the curve meets the Y - axis.
17. A point P is moving on the curve $y = 2x^2$. The x coordinates of P is increasing at the rate of 4 units per second. Find the rate at which y co-ordinates is uncreasing when the point is at $(2, 8)$.

SECTION - C

III. Answer any FIVE of the following Long Answer Questions. :

[5 x 7 = 35]

18. The base of an equilateral triangle is $x+y-2=0$ and opposite vertex is $(2,-1)$ Find the equation of the remaining sides.
19. If the second degree equation $S \equiv ax^2+2hxy+by^2+2gx+2fy+c=0$ in two variables x and y represents a pair of straight lines, then prove that. (a) $abc+2fgh-af^2-bg^2-ch^2=0$ (b) $h^2 \geq ab$, $f^2 \geq bc$, $g^2 \geq ac$.
20. Find the lines joining the origin with the points of intersection of the curve $7x^2-4xy+8y^2+2x-4y-8=0$ with the straight line $3x-y=2$ and also the angle between them.
21. Find the direction cosines of the two lines which are connected by the relations $l-5m+3n=0$, $7l^2+5m^2-3n^2=0$.

22. If $x^y+y^x=a^b$ then prove that $\frac{dy}{dx} = - \left[\frac{yx^{y-1} + y^x \log y}{x^y \log x + xy^{x-1}} \right]$

23. 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 $\sqrt{2} r$.

24. If $ax^2+by^2=1$, $a_1x^2+b_1y^2=1$, then show that the condition for orthogonality of above curves is

$$\frac{1}{a} - \frac{1}{b} = \frac{1}{a_1} - \frac{1}{b_1}$$
