

# Aimtutorial MODEL PAPER - 2

## MATHS - 1B

(Board of Intermediate Education Model Paper)

### SECTION - A

**I. Answer ALL the following Very Short Answer Questions: [10 x 2 = 20]**

1. Find the equation of the straight line passing through the origin and making equal angles with the co-ordinated axes.
2. If the product of the intercepts made by the straight line  $x \tan \alpha + Y \sec \alpha = 1$  on the co-ordinates axes is equal to  $\sin \alpha$ , find  $\alpha$ .
3. If  $M(\alpha, \beta, \gamma)$  is the mid point of the line segment joining the points  $A(x_1, y_1, z_1)$  and B then find B.
4. Find the equation of the plane passing through the point (2,3,4) and perpendicular to the X-axis.
5. Evaluate  $\lim_{x \rightarrow \infty} (\sqrt{x^2 + x} - x)$
6. Evaluate  $\lim_{x \rightarrow \infty} \frac{e^x - 1}{\sqrt{1+x} - 1}$
7. Find the derivative of  $\log \left( \frac{x^2 + x + 2}{x^2 - x + 2} \right)$  w.r. to x
8. If  $y = (\cot^{-1} x^3)^2$  then find  $\frac{dy}{dx}$
9. Find the approximate value of  ${}^4\sqrt{17}$
10. Show that there is no real number K, for which the equation  $x^2 - 3x + k = 0$  has two distinct roots in  $[0, 1]$ .

### SECTION - B

**II. Answer any FIVE of the following Short Answer Questions: [5 x 4 = 20]**

11. Find the equation of locus of P, If the ratio of the distances from P to A(5, -4) and B(7,6) is 2:3.
12. Show that the axes are to be rotated through an angle of  $\frac{1}{2} \tan^{-1} \left( \frac{2h}{a-b} \right)$  so as to remove the xy term from the equation an angle  $ax^2 + 2hxy + by^2 + 0$
13. Find the value of K if the angle between the straight lines  $4x - y + 7 = 0$ ,  $Kx - 5y - 9 = 0$  is  $45^\circ$
14. Is the function f defined by  $f(x) = \begin{cases} x^2 & \text{if } x \leq 1 \\ x & \text{if } x > 1 \end{cases}$  continuous on R?
15. Find the derivative of  $\cos^2 X$  from the first principle.
16. The volume of a cube is increasing at a rate of 9 cubic centimeters per second. How fast is the surface area increasing when the length of the edge is 10 centimeters?
17. Find the equation of the tangent to the curve  $y = 3x^2 - x^3$ , where it meets the x-axis.

**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 the opposite vertex is  $(2,-1)$ . Find the equation of the remaining sides.

19. Prove that the product of the perpendicular from  $(\alpha, \beta)$  to  $ax^2+2hxy+by^2=0$  is  $\frac{|a\alpha^2 + 2h\alpha\beta + b\beta^2|}{\sqrt{(a-b)^2 + 4h^2}}$

20. Show that the equation  $8x^2-24xy+18y^2-6x+9y-5=0$  represents a pair of parallel straight lines and find the distance between them.

21. Show that the lines whose direction cosines are given by  $l+m+n=0$ ,  $2mn+3nl-5lm=0$  are perpendicular to each other.

22. Show that the derivatives of  $\sin^{-1}\sqrt{\frac{x-b}{a-b}}$  and  $\tan^{-1}\sqrt{\frac{x-b}{a-x}}$  are equal.

23. Find the angle between the curves  $2y^2-9x=0$ ,  $3x^2+4y=0$  (in the 4<sup>th</sup> quadrant).

24. Prove that the radius of the right circular cylinder of greatest curved surface area which can be inscribed in a given cone is half of that of the cone.

\*\*\*\*\*