BOARD OF INTERMEDIATE EDUCATION

JUNIOR INTER MATHEMATICS PAPER – I (B)

MODEL PAPER (ENGLISH VERSION)

TIME: 3 HOURS MAX.MARKS: 75

SECTION – A

I. i) Very Short Answer Type questions.

ii) Answer ALL questions.

ii) Each question carries TWO marks. $10 \times 2 = 20$

1. Find the equation of the straightline passing through the points $\left(at_1^2, 2at_1\right)$ and $\left(at_2^2, 2at_2\right)$.

2. Find the area of the triangle formed by the straight line $3x - 4y + 12 = 0$ with coordinate axes.

3. Find x, if the distance between $(5, -1, 7)$ and $(x, 5, 1)$ is 9 units.

4. Find the angle between the planes $x + 2y + 2z - 5 = 0$ and $3x + 3y + 2z - 8 = 0$.

5. $\underset{x \to 0}{Lt} \dfrac{\sin (a + bx) - \sin (a - bx)}{x}$

6. Find $\underset{x \to \infty}{Lt} \dfrac{8|x| + 3x}{3|x| - 2x}$

7. If $f(x) = log (\sec x + \tan x)$ then find $f'(x)$.

8. $y = ax^{n+1} + bx^{-n}$ then prove that $x^2 y = n(n + 1)y$.

9. Find the approximate value of $\sqrt{82}$.

10. Find the value of C in Rolles theorem for the fusion $y = f(x) = x^2 + 4$ on $[-3, 3]$.

SECTION – B

II. i) Short Answer Type questions.

ii) Answer any FIVE questions.

iii) Each question carries FOUR marks. $5 \times 4 = 20$

11. Find an equation of locus of P, if the ratio of the distance from P to $(5, -4)$, $(7, 6)$ is 2 : 3.

12. When the axes are rotated through an angle $\dfrac{\pi}{4}$ find the original equation of $17x^2 - 16xy + 17y^2 = 225$.

13. $ax + by + c = 0$, $bx + cy + a = 0$, $cx + ay + b = 0$ are concurrent then show that $a^3 + b^3 + c^3 = 3$ abc.

14. If 'f' is given by $f(x) = \begin{cases} K^2 x - K & \text{if } x \geq 1, \\ 2 & \text{if } x < 1 \end{cases}$ is a continous function on R find the value of K.

15. Find the derivative of the function $f(x) = \tan 2x$ from the first principle.

16. Find the equation of tangent and normal to the curve $xy = 10$ at $(2, 5)$.

17. Show that at any point (x, y) on the curve $y = be^{x/a}$ the lengths of the sub tangent is a constant and the length of sub normal is $\dfrac{y^2}{a}$.

SECTION – C

III. **i) Long Answer Type questions.**

ii) Answer any FIVE questions.

iii) Each question carries SEVEN marks. **5 × 7 = 35**

18. Find the orthocentre of the triangle with the vertices (–5, –7), (13, 2), (–5, 6).

19. Show that the line joining the origin to the point of intersection of the curve
    $x^2 - xy + y^2 + 3x + 3y - 2 = 0$ and the straight line $x - y - \sqrt{2} = 0$ are mutually perpendicular.

20. Show that the area of the triangle formed by the lines $ax^2 + 2hxy + by^2 = 0$ and $lx + my + n = 0$ is
    $$\left| \frac{n^2 \sqrt{h^2 - ab}}{am^2 - 2hlm + bl^2} \right|$$

21. Find the angle between two diagonals of a cube.

22. If $\sqrt{1 - x^2} + \sqrt{1 - y^2} = a(x - y)$ then show that $\dfrac{dy}{dx} = \sqrt{\dfrac{1 - y^2}{1 - x^2}}$

23. Find the angle between the curves $y^2 = 4x$, $x^2 + y^2 = 5$.

24. Find two +ve integers x and y such that x + y = 60 and xy^3 is maximum.