

BOARD OF INTERMEDIATE EDUCATION (AP)

JUNIOR INTER MATHEMATICS – IB

MODEL PAPER

Time: 3 hours

Max. Marks: 75

SECTION – A

I. i) Very short answer type questions.

ii) Answer ALL questions.

iii) Each question carries TWO marks.

10 × 2 = 20

1. Find the slopes of the lines $x + y = 0$, $x - y = 0$.
2. Find the sum of the squares of the intercepts of the line $4x - 3y = 12$ on the coordinate axis.
3. Show that the points (1 2 3) (2 3 1) (3 1 2) form an equilateral triangle.
4. Find the angle between the planes $2x - y + z = 6$, $x + y + 2z = 7$.
5. Compute $\lim_{x \rightarrow 0} \frac{e^{7x} - 1}{x}$.
6. Compute $\lim_{x \rightarrow \infty} \frac{x^2 + 5x + 2}{2x^2 - 5x + 1}$.
7. Find the derivative of $5 \sin x + e^x \log x$.
8. If $y = x^4 + \tan x$ then find y^{11} .
9. Find the approximate value of $\sqrt[3]{65}$.
10. Find the value of 'C' in Rolle's theorem for the function $f(x) = (x - 1)(x - 2)(x - 3)$ on $[1, 3]$.

SECTION – B

II. i) Short answer type questions.

ii) Answer any FIVE questions.

iii) Each question carries FOUR marks.

5 × 4 = 20

11. If $A = (5 \ -4)$, $B = (7 \ 6)$ and P is any point in which $PA : PB = 2 : 3$ then find the locus of 'P'.
12. Find the transformed equation of $x \cos \alpha + y \sin \alpha = p$ when axes are rotated through an angle ' α '.
13. Find the value of 'k' if angle between the lines $4x - y + 7 = 0$ and $kx - 5y - 9 = 0$ is 45° .
14. Verify the continuity of the function $f(x) = \begin{cases} \frac{x^2 - 9}{x^2 - 2x - 3} & 0 < x < 5 \\ 3/2 & x = 3. \end{cases}$ at $x = 3$.
15. Find the derivative of $\tan 2x$ from the first principle.
16. The volume of a cube is increasing at the rate of $8 \text{ cm}^3/\text{sec}$. How fast is the surface area increasing when the length of an edge is 12 cm.

17. Find the lengths of subtangent, subnormal at a point 't' on the curve $x = a (\cos t + t \sin t)$, $y = a (\sin t - t \cos t)$.

SECTION - C

III. i) Long answer type questions.

ii) Answer any FIVE questions.

iii) Each question carries SEVEN marks.

5 × 7 = 35

18. Find circumcenter of the triangle formed by the lines $x + y + 2 = 0$, $5x - y - 2 = 0$, $x - 2y + 5 = 0$.
19. Show that the product of the perpendicular distances from a point (α, β) to the pair of lines $ax^2 + 2hxy + by^2 = 0$ is $\frac{|a\alpha^2 + 2h\alpha\beta + b\beta^2|}{\sqrt{(a-b)^2 + 4h^2}}$.
20. $lx + my = 1$ is a chord of the circle $x^2 + y^2 = a^2$ with centre $(0, 0)$. Find the condition that the chord subtends right angle at the centre of circle.
21. The vertices of a triangle ABC are $A(1, 4, 2)$, $B(-2, 1, 2)$ and $C(2, 3, -4)$ then find $\angle A$, $\angle B$, $\angle C$.
22. If $y = x^{\tan x} + \sin x^{\cos x}$ then find $\frac{dy}{dx}$.
23. If the tangent at any point on the curve $x^{2/3} + y^{2/3} = a^{2/3}$ intersects the coordinate axes at A, B then show that the length AB is a constant.
24. From a rectangular sheet of dimensions 30 cm × 80 cm, four equal squares of side 'x' cm are removed at the corners and the sides are then turned up so as to form an open rectangular box. Find the value of 'x' so that the volume of the box is maximum.

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