

BOARD OF INTERMEDIATE EDUCATION (AP)

HALF YEARLY EXAMINATIONS - 2021

JUNIOR INTER MATHEMATICS - IB

MODEL PAPER (English Version)

Time: 3 Hours

Max.Marks: 75

SECTION - A

Note: i) Very short answer type questions.

10 × 2 = 20

ii) Answer All questions.

iii) Each question carries Two marks.

1. Find the value of x, if the slope of the line passing through (2, 5) and (2, 3) is 2.
2. Find the sum of the squares of the intercepts of the line $4x - 3y = 12$ on the axes of co-ordinates.
3. Show that the points A (3, -2, 4), B (1, 1, 1) and C (-1, 4, -2) are collinear.
4. If (3, 2, -1), (4, 1, 1) and (6, 2, 5) are three vertices and (4, 2, 2) is the centroid of a tetrahedron, find the fourth vertex.
5. Find the ratio in which the XZ - plane divides the line joining A (-2, 3, 4) and B (1, 2, 3).
6. Find the equation of the plane whose intercepts on X, Y, Z - axes are 1, 2, 4 respectively.
7. Show that $2x + 3y + 7 = 0$ represents a plane perpendicular to XY - plane.
8. Compute $\lim_{x \rightarrow 0} x^2 \cos \frac{2}{x}$
9. Show that $\lim_{x \rightarrow 0^+} \left(\frac{2|x|}{x} + x + 1 \right) = 3$
10. Compute $\lim_{x \rightarrow \infty} \frac{11x^3 - 3x + 4}{13x^3 - 5x^2 - 7}$

SECTION - B

Note: i) Short answer type questions.

5 × 4 = 20

ii) Answer any Five questions.

iii) Each question carries Four marks.

11. Find the equation of the locus of P, if the ratio of the distances from P to A (5, -4) and B (7, 6) is 2 : 3.
12. A (5, 3) and B (3, -2) are two fixed points. Find the equation of the locus of P, so that the area of triangle PAB is 9.
13. A (1, 2), B (2, -3) and C (-2, 3) are three points. A point P moves such that $PA^2 + PB^2 = 2 PC^2$. Show that the equation to the locus of P is $7x - 7y + 4 = 0$.
14. Transform the equation $3x + 4y + 12 = 0$ into
 - i) slope - intercept form
 - ii) intercept form and
 - iii) normal form

15. Find the equation of the straight lines passing through (1, 3) and
 i) Parallel to
 ii) Perpendicular to the line passing through the points (3, -5) and (-6, 1).

16. Compute $\lim_{x \rightarrow 0} \left(\frac{\cos ax - \cos bx}{x^2} \right)$

17. Find real constants a, b so that the function f given by

$$f(x) = \begin{cases} \sin x, & \text{if } x \leq 0 \\ x^2 + a, & \text{if } 0 < x < 1 \\ bx + 3, & \text{if } 1 \leq x \leq 3 \\ -3, & \text{if } x > 3 \end{cases} \text{ is continuous on } \mathbb{R}.$$

SECTION - C

Note: i) Long answer questions.

5 × 7 = 35

ii) Answer any Five questions.

iii) Each question carries Seven marks.

18. Find the circumcenter of the triangle whose vertices are (1, 3), (-3, 5) and (5, -1).
 19. Find the orthocenter of the triangle formed by two lines $x + 2y = 0$, $4x + 3y - 5 = 0$.
 20. Prove that the equation $2x^2 + xy - 6y^2 + 7y - 2 = 0$ represents a pair of straight lines.
 21. Show that the lines joining the origin to the points 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.
 22. 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.
 23. Find the direction cosines of two lines which are connected by the relations $l - 5m + 3n = 0$ and $7l^2 + 5m^2 - 3n^2 = 0$.
 24. Find the direction cosines of the sides of the triangle whose vertices are (3, 5, -4), (-1, 1, 2) and (-5, -5, -2).

Writer: U. Prasanna Kumar