



IPE MODEL :: MATHS-IB (75 Marks)

SYLLABUS: *Co-ordinate system, Locus, Change of Axes, Straight Lines –up to ex: 3.3 SAQ: 15.*

SECTION-A

- I. Answer ALL the following questions. 10 x 2 = 20 M**
1. If two vertices of a triangle are $(4, 8)$, $(-2, 6)$ and the centroid is $(2, 7)$, then find third vertex.
 2. Find k , if $(k, -1)$, $(2, 1)$, $(4, 5)$ are collinear.
 3. Find the locus of the point which is equidistant to the coordinate axes.
 4. Find the point to which the origin has to be shifted to eliminate x and y terms in the equation $4x^2 + 9y^2 - 8x + 36y + 4 = 0$.
 5. Find the value of x , if the slope of the line joining $(2, 5)$, $(x, 3)$ is 2.
 6. Find the angle which the straight line $y = \sqrt{3}x - 4$ makes with the y -axis.
 7. Find the equation of the straight line passing through the point $(2, 3)$ and making non-zero intercepts on the coordinate axes whose sum is 0.
 8. If the area of the triangle formed by the straight lines $x = 0$, $y = 0$ and $3x + 4y = a$ ($a > 0$) is 6 square units then find a .
 9. Find the distance between the parallel lines $5x - 3y - 4 = 0$, $10x - 6y - 9 = 0$.
 10. Find the ratio in which the straight line $5x - 6y - 21 = 0$ divides the line segment joining the points $(4, -1)$, $(2, 1)$.

SECTION-B

- II. Answer any FIVE of the following questions. 5 x 4 = 20 M**
11. If the distance from P to the points $(2, 3)$, $(2, -3)$ are in the ratio 2:3 then find locus of P.
 12. Find the locus of P, if the join of the points $(2, 3)$ and $(-1, 5)$ subtends a right angle at P.
 13. Find the transformed equation of $x^2 + y^2 + 2x - 4y + 1 = 0$ when the origin is shifted to the point $(-1, 2)$.
 14. If the transformed equation of a curve $17X^2 - 16XY + 17Y^2 = 225$ when the axes are rotated through an angle 45° then find original equation of a curve.
 15. Reduce the equation $4x - 3y + 12 = 0$ into (i) Slope intercept form (ii) Intercept form
 16. Find the equation of the line whose x . intercept is -4 and which is perpendicular to the line $3x + 4y + 6 = 0$.
 17. Find the points on the line $3x - 4y - 1 = 0$ which are at a distance of 5 units from the point $(3, 2)$.

SECTION-C**III. Answer any FIVE of the following questions.****5 x 7 = 35 M**

18. Find the locus of P, if $A(4, 0)$, $B(-4, 0)$ and $|PA - PB| = 4$.
19. $A(2, 3)$, $B(-3, 4)$ are two points. If a point P moves such that the area of ΔPAB is 8.5 square units, then find locus of P.
20. Show that the angle of rotation of the axes to eliminate xy term in the equation $ax^2 + 2hxy + by^2 = 0$ is $\frac{1}{2} \tan^{-1} \left(\frac{2h}{a-b} \right)$ when $a \neq b$ and $\frac{\pi}{4}$ when $a = b$.
21. Transform the equation $\frac{x}{a} + \frac{y}{b} = 1$ into normal form where $a > 0$, $b > 0$. If the perpendicular distance of the line from the origin is P deduce that $\frac{1}{P^2} = \frac{1}{a^2} + \frac{1}{b^2}$.
22. Find the equations of the straight line passing through $(1, 1)$ and which are at a distance of 3 units from $(-2, 3)$.
23. If p, q are the perpendiculars from the origin to the lines $x \sec \alpha + y \operatorname{cosec} \alpha = a$ and $x \cos \alpha - y \sin \alpha = a \cos 2\alpha$ then show that $4p^2 + q^2 = a^2$.
24. Show that the origin lies within the triangle whose angular points are $(2, 1)$, $(3, -2)$ and $(-4, -1)$.

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