

# Straight lines and Pair of Straight Lines

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## I. E - SUBJECTIVE PROBLEMS

- 4) (1979)
- Two vertices of a triangle are  $(5, -1)$  and  $(2, -3)$ . If the orthocentre of the triangle is the origin, find the coordinates of the third point.
  - Find the equation of the line which bisects the obtuse angle between the lines  $x - 2y + 4 = 0$  and  $4x - 3y + 2 = 0$ .
- 5) A straight line  $L$  is perpendicular to the line  $5x - y + 1$ . The area of the triangle formed by  $L$  and the coordinate axes is 5. Find the equation of the line  $L$ . (1980)
- 6) The end **A**, **B** of a straight line segment of constant length  $c$  slide upon the fixed rectangular axes  $OX, OY$  respectively. If the rectangle  $OAPB$  be completed, then show that the locus of the foot of perpendicular drawn from **P** to  $AB$  is

$$x^{\frac{2}{3}} + y^{\frac{2}{3}} = c^{\frac{2}{3}}$$

- 7) The vertices of a triangle are  $[at_1t_2, a(t_1 + t_2)]$ ,  $[at_2t_3, a(t_2 + t_3)]$ ,  $[at_3t_1, a(t_3 + t_1)]$ . Find the orthocentre of the triangle. (1983-3M)
- 8) The coordinates of **A**, **B**, **C** are  $[6, 3]$ ,  $[3, 5]$ ,  $[4, 2]$  respectively, and **P** is any point  $(x, y)$ . Show that the ratio of the area of triangles  $\Delta PBC$  and  $\Delta ABC$  is  $\left| \frac{x+y-2}{7} \right|$ . (1983-2M)
- 9) Two equal sides of an isosceles triangle are given by the equations  $7x - y + 3 = 0$  and  $x + y - 3 = 0$  and its third side passes through the point  $(1, -10)$ . Determine the equation of the third side. (1985-3M)
- 10) One of the diameters of the circle circumscribing the rectangle  $ABCD$  is  $4y = x + 7$ . If **A** and **B** are the points  $(-3, 4)$  and  $(5, 4)$  respectively, find the area of rectangle. (1985-3M)
- 11) Two sides of a rhombus  $ABCD$  are parallel to the lines  $y = x + 2$  and  $y = 7x + 3$ . If the diagonals of the rhombus intersect at the point  $(1, 2)$  and the vertex **A** is on the y-axis, find the possible co-ordinates of **A**. (1985-5M)
- 12) Lines  $L_1 \equiv ax + by + c = 0$  and  $L_2 \equiv lx + my + n = 0$  intersect at the point **P** and make an angle  $\theta$  with each other. Find the equation of a line  $L$  different from  $L_2$  which passes through **P** and make same angle  $\theta$  with  $L_1$ . (1988-5M)
- 13) Let  $ABC$  be the triangle  $AB = AC$ . If **D** is the midpoint of  $BC$ , **E** is the foot of the perpendicular drawn from **D** to  $AC$  and **F** the mid-point of  $DE$ , prove that  $AF$  is perpendicular to  $BE$ . (1989-5M)
- 14) Straight lines  $3x + 4y = 5$  and  $4x - 3y = 15$  intersect at the point **A**. Points **B** and **C** are chosen on these two lines such that  $AB = AC$ . Determine the possible equations of the line  $BC$  passing through the point  $(1, 2)$ . (1990-4M)
- 15) A line cuts the x-axis at **A**(7, 0) and the y-axis at **B**(0, -5). A variable line  $PQ$  is drawn perpendicular to  $AB$  cutting the x-axis in  $P$  and the y-axis in  $Q$ . If  $AQ$  and  $BP$  intersect at **R**, find the locus of **R**. (1990-4M)
- 16) Find the equation of the line passing through the point  $(2, 3)$  and making intercept of length 2 units between the lines  $y + 2x = 3$  and  $y + 2x = 5$ . (1991-4M)

