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Straight lines and Pair of Straight Lines

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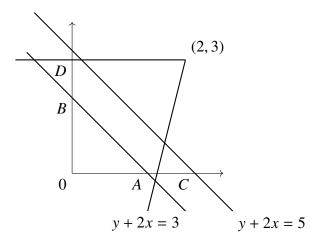
I. E - Subjective Problems

4) (1979)

- a) 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 thrid point.
- b) 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 stright 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 $\triangle PBC$ and $\triangle ABC$ 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, the 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 θ with each other. Find the equation of a line L different from L_2 which passes through P and make same angle θ with L_1 .
- 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 E the mid-point of E, prove that E is perpendicular to E. (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).
- 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)



- 17) Show that all chords of the curve $3x^2 y^2 2x + 4y = 0$, which subtend a right angle at the origin, pass through a fixed point. Find the coordinates of point. (1991-4M)
- 18) Determine all values of α for which the point (α, α^2) lies inside the triangle formed by the lines. (1992-6M)

$$2x + 3y - 1 = 0$$

$$x + 2y - 3 = 0$$

$$5x - 6y - 1 = 0$$