Conic Sections

11^{th} Maths - Chapter 11

Short Answer Type Questions

1. Find the equation of the straight line which passes through the point (1, -2) and cuts off equal intercepts from axes.
2. Find the equation of the line passing through the point (5,2) and perpendicular to the line joining the points (2,3) and (3, -1).
3. Find the angle between the lines $y(2-\sqrt{3})(x+5)$ and $y=(2+\sqrt{3})(x-7)$.
4. Find the equation of the lines which passes the point (3,4) and cuts off intercepts from the coordinate axes such that their sum is 14.
5. Find the points on the line $x+y=4$ which lie at a unit distance from the line $4x+3y=10$.
6. Show that the tangent of an angle between the lines $\frac{x}{a}+\frac{y}{b}=1$ and $\frac{x}{a}-\frac{y}{b}=1$ is $\frac{2ab}{a^2-b^2}$.
7. Find the equation of lines passing through (1,2) and making angle 30° with y-axis.
8. Find the equation of the line passing through the point of intersection of $2x+y=5$ and $x+3y+8=0$ and parallel the line $3x+4y=7$.
9. For what values of a and b the intercepts cut off on the coordinate axes by the line $ax+by+8=0$are equal in length but opposite in signs to those cut off by the line $2x-3y+=0$ on the axes.
10. If the intercept of a line between the coordinate axes is divided by the point (-5,4) in the ratio 1:2 then find the equation of the line.

11. Find the equation of a straight line on which length of perpendicular from the origin is four units and the line makes on angle of 120° with the positive direction of x-axis. [**Hint** : Use normal form, here $\omega = 30°$.]

12. Find the equation of one of the sides of an isosceles right angled triangle whose hypotenuse is given by $3x + 4y = 4$ and the opposite vertex of the hypotenuse is (2,2).

Long Answer Type

13. If the equation of the base of an equilateral triangle is $x + y = 2$ and the vertex is (2,-1), then find the length of the side of the triangle. [**Hint** : Find length of perpendicular (p) from (2,-1) to the line and use $p = l \sin 60 degree$,where l is the length of the triangle].

14. A variable line passes through a fixed point **P**.The algebraic sum of the perpendiculars drawn from the points (2,0),(0,2) and (1,1) on the line is zero. Find the coordinates of the point **P**. [**Hint** : let the slope of the line be m. Then the equation of the line passing through the fixed point $\mathbf{P}(x_1, y_1) y - y_1 = m(x - x_1)$. Taking the algebraic sum of perpendicular distances equal to zero, we get $y - l = m(x - 1)$. Thus (x_1, y_1) is (1,1).]

15. In what direction should a line be drawn through the point (1,2) so that its point of intersection with line $x + y = 4$ is at a distance $\sqrt{6}3$ from the given equilateral

16. A straight line moves so that the sum of the reciprocals of its intercepts made on axes is constant. Show that the line passes through a fixed point. [**Hint** : $\frac{x}{a} + \frac{y}{b} = 1$ where$\frac{1}{a} + \frac{1}{b} =$ constant $= \frac{1}{k}$(say). This implies that $\frac{k}{a} + \frac{k}{b} = 1$ line passes through the fixed point (k, k).]

17. Find the equation of the line which passes through the point (-4,3) and the portion of the line intercepted between the axes is divided internally in ratio 5:3 by this point.

18. Find the equations of the lines through the point of intersection of the line $x - y + 1 = 0$ and $2x - 3y + 5 = 0$ and whose distance from the point (3,2) is $\frac{7}{5}$.

19. If the sum of the distances of a moving point in a plane from the axes is l, then finds the locus of the point. [**Hint** :Given that $|x| + |y| = 1$,

which gives four sides of a square.]

20. $\mathbf{P}_1, \mathbf{P}_2$ are points on either of the two lines $y - \sqrt{3}\,|x| = 2$ at a distance of 5 units from their point of intersection. Find the coordinates of the root of perpendiculars drawn from P_1, P_2 on the bisector of the angle between the given lines. [**Hint** : Lines are $y = \sqrt{3}x + 2$ and $y = -\sqrt{3}x + 2$ according as $x \geq 0$ or $x0.y$-axis is the bisector of the angles between the lines. P_1, P_2 are the points on these lines at a distance of 5 units from the point of intersection of these lines which have a point on y-axis as a common foot of perpendiculars from these points. The y-coordinate of the foot of the perpendicular is given by 2=5 $\cos 30°$.]

21. If p is the length of perpendicular from the origin on the lien $\frac{x}{a} + \frac{y}{b} = 1$ and a^2, p^2, b^2 are in A.P, then show that $a^4 + b^4 = 0$.

Objective Type Questions

choose the correct answer from the given four options in Exercises 22 to 41

22. A line cutting off intercept -3 from the tangent at angle to the x-axis is $\sqrt{3}5$, its equation is
    (a) $5y - 3x + 15 = 0$
    (b) $3y - 5x + 15 = 0$
    (c) $5y - 3x - 15 = 0$
    (d) none of these

23. Slope of a line which cuts off intercepts of equal length on the axes is
    (a) -1
    (b) -0
    (c) 2
    (d) $\sqrt{3}$

24. The equation of the straight line passing through the point (3,2) and perpendicular to the line $y = x$ is
    (a) $x - y = 5$
    (b) $x + y = 5$

(c) $x + y = 1$

(d) $x - y = 1$

25. The equation of the line passing through the point (1,2) and perpendicular to the line $x + y + 1 = 0$ is

(a) $y - x + 1 = 0$

(b) $y - x - 1 = 0$

(c) $y - x + 2 = 0$

(d) $y - x - 1 = 0$

26. The tangent of angle between the lines whose intercepts on the axes are $a, -b$ and $b, -a$, respectively, is

(a) $\frac{a^2-b^2}{ab}$

(b) $\frac{b^2-a^2}{2}$

(c) $\frac{b^2-a^2}{2ab}$

(d) none of these

27. If the line $\frac{x}{a} + \frac{y}{b} = 1$ passes the points (2,-3) and (4,-5), then (a, b) is

(a) (1,1)

(b) (-1,1)

(c) (1,-1)

(d) (-1,-1)

28. The distance of the point of intersection of the lines $2x - 3y + 5 = 0$ and $3x + 4y = 0$ from the line $5x - 2y = 0$ is

(a) $\frac{130}{17\sqrt{29}}$

(b) $\frac{13}{7\sqrt{29}}$

(c) $\frac{130}{7}$

(d) none of these

29. The equations of the lines which pass through the point (3, -2) and are inclined at $60°$ to the line $\sqrt{3}x + y = 1$ is

    (a) $y + 2 = 0$, $\sqrt{3}x - y - 2 - 3\sqrt{3} = 0$

    (b) $x - 2 = 0$, $\sqrt{3}x - y + 2 + 3\sqrt{3} = 0$

    (c) $\sqrt{3}x - y - 2 - 3\sqrt{3} = 0$

    (d) None of these

30. The equations of the lines passing through the point (1,0) and at a distance $\frac{\sqrt{3}}{2}$ from the origin, are

    (a) $\sqrt{3}x + y - \sqrt{3} = 0$, $\sqrt{3}x - y - \sqrt{3} = 0$

    (b) $\sqrt{3}x + y + \sqrt{3} = 0$, $\sqrt{3}x - y + \sqrt{3} = 0$

    (c) $x + \sqrt{3}y - \sqrt{3} = 0$, $\sqrt{3}y - \sqrt{3} = 0$

    (d) None of these.

31. The distance between the lines $y = mx + c$, and $y = mx + c^2$ is

    (a) $\frac{c_1 - c_2}{\sqrt{m+1}}$

    (b) $\frac{|c_1 - c_2|}{\sqrt{1+m^2}}$

    (c) $\frac{c^2 - c^1}{\sqrt{1+m^2}}$

    (d) 0

32. The coordinates of the foot of perpendiculars from the point (2,3) on the line $y = 3x + 4$ is given by

    (a) $\frac{37}{10}$, $\frac{-1}{10}$

    (b) $\frac{-1}{10}$, $\frac{37}{10}$

    (c) $\frac{10}{37}$, -10

    (d) $\frac{2}{3}$, $\frac{-1}{3}$

33. If the coordinates of middle point of the portion of a line intercepted between the coordinate axes is (3,2),then the equation of the line will be

(a) $2x + 3y = 12$

(b) $3x + 2y = 12$

(c) $4x - 3y = 6$

(d) $5x - 2y = 10$

34. Equation of the line passing through (1,2) and parallel to the line $y = 3x - 1$ is

 (a) $y + 2 = x + 1$

 (b) $y + 2 = 3(x + 1)$

 (c) $y - 2 = 3(x - 1)$

 (d) $y - 2 = x - 1$

35. Equations of diagonals of the square formed by the lines $x = 0$, $y = 0$, $x = 1$ and $y = 1$ are

 (a) $y = x$, $y + x = 1$

 (b) $y = x, x + y = 2$

 (c) $2y = x$, $y + x = \frac{1}{3}$

 (d) $y = 2x$, $y + 2x = 1$

36. For specifying a straight line, how many geometrical parameters should be known?

 (a) 1

 (b) 2

 (c) 4

 (d) 3

37. The point (4,1)undergoes the following two successive transformations :

 (a) Reflection about the line $y = x$

 (b) Translation through a distance 2 units along the positive x-axis

 Then the final coordinates of the point are

(a) (4,3)

(b) (3,4)

(c) (1,4)

(d) $\frac{7}{2}, \frac{7}{2}$

38. A point equidistant from the lines $4x + 3y + 10 = 0$, $5x - 12y + 26 = 0$ and $7x + 24y - 50 = 0$ is

    (a) (1,-1)

    (b) (1,1)

    (c) (0,0)

    (d) (0,1)

39. A line passes through (2,2) and is perpendicular to the line $3x + y = 3$. Its y-intercept is

    (a) $\frac{1}{3}$

    (b) $\frac{2}{3}$

    (c) 1

    (d) $\frac{4}{3}$

40. The ratio in which the line $3x+4y+2 = 0$ divides the distance between the lines $3x + 4y + 5 = 0$ and $3x + 4y - 5 = 0$ is

    (a) 1:2

    (b) 3:7

    (c) 2:3

    (d) 2:5

41. One vertex of the equilateral with centroid at the origin and one side as $x + y - 2 = 0$ is

    (a) (-1,-1)

    (b) (2,2)

    (c) (-2-2)

(d) (2,-2)

[**Hint** : Let ABC be the equilateral triangle with vertex $\mathbf{A}(h,k)$ and let $\mathbf{D}(\alpha,\beta)$ be the point on BC. Then $\frac{2\alpha+h}{3} = 0 = \frac{2\beta+k}{3}$. Also $\alpha+\beta-2=0$ and $\frac{k-0}{h-o}x(-1) = -1$]

Fill in the blank in Exercises 42 to 47.

42. If a, b, c are is A.P.,then the straight lines $ax+by+c=0$ will always pass through ____.

43. The line which cuts off equal intercept from the axes and pass through the equilateral2) is ____.

44. Equations of the lines through the point (3,2) and making an angle of $40°$ with the line $x-2y=3$ are ____.

45. The points (3,4) and (2,-6)are situated on the ____ of the line $3x-4y-8=0$.

46. A point moves so that square of its distance from the point (3,-2) is numerically equal to its distance from the line $5x-12y=3$. The equation of its locus is

47. Locus of the mid-points of the portion of the line $x\sin\theta + y\cos\theta = p$ intercepted between the axes is ____. State whether the statements in Exercises 48 to 56 are true or false. Justify.

48. If the vertices of a triangle have integral coordinates, then the triangle can not be equilateral.

49. The points $\mathbf{A}(2,1)$, $\mathbf{B}(0,5)$, $\mathbf{C}(-1,2)$ are collinear.

50. Equation of the line passing through the point $(a\cos^3\theta, a\sin^3\theta)$ and perpendicular to the line $x\sec\theta + y\csc\theta = a$ is $x\cos\theta - y\sin\theta = \alpha\sin 2\theta$.

51. The straight line $5x+4y=0$ passes through the point of intersection of the straight lines $x+2y-10=0$ and $2x+y+5=0$.

52. The vertex of on equilateral triangle is (intercepted equation of the opposite side is $x+y=2$.then the other two sides are $y-3=(2\pm\sqrt{3})(x-2)$.

53. The equation of the line joining the point (3,5) to the point of intersection of the lines $4x + y - = 0$ and $7x - 3y - 5 = 0$ is equidistant from the points (0,0) and (8,34).

54. The line $\frac{x}{a} + \frac{y}{b} = 1$ moves in such a way that $\frac{1}{a^2} + \frac{1}{b^2} = \frac{1}{c^2}$, where c is a constant.The locus of the foot of the perpendicular from the origin on the given line is $x^2 + y^2 = c^2$.

55. The lines $ax + 2y + 1 = 0$, $bx = 3y + 1 = 0$ and $cx + 4y + 1 = 0$ are concurrent if a, b, c are in G.P.

56. Line joining the points (3,-4) and (-2,6) is perpendicular to the line joining the points (-3,6) and (9,-18).

Match the questions given under Column C_1 with their appropriate answers given under the Column C_2 is Exercises 57 to 59.

57.

1. **Column C_1**	a) **Column C_2**
2. The coordinates of the points P and Q on the line x + 5y = 13 which are at a distance of 2 units from the line 12x – 5y + 26 = 0 are	b) (3,1),(-7,11)
3. The coordinates of the point on the line x + y = 4, which are at a unit distance from the line 4x + 3y – 10 = 0 are	c) $-\frac{1}{11}, \frac{11}{3}$, $\frac{4}{3}, \frac{7}{3}$
4. The coordinates of the point on the line joining A (–2, 5) and B (3, 1) such that AP = PQ = QB are	d) $1, \frac{12}{5}$, $-3, \frac{16}{5}$

58. The value of the λ, if the lines $(2x + 3y + 4) + \lambda(6x - y + 12) = 0$ are

1. **Column C_1**	a) **Column C_2**
2. parallel to y-axis is	b) $\lambda = -\frac{3}{4}$
3. perpendicular to $7x + y - 4 = 0$ is	c) $\lambda = -\frac{1}{3}$
4. passes through (1,2) is	d) $\lambda = -\frac{17}{41}$
5. parallel to x axis is	e) $\lambda = 3$

59. The equation of the line through the intersection of the lines $2x - 3y = 0$ and $4x - 5y = 2$ and

	Column C_1	Column C_2
1.	through the point (2,1) is	a) $2x - y = 4$
2.	perpendicular to the line	b) $x + y - 5 = 0$
3.	parallel to the line $3x-4y+5 = 0$ is	c) $x - y - 1 = 0$
4.	equally inclined to the axes is	d) $3x - 4y - 1 = 0$