



Exercise 3D

Question 25:

$$2x - 3y - 7 = 0$$

$$(a + b)x + (a + b - 3)y - (4a + b) = 0$$

These equations are of the form

$$a_1x + b_1y + c_1 = 0, \quad a_2x + b_2y + c_2 = 0$$

$$\text{where, } a_1 = 2, b_1 = -3, c_1 = -7$$

$$a_2 = (a + b), b_2 = -(a + b - 3), c_2 = -(4a + b)$$

For infinite number of solutions

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\frac{2}{a+b} = \frac{-3}{-(a+b-3)} = \frac{-7}{-(4a+b)}$$

$$\frac{2}{a+b} = \frac{3}{(a+b-3)} = \frac{7}{(4a+b)}$$

$$\Rightarrow \frac{2}{a+b} = \frac{7}{(4a+b)} \text{ or } \frac{3}{(a+b-3)} = \frac{7}{(4a+b)}$$

$$8a + 2b = 7a + 7b \text{ and } 12a + 3b = 7a + 7b - 21$$

$$a - 5b = 0 \quad \text{--- (1)}$$

$$5a - 4b = -21 \quad \text{--- (2)}$$

Putting $a = 5b$ in (2), we get

$$5 \times 5b - 4b = -21$$

$$25b - 4b = -21$$

$$21b = -21$$

$$b = \frac{-21}{21} = -1$$

Putting $b = -1$ in (1), we get

$$a - 5 \times -1 = 0$$

$$a + 5 = 0$$

$$a = -5$$

Thus, $a = -5, b = -1$

Question 27:

The given equations are

$$2x + 3y = 7 \text{ ---(1)}$$

$$a(x + y) - b(x - y) = 3a + b - 2 \text{ ---(2)}$$

Equation (2) is

$$ax + ay - bx + by = 3a + b - 2$$

$$(a - b)x + (a + b)y = 3a + b - 2$$

Comparing with the equations

$$a_1x + b_1y + c_1 = 0, a_2x + b_2y + c_2 = 0$$

$$\therefore a_1 = 2, b_1 = 3, c_1 = 7$$

$$a_2 = (a - b), b_2 = (a + b), c_2 = 3a + b - 2$$

There are infinitely many solution

$$\text{If } \frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$$

$$\text{or } \frac{2}{a-b} = \frac{3}{a+b} = \frac{7}{3a+b-2}$$

$$\therefore \frac{2}{a-b} = \frac{3}{a+b} \text{ and } \frac{3}{a+b} = \frac{7}{3a+b-2}$$

$$2a + 2b = 3a - 3b \text{ and } 3(3a + b - 2) = 7(a + b)$$

$$-a = -5b \text{ and } 9a + 3b - 6 = 7a + 7b$$

$$a = 5b \text{ and } 9a - 7a + 3b - 7b = 6$$

$$\text{or } 2a - 4b = 6$$

$$\text{or } a - 2b = 3$$

thus equation in a, b are

$$a = 5b \text{ ---(3)}$$

$$a - 2b = 3 \text{ ---(4)}$$

putting $a = 5b$ in (4)

$$5b - 2b = 3 \text{ or } 3b = 3 \text{ } \therefore b = 1$$

Putting $b = 1$ in (3)

$$a = 5 \text{ and } b = 1$$

Question 28:

We have $5x - 3y = 0$ —(1)

$2x + ky = 0$ —(2)

Comparing the equation with

$$a_1x + b_1y + c_1 = 0, \quad a_2x + b_2y + c_2 = 0$$

$$a_1 = 5, \quad b_1 = -3, \quad a_2 = 2, \quad b_2 = k$$

These equations have a non – zero solution if

$$\frac{a_1}{a_2} = \frac{b_1}{b_2}$$

$$\frac{5}{2} = \frac{-3}{k} \Rightarrow 5k = -6$$

$$k = \frac{-6}{5}$$

***** END *****