Chapter 4:- Quadratic Equations
Ex 4.3

Question 1. Find the roots of the following quadratic equations, if they exist, by the method of completing the square:

(i) $2x^2 - 7x + 3 = 0$ (ii) $2x^2 + x - 4 = 0$

(iii) $4x^2 + 4\sqrt{3}x + 3 = 0$ (iv) $2x^2 + x + 4 = 0$

Solution:

(i) Given: $x^2 - 7x + 3 = 0$

$$\Rightarrow \quad 2\left(x^2 - \frac{7}{2}x + \frac{3}{2}\right) = 0$$

$$\Rightarrow \quad x^2 - \frac{7}{2}x + \frac{3}{2} = 0$$

$$\Rightarrow \quad (x)^2 - \left(\frac{7}{2}x\right) + \left(\frac{7}{4}\right)^2 - \left(\frac{7}{4}\right)^2 + \frac{3}{2} = 0$$

$$\Rightarrow \quad \left(x - \frac{7}{4}\right)^2 - \left(\frac{49}{16} - \frac{3}{2}\right) = 0$$

$$\Rightarrow \quad \left(x - \frac{7}{4}\right)^2 - \left(\frac{49 - 24}{16}\right) = 0$$

$$\Rightarrow \quad \left(x - \frac{7}{4}\right)^2 - \left(\frac{25}{16}\right) = 0$$

$$\Rightarrow \quad \left(x - \frac{7}{4}\right)^2 - \left(\frac{5}{4}\right)^2 = 0$$

$$\Rightarrow \quad \left(x - \frac{7}{4} + \frac{5}{4}\right)\left(x - \frac{7}{4} - \frac{5}{4}\right) = 0$$

$$\Rightarrow \quad \left(x - \frac{12}{4}\right)\left(x - \frac{2}{4}\right) = 0$$

$$\Rightarrow \quad (x - 3)\left(x - \frac{1}{2}\right) = 0$$

$$\Rightarrow \quad x = 3 \quad \text{or} \quad x = \frac{1}{2}$$

Question 2. Find the roots of the quadratic equations by applying the quadratic formula.

(i) $2x^2 - 7x + 3 = 0$ (ii) $2x^2 - x + 4 = 0$

(iii) $4x^2 - 4\sqrt{3}x + 3 = 0$ (iv) $2x^2 - x + 4 = 0$

Solution:

(i) $2x^2 - 7x + 3 = 0$

This is of the form $ax^2 + bx + c = 0$,

where $a = 2$, $b = -7$ and $c = 3$

Discriminant, $\quad D = b^2 - 4ac$

$$= (-7)^2 - 4 \times 2 \times 3 = 49 - 24 = 25$$

Since, $\quad D > 0$

Let roots are α and β

$$\alpha = \frac{-b + \sqrt{D}}{2a} = \frac{-(-7) + \sqrt{25}}{2 \times 2} = \frac{7 + 5}{4} = \frac{12}{4} = 3$$

$$\beta = \frac{-b - \sqrt{D}}{2a} = \frac{-(-7) - \sqrt{25}}{2 \times 2} = \frac{7 - 5}{4} = \frac{2}{4} = \frac{1}{2}$$

Hence, the roots are $3, \frac{1}{2}$.