Exercise 4.3

Q2. Find the roots of the following Quadratic Equations by applying quadratic formula.

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

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

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

(iv) $2x^2 + x + 4 = 0$

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

Comparing quadratic equation $2x^2 - 7x + 3 = 0$ with general form $ax^2 + bx + c = 0$, we get a = 2, b = -7 and c = 3

Putting these values in quadratic formula $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$x = \frac{7 \pm \sqrt{(-7)^2 - 4(2)(3)}}{2 \times 2}$$

$$\Rightarrow x = \frac{7 \pm \sqrt{49 - 24}}{4}$$

$$\Rightarrow x = \frac{7 \pm 5}{4}$$

$$\Rightarrow x = \frac{7+5}{4}, \frac{7-5}{4}$$

$$\Rightarrow x = 3, ½$$

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

Comparing quadratic equation $2x^2 + x - 4 = 0$ with the general form $ax^2 + bx + c = 0$, we get $a = 2$, $b = 1$ and $c = -4$

Putting these values in quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$$x = \frac{-1 \pm \sqrt{(1)^2 - 4(2)(-4)}}{2 \times 2}$$

$$\Rightarrow x = \frac{-1 \pm \sqrt{33}}{4}$$

$$\Rightarrow x = \frac{-1 + \sqrt{33}}{4}, \frac{-1 - \sqrt{33}}{4}$$

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

Comparing quadratic equation $4x^2+4\sqrt{3}x+3=0$ with the general form $ax^2+bx+c=0$, we get $a=4$, $b=4\sqrt{3}$ and $c=3$

Putting these values in quadratic formula $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$$x=\frac{-4\sqrt{3}\pm\sqrt{(4\sqrt{3})^2-4(4)(3)}}{2\times4}$$

$$\Rightarrow x=\frac{-4\sqrt{3}\pm\sqrt{0}}{8}$$

$$\Rightarrow x=\frac{-\sqrt{3}}{2}$$

A quadratic equation has two roots. Here, both the roots are equal.

Therefore, $x=\frac{-\sqrt{3}}{2},\frac{-\sqrt{3}}{2}$

(iv) $2x^2+x+4=0$

Comparing quadratic equation $2x^2+x+4=0$ with the general form $ax^2+bx+c=0$, we get $a=2$, $b=1$ and $c=4$

Putting these values in quadratic formula $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$

$$x=\frac{-1\pm\sqrt{(1)^2-4(2)(4)}}{2\times2}$$

$$\Rightarrow x=\frac{-1\pm\sqrt{-31}}{4}$$

But, square root of negative number is not defined.

Therefore, Quadratic Equation $2x^2+x+4=0$ has no solution.

Q3. Find the roots of the following equations:

(i) $\frac{x-1}{x}=3, x\neq 0$

(ii) $\frac{1}{x+4}-\frac{1}{x-7}=\frac{11}{30}, x\neq -4,7$

Ans. (i) $x-\frac{1}{x}=3 \text{ where } x\neq 0$

$\Rightarrow \frac{x^2-1}{x}=3$

$\Rightarrow x^2-1=3x$

$\Rightarrow x^2-3x-1=0$

Comparing equation $x^2-3x-1=0$ with general form $ax^2+bx+c=0$,

We get $a=1$, $b=-3$ and $c=-1$

Using quadratic formula $x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ to solve equation,

$x=\frac{3\pm\sqrt{(3)^2-4(1)(-1)}}{2\times 1}$

$\Rightarrow x=\frac{3\pm\sqrt{13}}{2}$

$\Rightarrow x=\frac{3+\sqrt{13}}{2}, \frac{3-\sqrt{13}}{2}$

********** END **********