Exercise 2.3

Question 15:

Check whether $p(x)$ is a multiple of $g(x)$ or not:

(i) $p(x) = x^3 - 5x^2 + 4x - 3, \quad g(x) = x - 2$

(ii) $p(x) = 2x^3 - 11x^2 - 4x + 5, \quad g(x) = 2x + 1$

Answer 15:

(i). We have $p(x) = x^3 - 5x^2 + 4x - 3, \quad g(x) = x - 2$

Put $g(x) = 0$

$\Rightarrow x - 2 = 0$

$\Rightarrow x = 2$

According to factor theorem if $p(x)$ is a multiple of $g(x)$, the remainder $p(2)$ should be zero.

Remainder $= p(2)$

$= (2)^3 - 5(2)^2 + 4(2) - 3$

$= 8 - 20 + 8 - 3$

$= 16 - 23 = -7 \neq 0$

$\Rightarrow p(x)$ is not a multiple of $g(x)$.

(ii). We have $p(x) = 2x^3 - 11x^2 - 4x + 5, \quad g(x) = 2x + 1$

Put $g(x) = 0$

$\Rightarrow 2x + 1 = 0$

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

According to factor theorem if $p(x)$ is a multiple of $g(x)$, the remainder $p\left(-\frac{1}{2}\right)$ should be zero.

Remainder $= p\left(-\frac{1}{2}\right)$

$= 2\left(-\frac{1}{2}\right)^3 - 11\left(-\frac{1}{2}\right)^2 - 4\left(-\frac{1}{2}\right) + 5$

$= -2 \times \frac{1}{8} - 11 \times \frac{1}{4} + 4 \times \frac{1}{2} + 5$

$= -\frac{1}{4} - \frac{11}{4} + 2 + 5$

$= -\frac{12}{4} + 7$

$= -3 + 7$

$= 4 \neq 0$

$\Longrightarrow p(x)$ is not a multiple of $g(x)$.