Factorisation of Polynomials Ex 6.3 Q10

Answer :

Let us denote the given polynomials as

$f(x) = ax^3 + 3x^2 - 3,$

$g(x) = 2x^3 - 5x + a,$

$h(x) = x - 4$

Now, we will find the remainders R_1 and R_2 when $f(x)$ and $g(x)$ respectively are divided by $h(x)$.

By the remainder theorem, when $f(x)$ is divided by $h(x)$ the remainder is

$$\begin{aligned} R_1 &= f(4) \\ &= a(4)^3 + 3(4)^2 - 3 \\ &= 64a + 48 - 3 \\ &= 64a + 45 \end{aligned}$$

By the remainder theorem, when $g(x)$ is divided by $h(x)$ the remainder is

$$\begin{aligned} R_2 &= g(4) \\ &= 2(4)^3 - 5(4) + a \\ &= 128 - 20 + a \\ &= a + 108 \end{aligned}$$

(i) By the given condition,

$R_1 = R_2$

$$\Rightarrow \quad 64a + 45 = a + 108$$
$$\Rightarrow \quad 64a - a = 108 - 45$$
$$\Rightarrow \quad 63a = 63$$
$$\Rightarrow \quad a = \frac{63}{63}$$
$$\Rightarrow \quad a = \boxed{1}$$

(ii) By the given condition,

$R_1 + R_2 = 0$

$$\Rightarrow \quad 64a + 45 + a + 108 = 0$$
$$\Rightarrow \quad 65a + 153 = 0$$
$$\Rightarrow \quad 65a = -153$$
$$\Rightarrow \quad a = \boxed{-\frac{153}{65}}$$

(iii) By the given condition,

$2R_1 - R_2 = 0$

$$\Rightarrow \quad 2(64a + 45) - (a + 108) = 0$$
$$\Rightarrow \quad 128a + 90 - a - 108 = 0$$
$$\Rightarrow \quad 127a = 18$$
$$\Rightarrow \quad a = \boxed{\frac{18}{127}}$$

Factorisation of Polynomials Ex 6.3 Q11

Answer :

Let us denote the given polynomials as

$$f(x) = ax^3 + 3x^2 - 13,$$
$$g(x) = 2x^3 - 5x + a,$$
$$h(x) = x - 2$$

Now, we will find the remainders R_1 and R_2 when $f(x)$ and $g(x)$ respectively are divided by $h(x)$.

By the remainder theorem, when $f(x)$ is divided by $h(x)$ the remainder is

$$\begin{aligned} R_1 &= f(2) \\ &= a(2)^3 + 3(2)^2 - 13 \\ &= 8a + 12 - 13 \\ &= 8a - 1 \end{aligned}$$

By the remainder theorem, when $g(x)$ is divided by $h(x)$ the remainder is

$$\begin{aligned} R_2 &= g(2) \\ &= 2(2)^3 - 5(2) + a \\ &= 16 - 10 + a \\ &= a + 6 \end{aligned}$$

By the given condition, the two remainders are same. Then we have, $R_1 = R_2$

$$\Rightarrow \quad 8a - 1 = a + 6$$
$$\Rightarrow \quad 8a - a = 6 + 1$$
$$\Rightarrow \quad 7a = 7$$
$$\Rightarrow \quad a = \frac{7}{7}$$
$$\Rightarrow \quad a = \boxed{1}$$

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