



On equating the constant term, we get

$$b + d = 7$$

Substituting $b = 5$, we get

$$5 + d = 7$$

$$d = 7 - 5$$

$$d = 2$$

Therefore, quotient $q(x) = ax + b$

$$= 2x + 5$$

Remainder $r(x) = cx + d$

$$= 11x + 2$$

Hence, the quotient and remainder are $\boxed{q(x) = 2x + 5}$ and $\boxed{r(x) = 11x + 2}$.

(iv) Given,

$$f(x) = 15x^3 - 20x^2 + 13x - 12$$

$$g(x) = 2 - 2x + x^2$$

Here, Degree $(f(x)) = 3$ and

Degree $(g(x)) = 2$

Therefore, quotient $q(x)$ is of degree $3 - 2 = 1$ and

Remainder $r(x)$ is of degree less than 2

Let $q(x) = ax + b$ and

$$r(x) = cx + d$$

Using division algorithm, we have

$$f(x) = g(x) \times q(x) + r(x)$$

$$15x^3 - 20x^2 + 13x - 12 = (x^2 - 2x + 2)(ax + b) + cx + d$$

$$15x^3 - 20x^2 + 13x - 12 = ax^3 - 2ax^2 + 2ax + bx^2 - 2bx + 2b + cx + d$$

$$15x^3 - 20x^2 + 13x - 12 = ax^3 - 2ax^2 + bx^2 + 2ax - 2bx + cx + 2b + d$$

$$15x^3 - 20x^2 + 13x - 12 = ax^3 - x^2(2a - b) + x(2a - 2b + c) + 2b + d$$

Equating the co-efficients of various powers of x on both sides, we get

On equating the co-efficient of x^3

$$ax^3 = 15x^3$$

$$a\cancel{x^3} = 15\cancel{x^3}$$

$$a = 15$$

On equating the co-efficient of x^2

$$2a - b = 20$$

Substituting $a = 15$, we get

$$2 \times 15 - b = 20$$

$$30 - b = 20$$

$$-b = 20 - 30$$

$$\cancel{-b} = \cancel{-}10$$

On equating the co-efficient of x

$$2a - 2b + c = 13$$

Substituting $a = 15$ and $b = 10$, we get

$$2 \times 15 - 2 \times 10 + c = 13$$

$$30 - 20 + c = 13$$

$$10 + c = 13$$

$$c = 13 - 10$$

$$c = 3$$

On equating constant term

$$2b + d = -12$$

Substituting $b = 10$, we get

$$2 \times 10 + d = -12$$

$$20 + d = -12$$

$$d = -12 - 20$$

$$d = -32$$

Therefore, quotient $q(x) = ax + b$

$$= 15x + 10$$

Remainder $r(x) = 3x - 32$

$$= 3x - 32$$

Hence, the quotient and remainder are $q(x) = 15x + 10$ and $r(x) = 3x - 32$.

***** END *****