Factorisation of Polynomials Ex 6.5 Q4

Answer :

Let $f(x) = x^4 - 7x^2 + 9x^2 + 7x - 10$ be the given polynomial.

Now, putting $x = 1$, we get

$$f(1) = (1)^4 - 7(1)^3 + 9(1)^2 + 7(1) - 10$$

$$= 1 - 7 + 9 + 7 - 10 = 0$$

Therefore, $(x-1)$ is a factor of polynomial $f(x)$.

Now,

$$f(x) = x^4 - x^3 - 6x^3 + 6x^2 + 3x^2 - 3x + 10x - 10$$

$$f(x) = x^3(x-1) - 6x^2(x-1) + 3x(x-1) + 10(x-1)$$

$$= (x-1)\{x^3 - 6x^2 + 3x + 10\}$$

$$= (x-1)g(x) \quad \ldots(i)$$

Where $g(x) = x^3 - 6x^2 + 32 + 10$

Putting $x = -1$, we get

$$g(-1) = (-1)^3 - 6(-1)^2 + 3(-1) + 10$$

$$= -1 - 6 - 3 + 10$$

$$= -10 + 10 = 0$$

Therefore, $(x+1)$ is a factor of $g(x)$.

Now,

$$g(x) = x^3 - 7x^2 + x^2 - 7x + 10x + 10$$

$$g(x) = x^2(x+1) - 7x(x+1) + 10(x+1)$$

$$= (x+1)\{x^2 - 7x + 10\}$$

$$= (x+1)\{x^2 - 7x + 10\}$$

$$= (x+1)\{x^2 - 5x - 2x + 10\}$$

$$= (x+1)(x-2)(x-5) \quad \ldots(ii)$$

From equation (i) and (ii), we get

$$f(x) = (x-1)(x+1)(x-2)(x-5)$$

Hence $(x+1), (x-1), (x-2)$ *and* $(x-5)$ are the factors of polynomial $f(x)$.

Factorisation of Polynomials Ex 6.5 Q5

Answer :

Let $f(x) = x^4 - 2x^3 - 7x^2 + 8x + 12$ be the given polynomial.

Now, putting $x = -1$, we get

$$\begin{aligned} f(-1) &= (-1)^4 - 2(-1)^3 - 7(-1)^2 + 8(-1) + 12 \\ &= 1 + 2 - 7 - 8 + 12 = -15 + 15 \\ &= 0 \end{aligned}$$

Therefore, $(x+1)$ is a factor of polynomial $f(x)$.

Now,

$$f(x) = x^4 - 3x^3 + x^3 - 3x^2 - 4x^2 + 12x - 4x + 12$$

$$\begin{aligned} f(x) &= x^3(x+1) - 3x^2(x+1) - 4x(x+1) + 12(x+1) \\ &= (x+1)\{x^3 - 3x^2 - 4x + 12\} \\ &= (x+1)g(x) \qquad \text{...(i)} \end{aligned}$$

Where $g(x) = x^3 - 3x^2 - 4x + 12$

Putting $x = 2$, we get

$$\begin{aligned} g(2) &= (2)^3 - 3(2)^2 - 4(2) + 12 \\ &= 8 - 12 - 8 + 12 = 20 - 20 \\ &= 0 \end{aligned}$$

Therefore, $(x-2)$ is the factor of $g(x)$.

Now,

$$g(x) = x^3 - 2x^2 - x^2 - 6x + 2x + 12$$

$$\begin{aligned} g(x) &= x^2(x-2) - x(x-2) - 6(x-2) \\ &= (x-2)\{x^2 - x - 6\} \\ &= (x-2)\{x^2 - 3x + 2x - 6\} \\ &= (x-2)(x+2)(x-3) \qquad \text{...(ii)} \end{aligned}$$

From equation (i) and (ii), we get

$$f(x) = (x+1)(x-2)(x+2)(x-3)$$

Hence $(x+1)$, $(x-2)$, $(x+2)$ *and* $(x-3)$ are the factors of polynomial $f(x)$.

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