Factorisation of Polynomials Ex 6.5 Q6

Answer :

Let $f(x) = x^4 + 10x^3 + 35x^2 + 50x + 24$ be the given polynomial.

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

$$\begin{aligned} f(-1) &= (-1)^4 + 10(-1)^3 + 35(-1)^2 + 50(-1) + 24 \\ &= 1 - 10 + 35 - 50 + 24 = 60 - 60 \\ &= 0 \end{aligned}$$

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

Now,

$$\begin{aligned} f(x) &= x^3(x+1) + 9x^2(x+1) + 26x(x+1) + 24(x+1) \\ &= (x+1)\{x^3 + 9x^2 + 26x + 24\} \\ &= (x+1)g(x) \qquad \text{...(i)} \end{aligned}$$

Where $g(x) = x^3 + 9x^2 + 26x + 24$

Putting $x = -2$, we get

$$\begin{aligned} g(-2) &= (-2)^3 + 9(-2)^2 + 26(-2) + 24 \\ &= -8 + 36 - 52 + 24 = 60 - 60 \\ &= 0 \end{aligned}$$

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

Now,

$$\begin{aligned} g(x) &= x^2(x+2) + 7x(x+2) + 12(x+2) \\ &= (x+2)\{x^2 + 7x + 12\} \\ &= (x+2)\{x^2 + 4x + 3x + 12\} \\ &= (x+2)(x+3)(x+4) \qquad \text{...(ii)} \end{aligned}$$

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

$$f(x) = (x+1)(x+2)(x+3)(x+4)$$

Hence $(x+1), (x+2), (x+3)$ *and* $(x+4)$ are the factors of polynomial $f(x)$.

Factorisation of Polynomials Ex 6.5 Q7

Answer :

Let $f(x) = 2x^4 - 7x^3 - 13x^2 + 63x - 45$ be the given polynomial.

Now, putting $x = 1$, we get

$$\begin{aligned} f(1) &= 2(1)^4 - 7(1)^3 - 13(1)^2 + 63(1) - 45 \\ &= 2 - 7 - 13 + 63 - 45 \\ &= 65 - 65 = 0 \end{aligned}$$

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

Now,

$$\begin{aligned} f(x) &= 2x^3(x-1) - 5x^2(x-1) - 18x(x-1) + 45(x-1) \\ &= (x-1)\{2x^3 - 5x^2 - 18x + 45\} \\ &= (x-1)g(x) \qquad \text{...(i)} \end{aligned}$$

Where $g(x) = 2x^2 - 5x^2 - 18x + 45$

Putting $x = 3$, we get

$$\begin{aligned} g(3) &= 2(3)^3 - 5(3)^2 - 18(3) + 45 \\ &= 54 - 45 - 54 + 45 \\ &= 0 \end{aligned}$$

Therefore, $(x-3)$ is a factor of $g(x)$.

Now,

$$\begin{aligned} g(x) &= 2x^2(x-3) + x(x-3) - 15(x-3) \\ &= (x-3)\{2x^2 + x - 15\} \\ &= (x-3)\{2x^2 + 6x - 5x - 15\} \\ &= (x-3)\{(2x-5)(x+3)\} \\ &= (x-3)(x+3)(2x-5) \qquad \text{...(ii)} \end{aligned}$$

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

$$f(x) = (x-1)(x-3)(x+3)(2x-5)$$

Hence $(x-1)$, $(x-3)$, $(x+3)$ *and* $(2x-5)$ are the factors of polynomial $f(x)$.

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