Factorisation of Polynomials Ex 6.4 Q16

Answer :

Let $f(x) = x^4 + px^3 + 2x^2 - 3x + q$ and $g(x) = x^2 - 1$ be the given polynomials.

We have,

$g(x) = x^2 - 1$

$\qquad = (x-1)(x+1)$

Here, $(x-1)$, $(x+1)$ are the factor of $g(x)$.

If $f(x)$ is divisible by $(x-1)$ and $(x+1)$, then $(x-1)$ and $(x+1)$ are factor of $f(x)$.

Therefore, $f(1)$ and $f(-1)$ both must be equal to zero.

Therefore,

$f(1) = (1)^4 + p(1)^3 + 2(1)^2 - 3(1) + q$

$\Rightarrow 1 + p + 2 - 3 + q = 0$

$p + q = 0 \qquad\qquad\qquad ...(i)$

and

$f(-1) = (-1)^4 + p(-1)^3 + 2(-1)^2 - 3(-1) + q = 0$

$\qquad\qquad 1 - p + 2 + 3 + q = 0$

$\qquad\qquad\qquad -p + q = -6 \qquad\qquad ...(ii)$

Adding both the equations, we get,

$(p+q) + (-p+q) = -6$

$\qquad\qquad 2q = -6$

$\qquad\qquad q = -3$

Putting this value in (i)

$p + (-3) = 0$

$\qquad p = 3$

Hence, the value of p and q are 3, -3 respectively.

Factorisation of Polynomials Ex 6.4 Q17

Answer :

Let $f(x) = x^4 + ax^3 - 3x^2 + 2x + b$ be the given polynomial.

By factor theorem, $(x+1)$ and $(x-1)$ are the factors of $f(x)$ if $f(-1)$ and $f(1)$ both are equal to zero.

Therefore,

$f(-1) = (-1)^4 + a(-1)^3 - 3(-1)^2 + 2(-1) + b = 0$

$\qquad\qquad 1 - a - 3 - 2 + b = 0$

$\qquad\qquad\qquad -a + b = 4 \qquad\qquad ...(i)$

and

$f(1) = (1)^4 + a(1)^3 - 3(1)^2 + 2(1) + b = 0$

$\qquad\qquad 1 + a - 3 + 2 + b = 0$

$\qquad\qquad\qquad a + b = 0 \qquad\qquad ...(ii)$

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

$2b = 4$

$\quad b = 2$

Putting this value in equation (i), we get,

$-a + 2 = 4$

$a = -2$

Hence, the value of a and b are -2 and 2 respectively.

Factorisation of Polynomials Ex 6.4 Q18

Answer :

Let $f(x) = x^3 + ax^2 - bx + 10$ and $g(x) = x^2 - 3x + 2$ be the given polynomials.

We have,

$$g(x) = x^2 - 3x + 2$$
$$= x^2 - 2x - x + 2$$
$$= (x - 2)(x - 1)$$

Here, $(x - 2)$ and $(x - 1)$ are the factors of $g(x)$,

Now,

By factor theorem,

$$f(2) = (2)^3 + a(2)^2 - b(2) + 10 = 0$$
$$8 + 4a - 2b + 10 = 0$$
$$4a - 2b + 18 = 0$$
$$2a - b = -9 \qquad \text{...(i)}$$

and

$$f(1) = (1)^3 + a(1)^2 - b(1) + 10 = 0$$
$$1 + a - b + 10 = 0$$
$$a - b = -11 \qquad \text{...(ii)}$$

Subtracting (ii) by (i), we get,

$$(2a - b) - (a - b) = -9 - (-11)$$

$$a = 2$$

Putting this value in equation (ii), we get,

$$2 - b = -11$$
$$b = 13$$

Hence, the value of a and b are 2 and 13 respectively.

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