Factorisation of Polynomials Ex 6.4 Q13

Answer :

Let $f(x) = k^2x^3 - kx^2 + 3kx - k$ be the given polynomial.

By the factor theorem,

$(x - 3)$ is a factor of $f(x)$ if $f(3) = 0$

Therefore,

$$f(3) = k^2(3)^3 - k(3)^2 + 3k(3) - k = 0$$

⇒27k2-9k+9k-k=0⇒27k2-k=0⇒k27k-1=0⇒k=0 or k=127

Hence, the value of k is 0 or $\frac{1}{27}$.

Factorisation of Polynomials Ex 6.4 Q14

Answer :

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

We have,

$$g(x) = x^2 - 4$$
$$= (x-2)(x+2)$$

$\{$because $a^2 - b^2 = (a-b)(a+b)\}$

$\Rightarrow (x-2), (x+2)$ are the factors of $g(x)$.

By factor theorem, if $(x-2)$ and $(x+2)$ both are the factor of $f(x)$

Then $f(2)$ and $f(-2)$ are equal to zero.

Therefore,

$$f(2) = a(2)^4 + 2(2)^3 - 3(2)^2 + b(2) - 4 = 0$$
$$16a + 16 - 12 + 2b - 4 = 0$$
$$16a + 2b = 0$$
$$8a + b = 0 \quad \text{...(i)}$$

and

$$f(2) = a(-2)^4 + 2(-2)^3 - 3(-2)^2 + b(-2) - 4 = 0$$
$$16a - 16 - 12 - 2b - 4 = 0$$
$$16a - 2b = 32$$
$$8a - b = 16 \quad \text{...(ii)}$$

Adding these two equations, we get

$$(8a + b) + (8a - b) = 16$$
$$16a = 16$$
$$a = 1$$

Putting the value of a in equation (i), we get

$$8 \times 1 + b = 0$$
$$b = -8$$

Hence, the value of a and b are 1, − 8 respectively.

Factorisation of Polynomials Ex 6.4 Q15

Answer :

Let $f(x)=x^3+3x^2-2\alpha x+\beta$ be the given polynomial.

By the factor theorem, $(x+1)$ and $(x+2)$ are the factor of the polynomial $f(x)$ if $f(-1)$ and $f(-2)$ both are equal to zero.

Therefore,

$$f(-1)=(-1)^3+3(-1)^2-2\alpha(-1)+\beta=0$$
$$\Rightarrow f(-1)=-1+3+2\alpha+\beta=0$$
$$\Rightarrow 2\alpha+\beta=-2 \qquad \ldots\text{(i)}$$

and

$$f(-2)=(-2)^3+3(-2)^2-2\alpha(-2)+\beta=0$$
$$-8+12+4\alpha+\beta=0$$
$$4\alpha+\beta=-4 \qquad \text{...(ii)}$$

Subtracting (i) from (ii)

We get,

$$(4\alpha+\beta)-(2\alpha+\beta)=-2$$
$$2\alpha=-2$$
$$\alpha=-1$$

Putting the value of α in equation (i), we get

$$2\times(-1)+\beta=-2$$
$$-2+\beta=-2$$
$$\beta=0$$

Hence, the value of α and β are -1, 0 respectively.

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