

Factorisation of Polynomials Ex 6.4 Q13

## Answer:

Let  $f(x) = k^2 x^3 - kx^2 + 3kx - k$  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.

$$g(x) = x2 - 4$$
$$= (x-2)(x+2)$$

{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,

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

$$16a + 16 - 12 + 2b - 4 = 0$$

$$16a + 2b = 0$$

$$8a + b = 0$$
 ...(i)

and

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

$$16a - 16 - 12 - 2b - 4 = 0$$

$$16a - 2b = 32$$

$$8a - b = 16 \qquad \dots(ii)$$

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,

$$f(-1) = (-1)^3 + 3(-1)^2 - 2\alpha(-1) + \beta = 0$$
  

$$\Rightarrow f(-1) = -1 + 3 + 2\alpha + \beta = 0$$
  

$$\Rightarrow 2\alpha + \beta = -2 \qquad \dots (i)$$

and

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

Subtracting (i) from (ii)

We get,

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

Putting the value of  $\alpha$  in equation (i), we get

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

Hence, the value of  $\alpha$  and  $\beta$  are -1, 0 respectively.

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