Exercise 2D

Question 13:

Let $f(x) = (x^3 - 10x^2 + ax + b)$, then by factor theorem

$(x - 1)$ and $(x - 2)$ will be factors of $f(x)$ if $f(1) = 0$ and $f(2) = 0$.

$f(1) = 1^3 - 10 \square 1^2 + a \square 1 + b = 0$

$\Rightarrow 1 - 10 + a + b = 0$

$\Rightarrow a + b = 9$ ....(i)

And $f(2) = 2^3 - 10 \square 2^2 + a \square 2 + b = 0$

$\Rightarrow 8 - 40 + 2a + b = 0$

$\Rightarrow 2a + b = 32$ ....(ii)

Subtracting (i) from (ii), we get

$a = 23$

Substituting the value of $a = 23$ in (i), we get

$\Rightarrow 23 + b = 9$

$\Rightarrow b = 9 - 23$

$\Rightarrow b = -14$

$\therefore a = 23$ and $b = -14$.

Question 14:

Let $f(x) = (x^4 + ax^3 - 7x^2 - 8x + b)$

Now, $x + 2 = 0$ $x = -2$ and $x + 3 = 0$ $x = -3$

By factor theorem, $(x + 2)$ and $(x + 3)$ will be factors of $f(x)$ if $f(-2) = 0$ and $f(-3) = 0$

$\therefore f(-2) = (-2)^4 + a(-2)^3 - 7(-2)^2 - 8(-2) + b = 0$

$\Rightarrow 16 - 8a - 28 + 16 + b = 0$

$\Rightarrow -8a + b = -4$

$\Rightarrow 8a - b = 4$ ....(i)

And, $f(-3) = (-3)^4 + a(-3)^3 - 7(-3)^2 - 8(-3) + b = 0$

$\Rightarrow 81 - 27a - 63 + 24 + b = 0$

$\Rightarrow -27a + b = -42$

$\Rightarrow 27a - b = 42$ ....(ii)

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

$19a = 38$

So, $a = 2$

Substituting the value of $a = 2$ in (i), we get

$8(2) - b = 4$

$\Rightarrow 16 - b = 4$

$\Rightarrow -b = -16 + 4$

$\Rightarrow -b = -12$

$\Rightarrow b = 12$

$\therefore a = 2$ and $b = 12$.

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