Exercise 2D

Question 11:

$f(x) = x^4 - x^3 - 11x^2 - x + a$

$x + 3 = 0 \Rightarrow x = -3$

$\therefore f(-3) = (-3)^4 - (-3)^3 - 11(-3)^2 - (-3) + a$

$= 81 + 27 - 11 \times 9 + 3 + a$

$= 81 + 27 - 99 + 3 + a$

$= 111 - 99 + a$

$= 12 + a$

Given that f(x) is divisible by (x + 3), that is (x+3) is a factor of f(x).

By the Factor Theorem, (x - a) will be a factor of f(x) if f(a) = 0 and therefore f(-3) = 0.

$\Rightarrow f(-3) = 12 + a = 0$

$\Rightarrow a = -12.$

Question 12:

$f(x) = (2x^3 + ax^2 + 11x + a + 3)$

$2x - 1 = 0 \Rightarrow x = 1/2$

Given that f(x) is exactly divisible by (2x - 1), that is (2x - 1) is a factor of f(x).

By the Factor Theorem, (x - a) will be a factor of f(x) if f(a) = 0

and therefore $f\left(\frac{1}{2}\right) \neq 0.$

Therefore, we have

$$f\left(\frac{1}{2}\right) = 2\left(\frac{1}{2}\right)^3 + a\left(\frac{1}{2}\right)^2 + 11 \times \frac{1}{2} + a + 3 = 0$$

$$\Rightarrow 2 \times \frac{1}{8} + a \times \frac{1}{4} + \frac{11}{2} + a + 3 = 0$$

$$\Rightarrow \frac{1}{4} + \frac{1}{4}a + \frac{11}{2} + a + 3 = 0$$

$$\Rightarrow \frac{1 + a + 22 + 4a + 12}{4} = 0$$

$$\Rightarrow \frac{5a + 35}{4} = 0$$

$$\Rightarrow 5a + 35 = 0$$

$$\Rightarrow 5a = -35$$

$$\Rightarrow a = \frac{-35}{5} = -7$$

$\therefore$ The value of a = -7.

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