

## SAMPLE PAPER 2: PAPER 1

### QUESTION 6 (25 MARKS)

#### Question 6 (a)

$$y = 2x^3 - 3x^2 - 12x + 4$$

$$\frac{dy}{dx} = 6x^2 - 6x - 12$$

$$\frac{dy}{dx} = 0 \Rightarrow 6x^2 - 6x - 12 = 0 \quad \text{[The slope of the tangent is zero. Put the derivative equal to zero and solve for x.]}$$

$$x^2 - x - 2 = 0$$

$$(x+1)(x-2) = 0$$

$$\therefore x = -1, 2$$

$$x = -1: y = 2(-1)^3 - 3(-1)^2 - 12(-1) + 4 \\ = -2 - 3 + 12 + 4 = 11$$

$$x = 2: y = 2(2)^3 - 3(2)^2 - 12(2) + 4 \\ = 16 - 12 - 24 + 4 = -16$$

Turning points:  $(-1, 11)$ ,  $(2, -16)$

#### Question 6 (b) (i)

$$f(x) = x^2 + kx + 10$$

$$f'(x) = 2x + k$$

#### Question 6 (b) (ii)

$$f'(3) = 0 \Rightarrow 2(3) + k = 0$$

$$6 + k = 0$$

$$\therefore k = -6$$

#### Question 6 (b) (iii)

$$f(x) = x^2 - 6x + 10$$

$$f'(x) = 2x - 6$$

$$f(0) = 10 \Rightarrow (0, 10) \in t$$

$$f'(0) = m = -6$$

Equation of  $t$ : Point  $(0, 10)$ ,  $m = -6$

$$y - 10 = -6(x - 0) \quad \boxed{y - y_1 = m(x - x_1)}$$

$$y - 10 = -6x$$

$$6x + y - 10 = 0$$