Tangents and Normals Ex 16.1 Q8

The given equation of the curve is

$$y = x^2 \qquad ---(i)$$

$\therefore$ Slope of tangent to (i) is

$$\frac{dy}{dx} = 2x \qquad ---(ii)$$

According to the question

$$\frac{dy}{dx} = x \qquad ---(iii) \qquad [\text{Slope} = x\text{-coordinate}]$$

From (ii) and (iii)

$$2x = x$$

$$\Rightarrow \quad x = 0 \ \& \ y = 0$$

Thus, the required point is $(0,0)$

Tangents and Normals Ex 16.1 Q9

The given equation of the curve is

$$x^2 + y^2 - 2x - 4y + 1 = 0 \qquad ---(i)$$

Differentiating with respect is x, we get

$$2x + 2y\frac{dy}{dx} - 2 - 4\frac{dy}{dx} = 0$$

$$\Rightarrow \quad \frac{dy}{dx}(2y - 4) = 2 - 2x$$

$$\Rightarrow \quad \frac{dy}{dx} = \frac{2(1-x)}{2(y-2)} \qquad ---(ii)$$

According to the question the tangent is parallel to x-axis, so $\theta = 0°$

$$\therefore \quad \text{Slope} = \tan\theta = \tan 0° = 0 \qquad ---(iii)$$

From (ii) and (iii), we get

$$\frac{1-x}{y-2} = 0$$

$$\Rightarrow \quad 1 - x = 0$$

$$\Rightarrow \quad x = 1$$

$\therefore$ from (i)

$$y = 0, 4$$

Thus, the points are $(1,0)$ and $(1,4)$

Tangents and Normals Ex 16.1 Q10

The given equation of curve is

$$y = x^2 \qquad \text{---(i)}$$

$$\therefore \quad \text{Slope} = \frac{dy}{dx} = 2x \qquad \text{---(ii)}$$

As per question

$$\text{slope} = \tan 45° = 1 \qquad \text{---(iii)}$$

From (ii) and (iii), we have

$$2x = 1$$

$$\Rightarrow \quad x = \frac{1}{2}$$

$\therefore$ From (i)

$$y = \frac{1}{4}$$

Thus, the required point is

$$\left(\frac{1}{2}, \frac{1}{4}\right)$$

Tangents and Normals Ex 16.1 Q11

The given equation of the curve is

$$y = 3x^2 - 9x + 8 \qquad \text{---(i)}$$

$$\text{Slope} = \frac{dy}{dx} = 6x - 9 \qquad \text{---(ii)}$$

As per question

The tangent is equally inclined to the axes

$$\therefore \quad \theta = \frac{\pi}{4} \text{ or } \frac{-\pi}{4}$$

$$\therefore \quad \text{Slope} = \tan\theta$$

$$= \tan\frac{\pi}{4} \text{ or } \tan\left(\frac{-\pi}{4}\right)$$

$$= 1 \text{ or } -1 \qquad \text{---(iii)}$$

From (ii) and (iii), we have,

$$6x - 9 = 1 \quad \text{or} \quad 6x - 9 = -1$$

$$\Rightarrow \quad x = \frac{5}{3} \quad \text{or} \quad x = \frac{4}{3}$$

So, from (i)

$$y = \frac{4}{3} \quad \text{or} \quad y = \frac{4}{3}$$

Thus, the points are

$$\left(\frac{5}{3}, \frac{4}{3}\right) \text{ or } \left(\frac{4}{3}, \frac{4}{3}\right)$$

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