Tangents and Normals Ex 16.2 Q14

The equation of the given curve is $y = \frac{1}{x-3}$, $x \neq 3$.

The slope of the tangent to the given curve at any point (x, y) is given by,

$$\frac{dy}{dx} = \frac{-1}{(x-3)^2}$$

If the slope of the tangent is 2, then we have:

$$\frac{-1}{(x-3)^2} = 2$$

$$\Rightarrow 2(x-3)^2 = -1$$

$$\Rightarrow (x-3)^2 = \frac{-1}{2}$$

This is not possible since the L.H.S. is positive while the R.H.S. is negative.

Hence, there is no tangent to the given curve having slope 2.

Tangents and Normals Ex 16.2 Q15

The slope of the tangent to the given curve at any point (x, y) is given by,

$$\frac{dy}{dx}=\frac{-(2x-2)}{\left(x^2-2x+3\right)^2}=\frac{-2(x-1)}{\left(x^2-2x+3\right)^2}$$

If the slope of the tangent is 0, then we have:

$$\frac{-2(x-1)}{\left(x^2-2x+3\right)^2}=0$$

$$\Rightarrow -2(x-1)=0$$
$$\Rightarrow x=1$$

When $x=1,\ y=\frac{1}{1-2+3}=\frac{1}{2}$.

$\therefore$The equation of the tangent through $\left(1,\ \frac{1}{2}\right)$ is given by,

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

Hence, the equation of the required line is y = ½.

Tangents and Normals Ex 16.2 Q16

The equation of the given curve is $y=\sqrt{3x-2}$.

The slope of the tangent to the given curve at any point (x, y) is given by,

$$\frac{dy}{dx}=\frac{3}{2\sqrt{3x-2}}$$

The equation of the given line is $4x-2y+5=0$.

$4x-2y+5=0 \Rightarrow y=2x+\frac{5}{2}$ (which is of the form $y=mx+c$)

$\therefore$Slope of the line = 2

Now, the tangent to the given curve is parallel to the line $4x-2y-5=0$ if the slope of the tangent is equal to the slope of the line.

$$\frac{3}{2\sqrt{3x-2}}=2$$
$$\Rightarrow \sqrt{3x-2}=\frac{3}{4}$$

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