Trigonometric Functions Ex 5.2 Q 4

We have,

$$\sin\theta + \cos\theta = 0$$

$$\Rightarrow \quad \sin\theta = -\cos\theta \text{ ------ (i)}$$

$$\Rightarrow \quad \frac{\sin\theta}{\cos\theta} = -1$$

$$\Rightarrow \quad \tan\theta = -1$$

We know that,

$$\sec^2\theta - \tan^2\theta = 1$$

$$\Rightarrow \quad \sec^2\theta = 1 + \tan^2\theta$$

$$\Rightarrow \quad \sec\theta = \pm\sqrt{1 + \tan^2\theta}$$

In the 4^{th} quadrant $\sec\theta$ is positive.

$$\therefore \quad \sec\theta = \sqrt{1 + \tan^2\theta}$$

$$= \sqrt{1 + (-1)^2}$$

$$= \sqrt{1 + 1}$$

$$= \sqrt{2}$$

$$\therefore \quad \cos\theta = \frac{1}{\sec\theta} = \frac{1}{\sqrt{2}}$$

putting $\cos\theta = \frac{1}{\sqrt{2}}$ in equation (i), we get,

$$\sin\theta = -\left(\frac{1}{\sqrt{2}}\right) = -\frac{1}{\sqrt{2}}$$

Hence, $\sin\theta = -\frac{1}{\sqrt{2}}$ and $\cos\theta = \frac{1}{\sqrt{2}}$.

Chapter 5 Trigonometric Functions Ex 5.2 Q 5.

We have,

$$\cos\theta = -\frac{3}{5}, \quad \text{and } \pi < \theta < \frac{3\pi}{2}$$

$\Rightarrow$ θ lies in the 3rd quadrant

We know that,

$\Rightarrow$ $\sin\theta = \pm\sqrt{1-\cos^2\theta}$

In the 3rd quadrant $\sin\theta$ is negative and $\tan\theta$ is positive.

$\therefore$ $\sin\theta = -\sqrt{1-\cos^2\theta}$

$$= -\sqrt{1-\left(-\frac{3}{5}\right)^2} \qquad \left[\because \quad \cos\theta = -\frac{3}{5}\right]$$

$$= -\sqrt{1-\frac{9}{25}}$$

$$= -\sqrt{\frac{16}{25}}$$

$$= -\frac{4}{5}$$

$\Rightarrow$ $\sin\theta = -\frac{4}{5}$

and, $\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\frac{-4}{5}}{\frac{-3}{5}} = \frac{4}{5}$

Now, $\operatorname{cosec}\theta = \frac{1}{\sin\theta} = \frac{1}{\frac{-4}{5}} = \frac{-5}{4}$

$\sec\theta = \frac{1}{\cos\theta} = \frac{1}{\frac{-3}{5}} = \frac{-5}{3}$

and, $\cot\theta = \frac{1}{\tan\theta} = \frac{1}{\frac{4}{3}} = \frac{3}{4}$

$$\therefore \quad \frac{\operatorname{cosec}\theta + \cot\theta}{\sec\theta - \tan\theta} = \frac{\frac{-5}{4} + \frac{3}{4}}{\frac{-5}{3} - \frac{4}{3}}$$

$$= \frac{\frac{-5+3}{4}}{\frac{-5-4}{3}}$$

$$= \frac{-\frac{2}{4}}{-\frac{9}{3}}$$

$$= \frac{2}{4} \times \frac{3}{9}$$

$$= \frac{1}{6}$$

$$\therefore \quad \frac{\operatorname{cosec}\theta + \cot\theta}{\sec\theta - \tan\theta} = \frac{1}{6}$$

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