



Trigonometric Equations Ex 11.1 Q3(iii)

We have,

$$\begin{aligned}
 & 2 \sin^2 x + \sqrt{3} \cos x + 1 = 0 \\
 \Rightarrow & 2(1 - \cos^2 x) + \sqrt{3} \cos x + 1 = 0 \\
 \Rightarrow & 2 \cos^2 x - \sqrt{3} \cos x - 3 = 0 \\
 & \text{factorise it, we get,} \\
 \Rightarrow & 2 \cos^2 x - 2\sqrt{3} \cos x + \sqrt{3} \cos x - 3 = 0 \\
 \Rightarrow & 2 \cos x (\cos x - \sqrt{3}) + \sqrt{3} (\cos x - \sqrt{3}) = 0 \\
 \Rightarrow & (2 \cos x + \sqrt{3})(\cos x - \sqrt{3}) = 0 \\
 \Rightarrow & \text{either} \\
 & \cos x = -\frac{\sqrt{3}}{2} \quad \text{or} \quad \cos x = \sqrt{3} \quad [\text{This is not possible as } -1 < \cos x < 1] \\
 \Rightarrow & \cos x = \cos \left(\pi - \frac{\pi}{6} \right) \\
 \Rightarrow & \cos x = \cos \frac{5\pi}{6} \\
 \Rightarrow & x = 2n\pi \pm \frac{5\pi}{6}, n \in \mathbb{Z}
 \end{aligned}$$

Trigonometric Equations Ex 11.1 Q3(vi)

We have,

$$\begin{aligned}
 & 4 \sin^2 \theta - 8 \cos \theta + 1 = 0 \\
 \Rightarrow & 4(1 - \cos^2 \theta) - 8 \cos \theta + 1 = 0 \\
 \Rightarrow & 4 \cos^2 \theta + 8 \cos \theta - 5 = 0 \\
 & \text{factorise it, we get,} \\
 \Rightarrow & 4 \cos^2 \theta + 10 \cos \theta - 2 \cos \theta - 5 = 0 \\
 \Rightarrow & 2 \cos \theta (2 \cos \theta + 5) - 1(2 \cos \theta + 5) = 0 \\
 \Rightarrow & (2 \cos \theta - 1)(2 \cos \theta + 5) = 0 \\
 & \text{either } 2 \cos \theta - 1 = 0 \quad \text{or} \quad 2 \cos \theta + 5 = 0 \\
 \Rightarrow & \cos \theta = \frac{1}{2} \quad \text{or} \quad \cos \theta = -\frac{5}{2} \quad [\text{This is not possible as } -1 < \cos \theta < 1] \\
 \Rightarrow & \cos \theta = \cos \frac{\pi}{3} \\
 \Rightarrow & \theta = 2n\pi \pm \frac{\pi}{3}, n \in \mathbb{Z}
 \end{aligned}$$

Trigonometric Equations Ex 11.1 Q3(v)

We have,

$$\begin{aligned}
 & \tan^2 x + (1 - \sqrt{3}) \tan x - \sqrt{3} = 0 \\
 \Rightarrow & \tan^2 x + \tan x - \sqrt{3} \tan x - \sqrt{3} = 0 \\
 \Rightarrow & \tan x (\tan x + 1) - \sqrt{3} (\tan x + 1) = 0 \\
 \Rightarrow & (\tan x - \sqrt{3})(\tan x + 1) = 0 \\
 \Rightarrow & \text{either} \\
 & \tan x = \sqrt{3} \quad \text{or} \quad \tan x = -1 \\
 \Rightarrow & \tan x = \tan \frac{\pi}{3} \quad \text{or} \quad \tan x = -\tan \frac{\pi}{4} \\
 \Rightarrow & x = n\pi + \frac{\pi}{3}, n \in \mathbb{Z} \quad \text{or} \quad x = m\pi - \frac{\pi}{4}, m \in \mathbb{Z} \\
 \therefore & x = n\pi + \frac{\pi}{3} \quad \text{or} \quad m\pi - \frac{\pi}{4}, n, m \in \mathbb{Z}
 \end{aligned}$$

Trigonometric Equations Ex 11.1 Q3(vi)

$$3\cos^2 \theta - 2\sqrt{3}\sin\theta\cos\theta - 3\sin^2 \theta = 0$$

$$\sqrt{3}\cos^2 \theta - 2\sin\theta\cos\theta - \sqrt{3}\sin^2 \theta = 0 \quad (\text{Dividing by } \sqrt{3})$$

$$\sqrt{3}\cos^2 \theta + \sin\theta\cos\theta - 3\sin\theta\cos\theta - \sqrt{3}\sin^2 \theta = 0$$

$$\cos\theta(\sqrt{3}\cos\theta + \sin\theta) - \sqrt{3}\sin\theta(\sqrt{3}\cos\theta + \sin\theta) = 0$$

$$(\sqrt{3}\cos\theta + \sin\theta)(\cos\theta - \sqrt{3}\sin\theta) = 0$$

$$\sqrt{3}\cos\theta + \sin\theta = 0 \quad \text{or} \quad \cos\theta - \sqrt{3}\sin\theta = 0$$

$$\tan\theta = -\sqrt{3} = -\tan\frac{\pi}{3} \quad \text{or} \quad \tan\theta = \frac{1}{\sqrt{3}} = \tan\frac{\pi}{6}$$

$$\theta = n\pi - \frac{\pi}{3} \quad \text{or} \quad \theta = m\pi + \frac{\pi}{6}$$

$$n, m \in \mathbb{Z}$$

***** END *****