Trigonometric Equations Ex 11.1 Q5(iii)

We have,

$\tan 3\theta + \tan\theta = 2\tan 2\theta$

$\Rightarrow \quad \tan 3\theta - \tan 2\theta = \tan 2\theta - \tan\theta$

$\Rightarrow \quad \tan 3\theta - \tan 2\theta = \tan 2\theta - \tan\theta$

$\Rightarrow \quad 2\sin^2\theta \sin 2\theta = 0$

$\Rightarrow$ either

$\sin\theta = 0 \quad$ or $\quad \sin 2\theta = 0$

$\Rightarrow \quad \theta = n\pi, n \in z \quad$ or $\quad 2\theta = m\pi, m \in z$

$\Rightarrow \quad \theta = n\pi, n \in z \quad$ or $\quad \theta = m\frac{\pi}{2}, m \in z$

Trigonometric Equations Ex 11.1 Q6(i)

We have,

$\sin\theta + \cos\theta = \sqrt{2}$

$\Rightarrow \quad \frac{1}{\sqrt{2}}\sin\theta + \frac{1}{\sqrt{2}}\cos\theta = 1$

$\Rightarrow \quad \sin\frac{\pi}{4}\sin\theta + \cos\frac{\pi}{4}\cos\theta = 1 \qquad \left[\because \cos\frac{\pi}{4} = \sin\frac{\pi}{4} = \frac{1}{\sqrt{2}}\right]$

$\Rightarrow \quad \cos\left(\theta - \frac{\pi}{4}\right) = \cos 0^\circ$

$\Rightarrow \quad \theta - \frac{\pi}{4} = 2n\pi, n \in z$

$\Rightarrow \quad \theta = 2n\pi + \frac{\pi}{4}, n \in z$

$\therefore \quad \theta = (8n+1)\frac{\pi}{4}, n \in z$

Trigonometric Equations Ex 11.1 Q6(ii)

$\sqrt{3}\cos\theta + \sin\theta = 1$

Divide both side by 2, we get

$\frac{\sqrt{3}}{2}\cos\theta + \frac{1}{2}\sin\theta = \frac{1}{2}$

$\Rightarrow \quad \cos\frac{\pi}{6}\cos\theta + \sin\frac{\pi}{6}\sin\theta = \frac{1}{2} \qquad \left[\because \sin\frac{\pi}{6} = \frac{1}{2}, \cos\frac{\pi}{6} = \frac{\sqrt{3}}{2}\right]$

$\Rightarrow \quad \cos\left(\theta - \frac{\pi}{6}\right) = \cos\frac{\pi}{3}$

$\Rightarrow \quad \theta = \frac{\pi}{6} = 2n \pm \frac{\pi}{3}, n \in z$

$\Rightarrow \quad \theta = 2n\pi \pm \frac{\pi}{3} + \frac{\pi}{6}, n \in z$

$\Rightarrow \quad \theta = (4n+1)\frac{\pi}{2} \quad$ or $\quad (12m-1)\frac{\pi}{6}, n, m \in z$

Trigonometric Equations Ex 11.1 Q6(iii)

We have,

$\sin\theta + \cos\theta = 1$

divide both side by $\sqrt{2}$, we get,

$$\Rightarrow \quad \frac{1}{\sqrt{2}}\sin\theta + \frac{1}{\sqrt{2}}\cos\theta = \frac{1}{\sqrt{2}}$$

$$\Rightarrow \quad \sin\frac{\pi}{4}\sin\theta + \cos\frac{\pi}{4}\cos\theta = \frac{1}{\sqrt{2}}$$

$$\Rightarrow \quad \cos\left(\theta - \frac{\pi}{4}\right) = \cos\frac{\pi}{4}$$

$$\Rightarrow \quad \theta = \frac{\pi}{4} = 2n\pi \pm \frac{\pi}{4}, n \in z$$

$$\Rightarrow \quad \theta = 2n\pi + \frac{\pi}{2} \quad \text{or} \quad 2n\pi, n \in z$$

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