



Trigonometric Equations Ex 11.1 Q2(iii)

$$\sin 9\theta = \sin \theta$$

$$\sin 9\theta - \sin \theta = 0$$

Apply $\sin A - \sin B$ formula

$$\sin A - \sin B = 2 \cos \left(\frac{A+B}{2} \right) \sin \left(\frac{A-B}{2} \right)$$

$$\sin 9\theta - \sin \theta = 2 \cos 5\theta \sin 4\theta = 0$$

$$\cos 5\theta \sin 4\theta = 0$$

$$\Rightarrow \cos 5\theta = 0 \text{ (or) } \sin 4\theta = 0$$

$$5\theta = \frac{(2n+1)\pi}{2} \text{ (or) } 4\theta = n\pi$$

$$\theta = \left\{ \frac{(2n+1)\pi}{10} \right\} \text{ (or) } \theta = \left\{ \frac{n\pi}{4} \right\} \text{ where } n \in \mathbb{Z}$$

Trigonometric Equations Ex 11.1 Q2(vi)

We have,

$$\sin 2\theta = \cos 3\theta$$

$$\Rightarrow \cos 3\theta = \sin 2\theta$$

$$\Rightarrow \cos 3\theta = \cos \left(\frac{\pi}{2} - 2\theta \right) \quad \left[\because \cos \left(\frac{\pi}{2} - \theta \right) = \sin \theta \right]$$

$$\Rightarrow 3\theta = 2n\pi \pm \left(\frac{\pi}{2} - 2\theta \right), n \in \mathbb{Z}$$

\Rightarrow either

$$5\theta = 2n\pi + \frac{\pi}{2}, n \in \mathbb{Z} \text{ or } \theta = 2n\pi - \frac{\pi}{2}, n \in \mathbb{Z}$$

$$\Rightarrow 5\theta = (4n+1)\frac{\pi}{2}, n \in \mathbb{Z} \text{ or } \theta = (4n-1)\frac{\pi}{2}$$

$$\Rightarrow \theta = (4n+1)\frac{\pi}{10}, n \in \mathbb{Z} \text{ or } \theta = (4n-1)\frac{\pi}{2}, n \in \mathbb{Z}$$

Trigonometric Equations Ex 11.1 Q2(v)

We have,

$$\tan \theta + \cot 2\theta = 0$$

$$\tan \theta = -\cot 2\theta$$

$$\Rightarrow \cot 2\theta = -\tan \theta$$

$$\Rightarrow \tan 2\theta = -\cot \theta$$

$$\Rightarrow \tan 2\theta = -\tan \left(\frac{\pi}{2} - \theta \right)$$

$$\Rightarrow \tan 2\theta = \tan \left(\theta - \frac{\pi}{2} \right)$$

$$\Rightarrow 2\theta = n\pi + \left(\theta - \frac{\pi}{2} \right), n \in \mathbb{Z}$$

$$\Rightarrow \theta = n\pi - \frac{\pi}{2}, n \in \mathbb{Z}$$

Trigonometric Equations Ex 11.1 Q2(vi)

We have,

$$\tan 3\theta = \cot \theta$$

$$\Rightarrow \tan 3\theta = \tan \left(\frac{\pi}{2} - \theta \right) \quad \left[\because \tan \left(\frac{\pi}{2} - \theta \right) = \cot \theta \right]$$

$$\Rightarrow 3\theta = n\pi + \frac{\pi}{2} - \theta, n \in \mathbb{Z}$$

$$\Rightarrow 4\theta = n\pi + \frac{\pi}{2}, n \in \mathbb{Z}$$

$$\Rightarrow \theta = \frac{n\pi}{4} + \frac{\pi}{8}, n \in \mathbb{Z}$$

***** END *****