



Trigonometric Equations Ex 11.1 Q3(vii)

We have,

$$\cos 4\theta = \cos 2\theta$$

$$\Rightarrow \cos 4\theta - \cos 2\theta = 0$$

$$\Rightarrow 2 \sin \theta \cdot \sin 3\theta = 0$$

\Rightarrow either

$$\sin \theta = 0 \quad \text{or} \quad \sin 3\theta = 0$$

$$\Rightarrow \theta = n\pi, n \in \mathbb{Z} \quad \text{or} \quad 3\theta = m\pi, m \in \mathbb{Z}$$

Thus,

$$\theta = n\pi \quad \text{or} \quad m\frac{\pi}{3}, n, m \in \mathbb{Z}$$

Trigonometric Equations Ex 11.1 Q4(i)

$$\cos \theta + \cos 2\theta + \cos 3\theta = 0$$

$$\Rightarrow \cos 2\theta + 2\cos 2\theta \cdot \cos \theta = 0 \quad [\because \cos \theta + \cos 3\theta = 2\cos 2\theta \cdot \cos \theta]$$

$$\Rightarrow \cos 2\theta (1 + 2\cos \theta) = 0$$

either

$$\cos 2\theta = 0 \quad \text{or} \quad 1 + 2\cos \theta = 0$$

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

$$\Rightarrow \theta = (2n+1)\frac{\pi}{4}, n \in \mathbb{Z} \quad \text{or} \quad \cos \theta = +\cos\left(\pi - \frac{\pi}{3}\right)$$

$$\text{or} \quad \cos \theta = \cos 2\frac{\pi}{3}$$

$$\text{or} \quad \theta = 2n\pi \pm \frac{2\pi}{3}, n \in \mathbb{Z}$$

Thus,

$$\theta = (2n+1)\frac{\pi}{4}, \quad \text{or} \quad \left(2n\pi \pm \frac{2\pi}{3}\right), n \in \mathbb{Z}$$

Trigonometric Equations Ex 11.1 Q4(ii)

$$\cos \theta + \cos 3\theta - \cos 2\theta = 0$$

$$\Rightarrow 2\cos 2\theta \cdot \cos \theta - \cos 2\theta = 0$$

$$\Rightarrow \cos 2\theta (2\cos \theta - 1) = 0$$

either

$$\cos 2\theta = 0 \quad \text{or} \quad 2\cos \theta = 1$$

$$\Rightarrow 2\theta = (2n+1)\frac{\pi}{2}, n \in \mathbb{Z} \quad \text{or} \quad \cos \theta = \frac{1}{2} = \cos \frac{\pi}{3}$$

$$\Rightarrow \theta = (2n+1)\frac{\pi}{4}, n \in \mathbb{Z} \quad \text{or} \quad \theta = 2m\pi \pm \frac{\pi}{3}, m \in \mathbb{Z}$$

Trigonometric Equations Ex 11.1 Q4(iii)

$$\sin \theta + \sin 5\theta = \sin 3\theta$$

$$\Rightarrow 2 \sin 3\theta \cos 2\theta - \sin 3\theta = 0 \quad \left[\because \sin C + \sin D = 2 \sin \frac{C+D}{2} \cdot \cos \frac{C-D}{2} \right]$$

$$\Rightarrow \sin 3\theta [2 \cos 2\theta - 1] = 0$$

\Rightarrow either

$$\sin 3\theta = 0 \quad \text{or} \quad 2 \cos 2\theta - 1 = 0$$

$$\Rightarrow 3\theta = n\pi, n \in \mathbb{Z} \quad \text{or} \quad \cos 2\theta = \frac{1}{2} = \cos \frac{\pi}{3}$$

$$\Rightarrow \theta = \frac{n\pi}{3}, n \in \mathbb{Z} \quad \text{or} \quad 2\theta = 2m\pi \pm \frac{\pi}{3}, m \in \mathbb{Z}$$

$$\text{or} \quad \theta = m\pi \pm \frac{\pi}{6}$$

Thus,

$$\theta = \frac{n\pi}{3} \quad \text{or} \quad m\pi \pm \frac{\pi}{6}, n, m \in \mathbb{Z}$$

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