Trigonometric Equations Ex 11.1 Q2(iii)

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

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

Apply sin A - sin B formula

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

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

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

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

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

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

Trigonometric Equations Ex 11.1 Q2(vi)

We have,

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

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

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

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

$\Rightarrow$ either

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

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

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

Trigonometric Equations Ex 11.1 Q2(v)

We have,

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

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

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

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

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

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

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

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

Trigonometric Equations Ex 11.1 Q2(vi)

We have,

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

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

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

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

$$\Rightarrow \quad \theta = \frac{n\pi}{4} + \frac{\pi}{8}, n \in z$$

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