Trigonometric Equations Ex 11.1 Q4(viii)

We have,

$$\sin 3\theta - \sin\theta = 4\cos^2\theta - 2$$

$$\Rightarrow \quad 2\cos 2\theta.\ \sin\theta = 2\left(2\cos^2\theta - 1\right)$$

$$\Rightarrow \quad 2\cos 2\theta.\ \sin\theta = 2\cos 2\theta \qquad \left[\because \cos 2\theta = 2\cos^2\theta - 1\right]$$

$$\Rightarrow \quad 2\cos 2\theta\left(\sin\theta - 1\right) = 0$$

either

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

$$\Rightarrow \quad 2\theta = \left(2n+1\right)\frac{\pi}{2}, n \in z \quad \text{or} \quad \sin\theta = 1 = \sin\frac{\pi}{2}$$

$$\Rightarrow \quad \theta = \left(2n+1\right)\frac{\pi}{4}, n \in z \quad \text{or} \quad \theta = m\pi + \left(-1\right)^m \frac{\pi}{2}, m \in z$$

Thus,

$$\theta = \left(2n+1\right)\frac{\pi}{4}, n \in z \quad \text{or} \quad m\pi + \left(-1\right)^m \frac{\pi}{2}, m \in z$$

Trigonometric Equations Ex 11.1 Q4(viii)

$\sin 2x - \sin 4x + \sin 6x = 0$

$(\sin 2x + \sin 6x) - \sin 4x = 0$

$2.\sin\left(\dfrac{8x}{2}\right).\cos\left(\dfrac{4x}{2}\right) - \sin 4x = 0$

$2\sin 4x.\cos 2x - \sin 4x = 0$

$\sin 4x\ (2\cos 2x - 1) = 0$

$\sin 4x = 0$ or $2\cos 2x - 1 = 0$

$4x = n(\pi)$ or $\cos 2x = 1/2$

$x = [\ \dfrac{n\pi}{4}\ ]$ or $\cos 2x = \cos [\ \dfrac{\pi}{3}\ ]$

$x = [\dfrac{n\pi}{4}\ ]$ or $x = n(\pi) \pm [\dfrac{\pi}{6}\ ]$

Trigonometric Equations Ex 11.1 Q5(i)

$$\tan x + \tan 2x + \frac{(\tan x + \tan 2x)}{1 - \tan x . \tan 2x} = 0$$

$$[\tan x + \tan 2x]\left[1 + \frac{1}{1 - \tan x . \tan 2x}\right] = 0$$

$$\tan x + \tan 2x \; (2 - \tan x . \tan 2x) = 0$$

$$\tan x = \tan(-2x) \text{ or } \tan x . \tan 2x = 2$$

$$x = n\pi - 2x \text{ or } \tan x . \frac{2\tan x}{1 - \tan^2 x} = 2$$

$$3x = n\pi \text{ or } \frac{2\tan^2 x}{1 - \tan^2 x} = 2$$

$$3x = n\pi \; or \; 2\tan^2 x = 2 - 2\tan^2 x$$

$$3x = n\pi \; or \; 4\tan^2 x = 2$$

$$x = \frac{n\pi}{3} \; or \tan^2 x = 1/2$$

$$x = \frac{n\pi}{3} \text{ or } x = m\pi \pm \tan^{-1}\left(\frac{1}{\sqrt{2}}\right), \quad n, m \in Z$$

Trigonometric Equations Ex 11.1 Q5(ii)

$$\tan\theta + \tan 2\theta = \tan(\theta + 2\theta)$$

$$\tan\theta + \tan 2\theta - \frac{\tan\theta + \tan 2\theta}{1 - \tan\theta \tan 2\theta} = 0$$

$$[\tan\theta + \tan 2\theta]\left[1 - \frac{1}{1 - \tan\theta \tan 2\theta}\right] = 0$$

$$[\tan\theta + \tan 2\theta]\left[\frac{1 - \tan\theta \tan 2\theta - 1}{1 - \tan\theta \tan 2\theta}\right] = 0$$

$$[\tan\theta + \tan 2\theta]\left[\frac{-\tan\theta \tan 2\theta}{1 - \tan\theta \tan 2\theta}\right] = 0$$

$$\tan\theta = 0 \; or \tan 2\theta = 0 \; or \tan\theta + \tan 2\theta = 0$$

$$\theta = n\pi or \frac{n\pi}{2} or \; \tan\theta\left[\frac{1 - \tan^2\theta + 2}{1 - \tan^2\theta}\right] = 0$$

$$\theta = n\pi or \frac{n\pi}{2} or \tan\theta = \pm\sqrt{3}$$

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

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