Trigonometric Equations Ex 11.1 Q3(iii)

We have,

$2\sin^2 x + \sqrt{3}\cos x + 1 = 0$

$\Rightarrow \quad 2\left(1-\cos^2 x\right) + \sqrt{3}\cos x + 1 = 0$

$\Rightarrow \quad 2\cos^2 x - \sqrt{3}\cos x - 3 = 0$

factorise it, we get,

$\Rightarrow \quad 2\cos^2 x - 2\sqrt{3}\cos x + \sqrt{3}\cos x - 3 = 0$

$\Rightarrow \quad 2\cos x\left(\cos x - \sqrt{3}\right) + \sqrt{3}\left(\cos x - \sqrt{3}\right) = 0$

$\Rightarrow \quad \left(2\cos x + \sqrt{3}\right)\left(\cos x - \sqrt{3}\right) = 0$

$\Rightarrow$ either

$\cos x = -\frac{\sqrt{3}}{2}$ or $\cos x = \sqrt{3}$ [This is not possible as $-1 < \cos x < 1$]

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

$\Rightarrow \quad \cos x = \cos\frac{5\pi}{6}$

$\Rightarrow \quad x = 2n\pi \pm \frac{5\pi}{6}, n \in z$

Trigonometric Equations Ex 11.1 Q3(vi)

We have,

$4\sin^2\theta - 8\cos\theta + 1 = 0$

$\Rightarrow \quad 4\left(1-\cos^2\theta\right) - 8\cos\theta + 1 = 0$

$\Rightarrow \quad 4\cos^2\theta + 8\cos\theta - 5 = 0$

factorise it, we get,

$\Rightarrow \quad 4\cos^2\theta + 10\cos\theta - 2\cos\theta - 5 = 0$

$\Rightarrow \quad 2\cos\theta\left(2\cos\theta + 5\right) - 1\left(2\cos\theta + 5\right) = 0$

$\Rightarrow \quad \left(2\cos\theta - 1\right)\left(2\cos\theta + 5\right) = 0$

either $2\cos\theta - 1 = 0$ or $2\cos\theta + 5 = 0$

$\Rightarrow \quad \cos\theta = \frac{1}{2}$ or $\cos\theta = -\frac{5}{2}$ [This is not possible as $-1 < \cos\theta < 1$]

$\Rightarrow \quad \cos\theta = \cos\frac{\pi}{3}$

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

Trigonometric Equations Ex 11.1 Q3(v)

We have,

$\tan^2 x + \left(1-\sqrt{3}\right)\tan x - \sqrt{3} = 0$

$\Rightarrow \quad \tan^2 x + \tan x - \sqrt{3}\tan x - \sqrt{3} = 0$

$\Rightarrow \quad \tan x\left(\tan x + 1\right) - \sqrt{3}\left(\tan x + 1\right) = 0$

$\Rightarrow \quad \left(\tan x - \sqrt{3}\right)\left(\tan x + 1\right) = 0$

$\Rightarrow$ either

$\tan x = \sqrt{3}$ or $\tan x = -1$

$\Rightarrow \quad \tan x = \tan\frac{\pi}{3}$ or $\tan x = -\tan\frac{\pi}{4}$

$\Rightarrow \quad x = n\pi + \frac{\pi}{3}, n \in z$ or $x = m\pi - \frac{\pi}{4}, m \in z$

$\therefore \quad x = n\pi + \frac{\pi}{3}$ or $m\pi - \frac{\pi}{4}, n, m \in z$

Trigonometric Equations Ex 11.1 Q3(vi)

$3\cos^2\theta - 2\sqrt{3}\sin\theta\cos\theta - 3\sin^2\theta = 0$

$\sqrt{3}\cos^2\theta - 2\sin\theta\cos\theta - \sqrt{3}\sin^2\theta = 0$ (Dividing by $\sqrt{3}$)

$\sqrt{3}\cos^2\theta + \sin\theta\cos\theta - 3\sin\theta\cos\theta - \sqrt{3}\sin^2\theta = 0$

$\cos\theta(\sqrt{3}\cos\theta + \sin\theta) - \sqrt{3}\sin\theta(\sqrt{3}\cos\theta + \sin\theta) = 0$

$(\sqrt{3}\cos\theta + \sin\theta)(\cos\theta - \sqrt{3}\sin\theta) = 0$

$\sqrt{3}\cos\theta + \sin\theta = 0$ or $\cos\theta - \sqrt{3}\sin\theta = 0$

$\tan\theta = -\sqrt{3} = -\tan\frac{\pi}{3}$ or $\tan\theta = \frac{1}{\sqrt{3}} = \tan\frac{\pi}{6}$

$\theta = n\pi - \frac{\pi}{3}$ or $\theta = m\pi + \frac{\pi}{6}$

$n, m \in Z$

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