TRIGONOMETRIC EQUATIONS

PREVIOUS EAMCET BITS

1. If $3\cos x \neq 2, \sin x$, then the general solution of $\sin^2 x - \cos 2x = 2 - \sin 2x$ is x = **[EAMCET 2009]**

1) $n\pi + (-1)^n \frac{\pi}{2}, n \in Z$ 2) $\frac{n\pi}{2}, n \in Z$

3) $(4n \pm 1)\frac{\pi}{2}, n \in Z$ 4) $(2n-1)\pi, n \in Z$

Ans: 3

Sol. $\sin^2 x - (1 - 2\sin^2 x) = 2 - 2\sin x \cos x$

$\Rightarrow 3\sin^2 x + 2\sin x \cos x - 3 = 0$

$\Rightarrow 3\sin^2 x + 2\sin x \cos x - 3(\sin^2 x + \cos^2 x) = 0$

$\Rightarrow \cos x (2\sin x - 3\cos x) = 0$

$\Rightarrow \cos x = 0 (\because 2\sin x \neq 3\cos x)$

$\Rightarrow x = (4n \pm 1)\pi / 2, n \in Z$

2. $\{x \in R : \cos 2x + 2\cos^2 x - 2 = 0\} =$ **[EAMCET 2008]**

1) $\left\{2n\pi + \frac{\pi}{3}; n \in Z\right\}$ 2) $\left\{n\pi \pm \frac{\pi}{6}; n \in Z\right\}$ 3) $\left\{n\pi \pm \frac{\pi}{3}; n \in Z\right\}$ 4) $\left\{2n\pi - \frac{\pi}{3}; n \in Z\right\}$

Ans: 2

Sol. $\cos 2x + 2\cos^2 x - 2 = 0 \Rightarrow 2\cos^2 x - 1 + 2\cos^2 x - 2 = 0$

$\Rightarrow 4\cos^2 x = 3 \Rightarrow \cos^2 x = \frac{3}{4} = \cos^2\left(\frac{\pi}{6}\right) \Rightarrow x = n\pi \pm \frac{\pi}{6}$

3. $\cos 2x = (\sqrt{2}+1)\left(\cos x - \frac{1}{\sqrt{2}}\right), \cos x \neq \frac{1}{2} \Rightarrow x \in$ **[EAMCET 2005]**

1) $\left\{2n\pi \pm \frac{\pi}{3} : n \in Z\right\}$ 2) $\left\{2n\pi \pm \frac{\pi}{6} : n \in Z\right\}$

3) $\left\{2n\pi \pm \frac{\pi}{2} : n \in Z\right\}$ 4) $\left\{2n\pi \pm \frac{\pi}{4} : n \in Z\right\}$

Ans: 4

Sol. $2\sqrt{2}\cos^2 x - (2+\sqrt{2})\cos x + 1 = 0$

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

$(2\cos x - 1)(\sqrt{2}\cos x - 1) = 0$

$\cos x \neq \frac{1}{2}$; $\cos x = \frac{1}{\sqrt{2}}$

$\therefore\ x \in \left\{2n\pi \pm \frac{\pi}{4} / n \in Z\right\}$

4. The solution set of $(5+4\cos\theta)(2\cos\theta+1)=0$ in the interval [0, 2π] is **[EAMCET 2003]**

1) $\left\{\frac{\pi}{3}, \frac{2\pi}{3}\right\}$ 2) $\left\{\frac{2\pi}{3}, \frac{5\pi}{3}\right\}$ 3) $\left\{\frac{2\pi}{3}, \frac{4\pi}{3}\right\}$ 4) $\left\{\frac{2\pi}{3}, \frac{5\pi}{3}\right\}$

Ans: 3

Sol. $(5+4\cos\theta)(2\cos\theta+1)=0$

$\cos\theta = \frac{-1}{2} \Rightarrow \theta = \frac{2\pi}{3}, \frac{4\pi}{3}$

5. The equation $\sqrt{3}\sin x + \cos x = 4$ has **[EAMCET 2001]**

1) only one solution 2) two solutions
3) infinitely many solutions 4) no solutions

Ans: 4

Sol. The max. value of $\sqrt{3}$ sinx + cosx is '2'.

$\therefore \sqrt{3}$ sinx + cosx never equal to '4'.

6. If $\tan\theta + \sec\theta = \sqrt{3}$, then the principal value of $\theta + \frac{\pi}{6}$ is **[EAMCET 2000]**

1) π/4 2) π/3 3) 2π/3 4) 3π/4

Ans: 2

Sol. $\tan\theta + \sec\theta = \sqrt{3}$

$\sqrt{3}\cos\theta - \sin\theta = 1$

$\cos\left(\theta + \frac{\pi}{6}\right) = \frac{1}{2} \qquad \therefore \left(\theta + \frac{\pi}{6}\right) = \frac{\pi}{3}$

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