TRIGONOMETRIC EQUATION PH-II

EXERCISE – I — HINTS & SOLUTIONS

Sol.1 B

$2 \cos 2x = 3.2 \cos^2 x - 4$

$\Rightarrow 2 \cos 2x = 3 (\cos 2x + 1) - 4$

$\Rightarrow \cos 2x = 1 \quad \Rightarrow 2x = 2n\pi \; ; n \in I$

$\Rightarrow x = n\pi \; ; n \in I$

Sol.2 D

$4 \sin\theta \cos\theta - 2\cos\theta - 2\sqrt{3} \sin\theta + \sqrt{3} = 0$

$\Rightarrow 2\cos\theta (2\sin\theta - 1) - \sqrt{3} (2\sin\theta - 1) = 0$

$\Rightarrow (2\sin\theta - 1)(2\cos\theta - \sqrt{3}) = 0$

$\Rightarrow \sin\theta = \frac{1}{2}$ or $\cos\theta = \frac{\sqrt{3}}{2}$

$\theta = n\pi + (-1)^n \frac{\pi}{6} \qquad \theta = 2m\pi \pm \frac{\pi}{6}$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6} \in (0, 2\pi) \qquad \theta = \frac{\pi}{6}, \frac{11\pi}{6}$

$\therefore \theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{11\pi}{6} \qquad m, n \in I$

Sol.3 D

$\sin x \tan 4x = \cos x$

$\Rightarrow \tan 4x = \cot x$

$\Rightarrow \tan 4x = \tan\left(\frac{\pi}{2} - x\right)$

$\Rightarrow 4x = n\pi + \frac{\pi}{2} - x \qquad n \in I$

$\Rightarrow x = (2n + 1)\frac{\pi}{10}$

For $x \in (0, \pi) \quad n \in I$

$(2n + 1) < 10$

$n < \frac{9}{2} \Rightarrow n = 0, 1, 2, 3, 4 \Rightarrow$ No. of sol. is 5

Sol.4 B

$2\sin\theta + \tan\theta = 0 \qquad \cos\theta \neq 0$

$\Rightarrow 2\sin\theta + \frac{\sin\theta}{\cos\theta} = 0$

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

$\Rightarrow \sin\theta = 0$ or $\cos\theta = -\frac{1}{2}$

$\theta = n\pi$ or $\theta = 2m\pi \pm \frac{2\pi}{3} \qquad n, m \in I$

Sol.5 C

$\tan\theta = -1 \quad \& \quad \cos\theta = \frac{1}{\sqrt{2}}$

principal solution

$\theta = \frac{3\pi}{4}, \frac{7\pi}{4} \;\&\; \theta = \frac{\pi}{4}, \frac{7\pi}{4}$

common principal solutoin is $\frac{7\pi}{4}$

then general solution is $\theta = 2n\pi + \frac{7\pi}{4}$, $n \in I$

Sol.6 A

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

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

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

$\Rightarrow (2\sin x - 1)(\sin x + 2) = 0$

$\Rightarrow \sin x = \frac{1}{2}$ or $\sin x \neq -2$

$\theta = \frac{\pi}{6}, \frac{5\pi}{6}$

Sol.7 D

$20\sin^2\theta + 21\cos\theta - 24 = 0 \;\&\; \frac{7\pi}{4} < \theta < 2\pi$

$\Rightarrow 20 - 20\cos^2\theta + 21\cos\theta - 24 = 0$

$\Rightarrow 20\cos^2\theta - 21\cos\theta + 4 = 0$

$\Rightarrow (5\cos\theta - 4)(4\cos\theta - 1) = 0$

$\Rightarrow \cos\theta \neq \frac{1}{4} \quad \because \theta \notin \left(\frac{7\pi}{4}, 2\pi\right)$

or $\cos\theta = \frac{4}{5} \qquad \cos\frac{\theta}{2} = \sqrt{\frac{\cos\theta + 1}{2}}$

$\cos\frac{\theta}{2} = \pm\frac{3}{\sqrt{10}}$

$\cos\frac{\theta}{2} = -\frac{3}{\sqrt{10}} \quad \because \frac{\theta}{2} \in \left(\frac{7\pi}{8}, \pi\right)$

$\sin\frac{\theta}{2} = \frac{1}{\sqrt{10}} \Rightarrow \cot\frac{\theta}{2} = -3$

Sol.8 B

$\sin 7x + \sin 4x + \sin x = 0$

$\Rightarrow \sin 7x + \sin x + \sin 4x = 0$

$\Rightarrow 2\sin 4x \cos 3x + \sin 4x = 0$

$\Rightarrow \sin 4x (2\cos 3x + 1) = 0$

$\Rightarrow$ $\sin 4x = 0 \Rightarrow 4x = n\pi \quad n \in I,\ x \in \left[0, \frac{\pi}{2}\right]$

$x = \frac{n\pi}{4} \quad \therefore \quad x = 0, \frac{\pi}{4}, \frac{\pi}{2}$

or $\cos 3x = -\frac{1}{2}$

$3x = 2m\pi \pm \frac{2\pi}{3} \Rightarrow x = (6m \pm 2)\frac{\pi}{9} \quad m \in I$

$\therefore\ x = \frac{2}{9}\pi, \frac{4\pi}{9} \because x \in \left[0, \frac{\pi}{2}\right]$

No. of sol. 5

Sol.9 C

$\sin x + \sin 5x = \sin 2x + \sin 4x$

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

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

$\Rightarrow$ $\sin 3x = 0 \Rightarrow 3x = n\pi \Rightarrow x = \frac{n\pi}{3}, n \in I$

or $\cos 2x - \cos x = 0$

$-2\sin\frac{3x}{2}\sin\frac{x}{2} = 0$

or $\frac{3x}{2} = m\pi$ or $\frac{x}{2} = k\pi \quad \{m, k \in I$

$x = \frac{2m\pi}{3}$ or $x = 2k\pi$

Union of all solutions is $x = \frac{n\pi}{3}\ n \in I$

Sol.10 B

$\sin(2A + B) = \frac{1}{2}$

$\sin(2A + B) = \sin\frac{\pi}{6}$ or $\sin\frac{5\pi}{6}$

$2A + B = \frac{\pi}{6}$ is not possible

$\therefore \quad 2A + B = \frac{5\pi}{6}$ ....(i)

Given that

$2B = A + C$ ....(ii)

We know

$A + B + C = \pi$ .... (iii)

From (ii) & (iii) $3B = \pi \Rightarrow B = \frac{\pi}{3}$

From (i) $2A = \frac{5\pi}{6} - \frac{\pi}{3} \Rightarrow A = \frac{\pi}{4}$

From (iii) $C = \pi - (A + B)$

$= \pi - \left(\frac{\pi}{3} + \frac{\pi}{4}\right) \Rightarrow C = \frac{5\pi}{12}$

Sol.11 B

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

$\Rightarrow$ $2\cos\theta\,[4\cos^2\theta - 3] = (4\cos^2\theta - 3)$

$\Rightarrow$ $(2\cos\theta - 1)(4\cos^2\theta - 3) = 0$

$\Rightarrow$ $\cos\theta = \frac{1}{2} \Rightarrow \theta = 2n\pi \pm \frac{\pi}{3}, n \in I$

or $\cos^2\theta = \frac{3}{4} = \left(\frac{\sqrt{3}}{2}\right)^2 \Rightarrow \theta = n\pi \pm \frac{\pi}{6}, m \in I$

doesn't satisfy the given equation

Sol.12 C

$\frac{\sin 3\theta}{2\cos 2\theta + 1} = \frac{1}{2}$

$\Rightarrow$ $\frac{3\sin\theta - 4\sin^3\theta}{2 - 4\sin^2\theta + 1} = \frac{1}{2}$

$\Rightarrow$ $2\sin\theta\,[3 - 4\sin^2\theta] = (3 - 4\sin^2\theta)$

$\Rightarrow$ $(2\sin\theta - 1)(3 - 4\sin^2\theta) = 0$

$\Rightarrow$ $\sin\theta = \frac{1}{2} \Rightarrow \theta = n\pi + (-1)^n\frac{\pi}{6}, n \in I$

or $\sin^2\theta = \frac{3}{4} \Rightarrow \theta = n\pi \pm \frac{\pi}{3}, m \in I$

But doesn't satisfy the given equation

Sol.13 A

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

$\Rightarrow$ $2\cos^2\theta + 3\cos\theta - 1 = 0$

$\Rightarrow$ $\cos\theta = \frac{-3 \pm \sqrt{9+8}}{4} = \frac{-3 \pm \sqrt{17}}{4}$

(–) sign reject

$\Rightarrow$ $\cos\theta = \cos\alpha$

$\theta = 2n\pi \pm \alpha$ where $\alpha = \cos^{-1}\left(\frac{-3 + \sqrt{17}}{4}\right)$

Sol.14 B

$\sin\theta + 7\cos\theta = 5$

$\Rightarrow \frac{2\tan\frac{\theta}{2}}{1 + \tan^2\frac{\theta}{2}} + \frac{7\left(1 - \tan^2\frac{\theta}{2}\right)}{\left(1 + \tan^2\frac{\theta}{2}\right)} = 5$, Let $\tan\frac{\theta}{2} = t$

$\Rightarrow$ $2t + 7(1 - t^2) = 5(1 + t^2) \Rightarrow 6t^2 - t - 1 = 0$

Sol.15 C

$\tan x + \tan\left(x+\frac{\pi}{3}\right) + \tan\left(x+\frac{2\pi}{3}\right) = 3$

$\Rightarrow \quad \tan x + \frac{\tan x+\sqrt{3}}{1-\sqrt{3}\tan x} + \frac{\tan x-\sqrt{3}}{1+\sqrt{3}\tan x} = 3$

$\Rightarrow \frac{\tan x - 3\tan^3 x + \tan x + \sqrt{3}\tan^2 x + \sqrt{3} + 3\tan x + \tan x - \sqrt{3}\tan^2 x - \sqrt{3} + 3\tan x}{1-3\tan^2 x} = 3$

$\Rightarrow \frac{9\tan x - 3\tan^3 x}{1-3\tan^2 x} = 3 \Rightarrow \frac{3\tan x - \tan^3 x}{1-3\tan^2 x} = 1$

$\Rightarrow \tan 3x = 1 \Rightarrow 3x = n\pi + \frac{\pi}{4} \quad n \in I$

$\Rightarrow x = \frac{n\pi}{3} + \frac{\pi}{12} \quad n \in I$

Sol.16 C

$\tan^2\alpha + 2\sqrt{3}\tan\alpha = 1$

$\Rightarrow \quad 2\sqrt{3}\tan\alpha = 1 - \tan^2\alpha$

$\Rightarrow \quad \sqrt{3}\ \frac{2\tan\alpha}{1-\tan^2\alpha} = 1$

$\Rightarrow \quad \tan 2\alpha = \frac{1}{\sqrt{3}} = \tan\frac{\pi}{6}$

$\Rightarrow \quad 2\alpha = n\pi + \frac{\pi}{6} \quad \because \quad n \in I$

$\Rightarrow \quad \alpha = \frac{n\pi}{2} + \frac{\pi}{12} = (6n+1)\frac{\pi}{12}$, $n \in I$

Sol.17 D

$\sin 3\theta = 4\sin\theta \,.\, \sin 2\theta \sin 4\theta, \quad 0 \le \theta \le \pi$

$\Rightarrow 3\sin\theta - 4\sin^3\theta - 4\sin\theta\sin 2\theta\sin 4\theta = 0$

$\Rightarrow \sin\theta\,[3 - 4\sin^2\theta - 4\sin 2\theta\sin 4\theta]$

$\Rightarrow \sin\theta\,[3 - 2 + 2\cos\theta - 2\cos 2\theta + 2\cos 6\theta]$

$\Rightarrow \quad \sin\theta\,[1 + 2\cos 6\theta] = 0$

$\Rightarrow \quad \sin\theta = 0$ or $\quad \cos 6\theta = -\frac{1}{2}$

$\theta = 0, \pi$ or $\quad 0 \le \theta \le \pi$

$0, \pi \in [0, \pi]$ or $\quad 0 \le 6\theta \le 6\pi$ (3 rounds)

no. of solutions in 1 round $= 2$

total no.of solutons in $\theta \in [0, \pi]$

$= 2 + 6 = 8$

Sol.18 A

$\cot 3\theta - \cot\theta = 0$

$\Rightarrow \quad \cot 3\theta = \cot\theta$

$\Rightarrow \quad 3\theta = n\pi + \theta$

$\Rightarrow \quad 2\theta = n\pi$

$\Rightarrow \quad \theta = \frac{n\pi}{2} \quad \because \quad n \in I \begin{cases} 3\theta \ne n\pi \text{ or } \theta \ne m\pi \\ \theta \ne \frac{n\pi}{3} \end{cases}$

$\Rightarrow \quad \theta = (2n-1), \frac{\pi}{2} \quad n \in I$

$\{\cot\theta = 0 \ \&\ \cot\theta \ne \infty$, so n = odd int$\}$

$\Rightarrow \quad \theta = (2n-1), \frac{\pi}{2} \quad n \in I$

Sol19 A

$\frac{\tan 3x - \tan 2x}{1 + \tan 3x + \tan 2x} = 1$

$\Rightarrow \quad \tan(3x - 2x) = 1$

$\Rightarrow \quad \tan x = 1 = \tan\frac{\pi}{4}$

$\Rightarrow \quad x = n\pi + \frac{\pi}{4} \quad n \in I$

Bet at this value of x, $\tan 2x = \infty$

It's not solution

$\Rightarrow x \in \phi$

Sol.20 D

$\cos 2x + a\sin x = 2a - 7$

$\Rightarrow \quad 1 - 2\sin^2 x + a\sin x = 2a - 7$

$\Rightarrow \quad 2\sin^2 x - a\sin x + (2a - 8) = 0$

$\Rightarrow \quad \sin x = \frac{a \pm \sqrt{a^2 + 4.2(8-2a)}}{4}$

$= \frac{a \pm \sqrt{(a-8)^2}}{4}$

$\Rightarrow \quad \sin x = \frac{a \pm (a-8)}{4}; \ -1 \le \sin x \le 1$

$\Rightarrow \quad \sin x = \frac{2a-8}{4} \quad$ so $\quad \sin x \ne 2$

$\Rightarrow -1 \le \sin x = \frac{a-4}{2} \le 1$

$\Rightarrow -1 \le \frac{a-4}{2} \le 1$

$\Rightarrow -2 \le a - 4 \le 2$

$\Rightarrow 2 \le a \le 6 \quad \because \ a \in I$

a = 2, 3, 4, 5, 6 a has 5 vlaues.

Sol.21 A

$2\cos x = \sqrt{2 + 2\sin 2x} \quad x \in [0, 2\pi]$

$\Rightarrow \quad 4\cos^2 x = 2 + 2\sin 2x$

$\Rightarrow \quad 2\cos^2 x - 1 = \sin 2x$

$\Rightarrow \quad \cos 2x = \sin 2x$

$\Rightarrow \quad \cos 2x = \cos\left(\frac{\pi}{2} - 2x\right)$

$\Rightarrow 2x = 2n\pi \pm \left(\frac{\pi}{2} - 2x\right)$

$\Rightarrow 2x = 2n\pi + \frac{\pi}{2} - 2x$ & $2x = 2n\pi - \frac{\pi}{2} + 2x$

$\Rightarrow 4x = \left(\frac{4n+1}{2}\right)\pi$ not possible

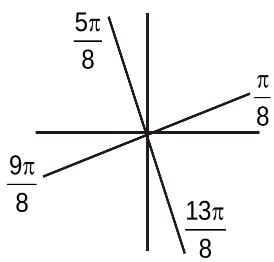
$\Rightarrow x = \left(\frac{4n+1}{8}\right)\pi$

$\therefore 0 \le \left(\frac{4n+1}{8}\right)\pi \le 2\pi$

$\Rightarrow 0 \le \frac{4n+1}{8} \le 2$

$\Rightarrow -\frac{1}{8} \le \frac{n}{2} \le 2 - \frac{1}{8}$

$\Rightarrow -\frac{1}{4} \le n \le \frac{15}{4}$



n = 0, 1, 2, 3

$x \in [0, 2\pi]$

$x = \frac{\pi}{4}, \frac{5\pi}{8}, \frac{9\pi}{8}, \frac{13\pi}{8}$

cosx (–) value

$x = \frac{\pi}{8}, \frac{13\pi}{8}$

Sol.22 C

$|\sin x| = |\cos 3x| \qquad x \in [-2\pi, 2\pi]$

Case (I) : sin x = cos 3x

$\cos\left(\frac{\pi}{2} - x\right) = \cos 3x$

$3x = 2n\pi \pm \left(\frac{\pi}{2} - x\right) \qquad n \in I$

$3x = 2n\pi + \frac{\pi}{2} - x$ & $3x = 2n\pi - \frac{\pi}{2} + x$

$4x = (4n+1)\frac{\pi}{2} \qquad 2x = (4n-1)\frac{\pi}{2}$

$x = (4n+1)\frac{\pi}{8} \qquad x = (4n-1)\frac{\pi}{4}$

$-2 \le \frac{4n+1}{8} \le 2 \qquad -2 \le \frac{4n-1}{4} \le 2$

$-\frac{17}{4} \le n \le \frac{15}{4} \qquad -\frac{7}{4} \le n \le \frac{9}{4}$

n = –4, –3, –2, –1, 0, 1, 2, 3   n = –1, 0, 1, 2

no. of sol. 8   no. of sol. 4

Case (II) : – sin x = cos 3x

$\cos\left(\frac{\pi}{2} + x\right) = \cos 3x$

$3x = 2n\pi \pm \left(\frac{\pi}{2} + x\right) \qquad \because \ m \in I$

$3x = 2n\pi + \frac{\pi}{2} + x$ & $3x = 2n\pi - \frac{\pi}{2} - x$

$x = \frac{(4n+1)\pi}{4}$ & $x = \frac{(4n-1)\pi}{8}$

$-2 \le \frac{4x+1}{4} \le 2 \qquad -2 \le \frac{4x-1}{8} \le 2$

$-\frac{9}{4} \le n \le \frac{7}{4} \qquad \frac{-15}{4} \le x \le \frac{17}{4}$

n = –2, –1, 0, 1   n = –3, –2, –1, 0, 1, 2, 3, 4

no. of sol. 4   no. of sol. 8

Total no. of sol. is = 8 + 4 + 4 + 8 = 24

Sol.23 D

$a_1 + a_2 \cos 2x + a_3 \sin^2 x = 0$

$a_1 + a_2 (1 - 2\sin^2 x) + a_3 \sin^2 x = 0$

$(a_1 + a_2) = (2a_2 - a_3)\sin^2 x$

$\sin^2 x = \frac{a_1 + a_2}{2a_2 - a_3} \qquad \because \ 0 \le \sin^2 x \le 1$

$0 \le \frac{a_1 + a_2}{2a_2 - a_3} \le 1$

$0 \le a_1 + a_2 \le 2a_2 - a_3$

$a_1 + a_2 \ge 0$ ....(i)

$2a_2 - a_3 \ge 0$ ....(ii)

$-a_1 + a_2 - a_3 \ge 0$ ...(iii) $N^r \le D^r$

homogenous equation system

$$\begin{bmatrix} 1 & 1 & 0 \\ 0 & 2 & -1 \\ -1 & 1 & -1 \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} \ge \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$|A| = 1(-2 + 1) - 1(0 - 1) + 0 = -1 + 1 = 0$

So no. of solution is initinite

Sol.24 B

$4\,\text{cosec}^2(\pi(a + x)) + a^2 - 4a = 0$

$\Rightarrow \quad 4\,\text{cosec}^2(\pi(a + x)) = 4a - a^2$

$\Rightarrow \quad \sin^2(\pi(a + x)) = \frac{4}{4a - a^2}$

$0 \le \sin^2 x \le 1$

$0 \le \frac{4}{4a - a^2} \le 1$

$0 \le 4 \le 4a - a^2$

$4a - a^2 \ge 4$

$(a-2)^2 \ge 0$

$2 \ge a$ $\quad$ 2 > a not satisfy

$a = 2$ $\quad \begin{cases} \text{if } a = 1 \\ 4 \le (4-1)1 \\ 4 \not\le 3 \end{cases}$

Sol.25 D

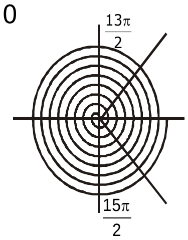
$2\tan^2 x - 5\sec x - 1 = 0 \quad x \in \left[0, \dfrac{n\pi}{2}\right], n \in N$

$2\sec^2 x - 5\sec x - 3 = 0$ $\quad$ x = 1

$(\sec x - 3)(2\sec x + 1) = 0$

$\sec x = 3$

or $\sec x \ne -\dfrac{1}{2}$



$\cos x = \dfrac{1}{3}$

two values of x lies between $[0, 2\pi]$

& six values of x lies between $[0, 6\pi]$

seven values of x lies between

$[0, 6\pi + \dfrac{\pi}{2}] = \left[0, \dfrac{13}{2}\pi\right]$

for greatest value of x, $\left[0, \dfrac{13\pi}{2} + \pi\right] = \left[0, \dfrac{15\pi}{2}\right]$

n = 15

Sol.26 D

$|\cos x| = \cos x - 2\sin x$

Case-I : $\cos x = \cos x - 2\sin x$ if $\cos x \ge 0$

$\Rightarrow \quad \sin x = 0$

$\Rightarrow \quad x = n\pi$ but $\quad \cos x \ge 0$

only even integer of π

$x = 2n\pi \; n \in I$

Case-II :

$-\cos x = \cos x - 2\sin x$ if $\cos x < 0$

$-2\cos x = -2\sin x$

$\Rightarrow \quad \tan x = 1$

$\Rightarrow \quad x = n\pi + \dfrac{\pi}{4}$ $\quad \in$ (I & III quadrant)

But cos x < 0 $\quad$ So $\quad$ x will be in III quadrant

s.t. n should be odd integer

$x = (2m+1) + \dfrac{\pi}{4}$,$m \in I$

Sol.27 D

$\sin\theta + 2\sin 2\theta + 3\sin\theta + 4\sin 4\theta = 10$ in $(0, \pi)$

Using boundary of SM

It's only possible if $\Rightarrow 1 + 2 + 3 + 4 = 10$

$\sin\theta = 1$ & $\sin 2\theta = 1$ & $\sin 3\theta = 1$ & $\sin 4\theta = 1$

$\theta = 2m\pi + \dfrac{\pi}{2}, \; 2\theta = 2n\pi + \dfrac{\pi}{2}, \; 3\theta = 2k\pi + \dfrac{\pi}{2}, \; 4\theta = 2p\pi + \dfrac{\pi}{2}$

$m \in I \qquad n \in I \qquad k \in I \qquad p \in I$

$\theta = \dfrac{\pi}{2} \qquad \theta = \dfrac{\pi}{4} \qquad \theta = \dfrac{\pi}{6}, \dfrac{5\pi}{6} \qquad \theta = \dfrac{\pi}{8}, \dfrac{5\pi}{8}$

$x \in \left\{\dfrac{\pi}{2}\right\} \cap \left\{\dfrac{\pi}{4}\right\} \cap \left\{\dfrac{\pi}{6}, \dfrac{5\pi}{6}\right\} \cap \left\{\dfrac{\pi}{8}, \dfrac{5\pi}{8}\right\}$

$x \in \{\;\}$ no. of solutoins is zero.

Sol.28 B

$4\cos^3 x - 4\cos^2 x - \cos(\pi + x) - 1 = 0$

A.M. of roots $x \in [0, 315]$

$\Rightarrow \quad 4\cos^2 x(\cos x - 1) + (\cos x - 1) = 0$

$\Rightarrow \quad (\cos x - 1)(4\cos^2 x + 1) = 0$

$\Rightarrow \quad \cos x = 1$ $\quad$ or $\quad \cos^2 x = -\dfrac{1}{4}$

$x = 2n\pi \; x \in I$ $\quad$ not possible

$0 \le 2n \le 100$ $\quad x \in [0, 315]$

$0 \le n \le 50$ $\quad$ or $[0, 100\pi]$

$x = 0, 2\pi, 4\pi, 6\pi, \ldots, 100\pi$

$\text{A.M.} = \dfrac{2\pi[0+1+2+3+\ldots+50]}{51}$

$= \dfrac{2\pi}{51} \; \dfrac{50 \times 51}{2} = 50\pi$

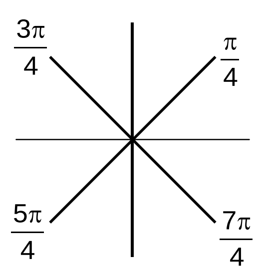
Sol.29 B

$\sin x\sqrt{8\cos^2 x} = 1$

$\Rightarrow 8\sin^2 x\cos^2 x = 1 \quad \Rightarrow 2\sin^2 2x = 1$

$\Rightarrow \sin^2 2x = \dfrac{1}{2}$

$x \in [0, 2\pi]$



$\sin 2x = \pm\dfrac{1}{\sqrt{2}}$

$2x = \dfrac{\pi}{4}, \dfrac{3\pi}{4}, \dfrac{5\pi}{4}, \dfrac{7\pi}{4}$

$x = \dfrac{\pi}{8}, \dfrac{3\pi}{8}, \dfrac{5\pi}{8}, \dfrac{7\pi}{8}$

common difference

$d = \dfrac{3\pi}{8} - \dfrac{\pi}{8} = \dfrac{\pi}{4}$