Past Year JEE Questions

Questions

Quetion: 01

If $0 \leq x < 2\pi$, then the number of real values of x, which satisfy the equation
$\cos x + \cos 2x + \cos 3x + \cos 4x = 0$ is:

A. 7

B. 9

C. 3

D. 5

Solutions

Solution: 01

Explanation

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

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

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

$\Rightarrow 2 \cos x \left(2 \cos \dfrac{5x}{2} \cos \dfrac{x}{2} \right) = 0$

$\cos x = 0, \cos \dfrac{5x}{2} = 0, \cos \dfrac{x}{2} = 0$

$x = \pi, \dfrac{\pi}{2}, \dfrac{3\pi}{2}, \dfrac{\pi}{5}, \dfrac{3\pi}{5}, \dfrac{7\pi}{5}, \dfrac{9\pi}{5}$