

Trigonometric Functions - Class XI

Past Year JEE Questions

Questions

Question: 01

The sum of all values of x in $[0, 2\pi]$, for which $\sin x + \sin 2x + \sin 3x + \sin 4x = 0$, is equal to :

- A. 8π
- B. 11π
- C. 12π
- D. 9π

Solutions

Solution: 01

Explanation

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

$$\Rightarrow 2 \sin \frac{5x}{2} \left\{ \cos \frac{3x}{2} + \cos \frac{x}{2} \right\} = 0$$

$$\Rightarrow 2 \sin \frac{5x}{2} \{ 2 \cos x \cos \frac{x}{2} \} = 0$$

$$2 \sin \frac{5x}{2} = 0 \Rightarrow \frac{5x}{2} = 0, \pi, 2\pi, 3\pi, 4\pi, 5\pi$$

$$\Rightarrow x = 0, \frac{2\pi}{5}, \frac{4\pi}{5}, \frac{6\pi}{5}, \frac{8\pi}{5}, 2\pi$$

$$\cos \frac{x}{2} = 0 \Rightarrow \frac{x}{2} = \frac{\pi}{2} \Rightarrow x = \pi$$

$$\cos x = 0 \Rightarrow x = \frac{\pi}{2}, \frac{3\pi}{2}$$

$$\text{So, sum} = 6\pi + \pi + 2\pi = 9\pi$$