

Trigonometry Functions - Class XI

Past Year JEE Questions

Questions

Question: 01

If $0 < x, y < \pi$ and $\cos x + \cos y - \cos(x + y) = \frac{3}{2}$, then $\sin x + \cos y$ is equal to :

- A. $\frac{1+\sqrt{3}}{2}$
- B. $\frac{1}{2}$
- C. $\frac{\sqrt{3}}{2}$
- D. $\frac{1-\sqrt{3}}{2}$

Solutions

Solution: 01

Explanation

$$2 \cos\left(\frac{x+y}{2}\right) \cos\left(\frac{x-y}{2}\right) - [2\cos^2\left(\frac{x+y}{2}\right) - 1] = \frac{3}{2}$$

$$2 \cos\left(\frac{x+y}{2}\right) [\cos\left(\frac{x-y}{2}\right) - \cos\left(\frac{x+y}{2}\right)] = \frac{1}{2}$$

$$2 \cos\left(\frac{x+y}{2}\right) [2 \sin\left(\frac{x}{2}\right) \cdot \sin\left(\frac{y}{2}\right)] = \frac{1}{2}$$

$$\cos\left(\frac{x+y}{2}\right) \cdot \sin\left(\frac{x}{2}\right) \cdot \sin\left(\frac{y}{2}\right) = \frac{1}{8}$$

Possible when $\frac{x}{2} = 30^\circ$ & $\frac{y}{2} = 30^\circ$

$$x = y = 60^\circ$$

$$\sin x + \cos y = \frac{\sqrt{3}}{2} + \frac{1}{2} = \frac{\sqrt{3}+1}{2}$$