

Answer on Question #66461-Physics- Other

Two collinear harmonic oscillations $x_1 = 8 \sin(100 \pi t)$ and $x_2 = 12 \sin(96 \pi t)$ are superposed. Calculate the values of time when the amplitude of the resultant oscillation will be (i) maximum and (ii) minimum

Solution

The amplitude of the resultant oscillation will be

$$R = \sqrt{8^2 + 12^2 + 2(12)(8) \cos(100 \pi t - 96 \pi t)} = \sqrt{208 + 192 \cos(4 \pi t)}$$

(i) Maximum will be at

$$4 \pi t = 2\pi n$$

$$t = \frac{n}{2}, n = 0, 1, 2, \dots$$

(ii) Minimum will be at

$$4 \pi t = \pi \pm 2\pi n$$

$$t = \frac{1}{4} \pm \frac{n}{2}, n = 0, 1, 2, \dots$$

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