

Answer on Question #65634-Physics-Mechanics-Relativity

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

$$R = \sqrt{8^2 + 12^2 + 2(12)(5) \cos(100\pi t - 96\pi t)} = \sqrt{208 + 120 \cos(4\pi t)}$$

(i) Maximum will be at

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

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

(i) Minimum will be at

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

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

Answer provided by <https://www.AssignmentExpert.com>