t = 1.5 s

2 4 6 8

Suggested Solutions

Tutorial 10A : Superposition & Interference

Self-Practice Questions:

S1 This question tests students on application of Principle of Superposition.









This question is similar to Lecture Example 10.3.1. The strategy is to sketch the individual waveforms of each wave at any desired time, then add up their displacements.

10 12 14 16

18 20

S2 This question tests students on understanding of phase difference and how it relates to destructive interference.

At point P, waves from S_1 and S_2 meet in antiphase at P (i.e. destructive interference). Correct Option is A.





S3 (a)

This question is a calculation question relating **path difference** to **interference**.

Given that the pair of speakers (i.e. the sources) are driven by the same oscillator, this implies that the speakers are in phase.

By applying Pythagoras Theorem,

 $r_1 = \sqrt{1.15^2 + 8.00^2} = 8.082m$ $r_2 = \sqrt{1.85^2 + 8.00^2} = 8.211m$ This question is similar to Lecture Example 10.4.1. If the sources are in phase, first minima occurs when path difference is equal to half of a wavelength.

Given that the first minimum occurs at P, this implies that

Path difference = $(r_2 - r_1) = \lambda/2$

Solving, we get $\lambda = 0.258m$ and $f = \frac{v}{\lambda} = \frac{330}{0.258} = 1.28kHz$

(b)

Maximum (i.e. constructive interference) in sound intensity at P if speakers are connected in antiphase.