

AS Level Physics A
H156/01 Breadth in Physics

Question Set 15

1. (a) An oscilloscope is connected to a microphone. The oscilloscope is used to determine the frequency of sound waves emitted from a loudspeaker. Describe how the trace on the oscilloscope screen can be used to determine the frequency f of the sound waves.

[2]

(b) Fig. 25.1 shows two loudspeakers L_1 and L_2 connected to the same signal generator. The loudspeakers emit sound of the same wavelength but with different amplitudes. The points P and Q are at different distances from the loudspeakers.

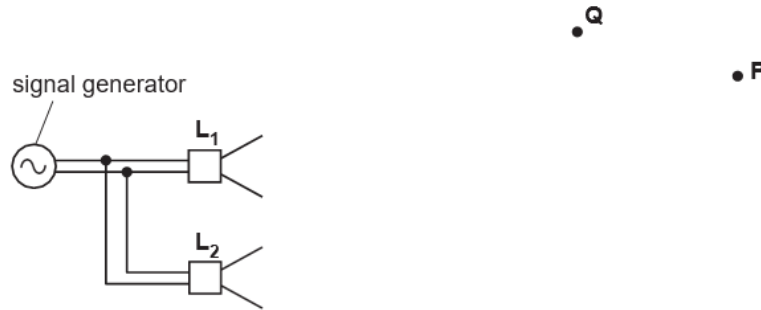


Fig. 25.1

The sound at point P from L_1 alone has displacement x_1 . The sound from L_2 alone has displacement x_2 . Fig. 25.2 shows the variation of x_1 with time t .

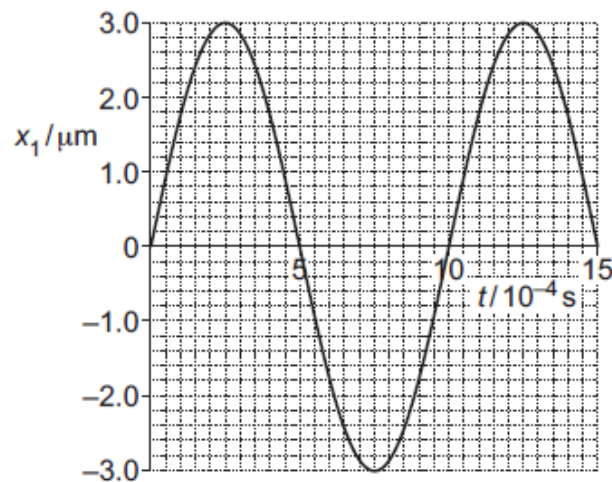


Fig. 25.2

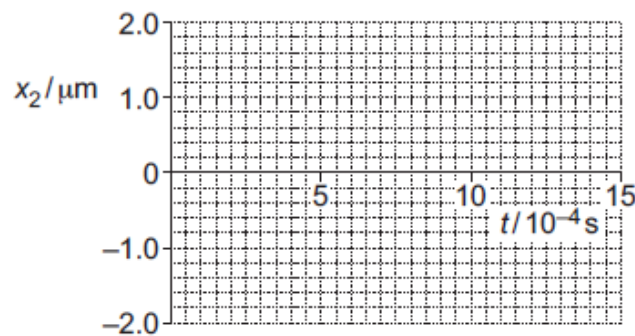


Fig. 25.3

The sound from L_2 alone at point P has amplitude $1.0\ \mu\text{m}$, a phase difference of 180° compared with the sound from L_1 and the same frequency as the sound from L_1 .

(i) On Fig. 25.3, draw the variation of x_2 with time t at point P .

[1]

(ii) Explain why the intensity at P due to the sound from both L_1 and L_2 is not the same as the intensity of the sound at P from only L_1 .

[2]

(iii) The wavelength of the sound is 34 cm. The distance L_1Q is 200 cm and the distance L_2Q is 217 cm.

Explain the type of interference occurring at point Q .

[2]

Total Marks for Question Set 15: 7

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