

18-03

Question 104

A sinusoidal sound wave is described by the displacement

$$S(x,t) = 2 \cdot 10^{(-8)} \cos [1.25 x - 1850 t],$$

where x is in meters and t is seconds. What is the pressure amplitude of this wave if it is traveling in a material with a bulk modulus of $2.1 \cdot 10^{**9} \text{ N/m**2}$?

- (a) 53 Pa
- (b) 77 Pa
- (c) 66 Pa
- (d) 82 Pa
- (e) 44 Pa

18-4 Interference

18-04

1.43-37%

Question 105

Two identical speakers, facing each other are driven by a common oscillator of frequency 600 Hz. A man, at the midpoint between the speakers, start moving toward one of them. He reaches the first minimum sound when he is 1 m from one of the speakers. Find the distance between the speakers. (Speed of sound = 343 m/s.)

- (a) 6.1 m
- (b) 4.0 m
- (c) 2.3 m
- (d) 5.6 m
- (e) 4.5 m

18-04

Question 106

Two speakers are driven by a common oscillator and face each other at a distance of 1.500 m. A man is standing at 0.700 m from one of the speakers along the line joining the two speakers. What is the highest frequency of the oscillator, within the audible range (20.0 Hz to 20.0 kHz), so that the man hears a minimum sound? (Speed of sound = 343 m/s).

- (a) 19.9 kHz
- (b) 18.9 kHz
- (c) 12.6 kHz
- (d) 15.9 kHz
- (e) 10.3 kHz

18-04

1.44-36%

Question 107

Two sound waves, from two different sources with the same frequency, 660 Hz, travel at a speed of 330 m/s. The sources are in phase. What is the phase difference of the waves at a point that is 5.0 m from one source and 4.0 m from the other? (The waves are traveling in the same direction.)

- (a) 1 Pi.
- (b) 2 Pi.
- (c) 4 Pi.
- (d) 3 Pi.
- (e) 5 Pi.

18-04
0.13-83%

Question 108

A sound wave of 50.0 cm wavelength enters the tube shown in figure(1) at the source end. What must be the smallest radius(r) (other than zero) such that a maximum sound will be heard at the detector end?



Figure (1)

- (a) 15.9 cm.
- (b) 21.3 cm.
- (c) 33.0 cm.
- (d) 17.5 cm.
- (e) 43.8 cm.

18-04

Question 109

Two point sources S_1 and S_2 are placed on the y -axis as shown in figure 1. The two sources are in phase and emit identical sound waves with frequency 860 Hz. An observer starts at point A and moves to point B along a straight line parallel to the y -axis. How many points of maximum intensity (constructive interference) will he observe? (speed of sound in air = 344 m/s).

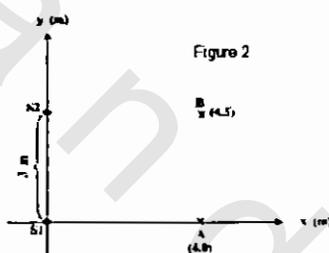


Figure 2

- (a) 1
- (b) 4
- (c) 0
- (d) 5
- (e) 3

18-04
0.70-40%

Question 110

Two small identical speakers are in phase (see figure 2). The speakers are 3.0 m apart. An observer stands at point X , 4.0 m in front of one of the speakers. The sound he hears will be a maximum if the wavelength is

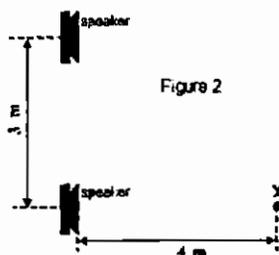


Figure 2

- (a) 2.0 m.
- (b) 3.0 m.
- (c) 1.5 m.
- (d) 1.0 m.
- (e) 2.5 m.

Question 11118-04
0.31-41%

Two speakers face each other and emit sound waves in air with a frequency of 500 Hz, as shown in figure 1. The phase difference between the sound waves emitted by the two speakers at point A is 2.35 radians. What is the distance between A and S₂? The speed of sound in air is 343 m/s.

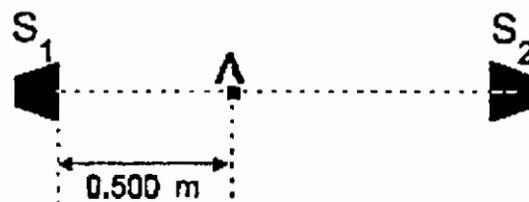


FIGURE 1

- (a) 0.256 m
- (b) 1.05 m
- (c) 3.17 m
- (d) 0.756 m
- (e) 0.500 m

Question 11218-04
0.21-75%

Two speakers A and B are driven by a common oscillator at 256 Hz and face each other at a distance of 10.0 m (see figure 2). A small detector is located midway between the two speakers (at point O). Find the distance that the detector has to move towards A along the line joining A and B to detect the first minimum in the sound intensity. [speed of sound in air = 343 m/s].

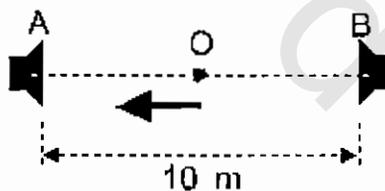


Figure 2

- (a) 0.670 m
- (b) 0.172 m
- (c) 0.335 m
- (d) 1.00 m
- (e) 0.195 m

Question 113

18-04

A listener hears two sound waves from two loud-speakers that are in phase. At the listener's location a phase difference of 450 degrees is detected. What is the path difference if the wavelength of the waves is 4 m.

- (a) 10 m.
- (b) 5 m.
- (c) 99 m.
- (d) 1 m.
- (e) zero.

Question 114

18-04
0.48-47%

Two transmitters, S1 and S2 shown in figure (1), emit identical sound waves of wavelength λ . The transmitters are separated by a distance $\lambda/2$. Consider a big circle of radius R with its center halfway between these transmitters. How many interference maxima are there on this big circle?

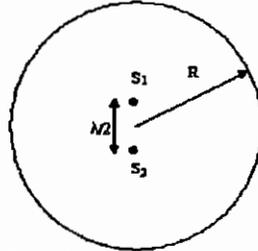


Figure 1

- (a) 2.
- (b) 5.
- (c) 1.
- (d) 6.
- (e) 8.

Question 115

18-04
0.33-70%

Two loudspeakers, S1 and S2, emit sound waves of identical wavelength and amplitude. They are situated as shown in figure 4. The two speakers are in phase. A listener starts to walk from point D toward S2 along a line perpendicular to the line joining S1 and S2. How many times will he hear a minimum in sound intensity as he moves from D to S2?

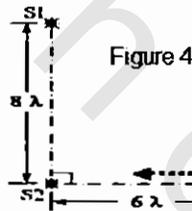


Figure 4

- (a) 5
- (b) 2
- (c) 1
- (d) 4
- (e) 3

Question 116

18-04
0.35-66%

In figure 4, two small identical speakers are connected (in phase) to the same source. The speakers are 4.10 m apart and at ear level. An observer stands at X, 8.00 m in front of one speaker. In the frequency range 200 Hz-500 Hz, the sound he hears will be most intense if the frequency is: [speed of sound in air is 343 m/s]

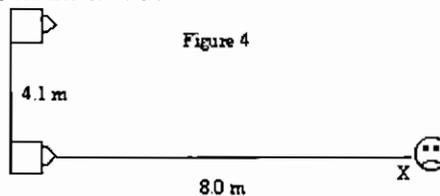


Figure 4

- (a) 600 Hz.
- (b) 346 Hz.
- (c) 500 Hz.
- (d) 210 Hz.
- (e) 422 Hz.