Ques·ion 142

The intensity level of sound from 10 persons each of intensity level 60 dB is
(a)   12 dB.
(b)   120 dB.
(c)   600 dB.
(d)   70 dB.
(e)   300 dB.

Quest on 143

A per·on is hearing a sound level of 70 dB at a distance of 3.0 m from a point source. Assuming that the sound is emitted isotropically, find the power of the source.
(a) $8.6*10**(-6)$ W.
(b) $2.3*10**(-4)$ W.
(c) $2.9*10**(-5)$ W.
(d) $1.1*10**(-3)$ W.
(e) $7.7*10**(-3)$ W.

18-6   Sources of Musical Sound

Question 144

An air column 2 m in length is open at both ends. The frequency of a certain harmonic is 410 Hz, and the frequency of the next higher harmonic is 492 Hz. Determine the speed of sound in the air column.
(a)   317 m/s.
(b)   320 m/s.
(c)   328 m/s.
(d)   342 m/s.
(e)   305 m/s.

Question 145

An air column 2 m in length is open at one end and closed at the other end. The frequency of a certain harmonic is 369 Hz, and the frequency of the next higher harmonic is 451 Hz. Determine the speed of sound in the air column.
(a)   328 m/s.
(b)   342 m/s.
(c)   325 m/s.
(d)   323 m/s.
(e)   320 m/s.

Question 146

The second harmonic of a string, fixed at both ends, of length 0.6 m and linear density $1.1*10**-3$ kg/m, has the same frequency as the fifth harmonic (n=5) of a pipe closed at one end of length 1.0 m. Find the tension in the string. (Speed of sound = 343 m/s).
(a)   90 N
(b)   38 N
(c)   50 N
(d)   73 N
(e)   18 N

18-06

Question 147
During a time equal to the period of a certain vibrating fork, the emitted sound wave travels a distance:
(a)   proportional to the frequency of the wave.
(b)   of one wavelength.
(c)   of about 331 meters.
(d)   directly proportional to the frequency of the fork.
(e)   equal to the length of the fork.

18-06

Question 148
If two successive frequencies of a pipe, closed at one end and filled by air, are 500 Hz and 700 Hz, the length of the pipe is: [speed of sound in air = 340 m/s].
(a)   0.85 m.
(b)   3.40 m.
(c)   1.70 m.
(d)   0.43 m.
(e)   0.18 m.

18-06

Question 149
Which of the following statements are CORRECT:
     1. Waves carry energy and momentum.
     2. Mechanical waves need a medium to propagate.
     3. Sound waves are transverse waves.
     4. A Wave on a stretched string is a longitudinal wave.
     5. For a tube closed at one end, only odd harmonics are present.
(a)   3 and 5.
(b)   2 and 4.
(c)   1, 2 and 3.
(d)   1, 2, and 5.
(e)   1 and 4.

18-06
0.44-55%

Question 150
A tube 1.5 m long is closed at one end. A stretched wire is placed near the open end, see Fig. (1). The wire is 0.33 m long and has a mass of 9.8 g. It is fixed at both ends and vibrates in its fundamental mode. By resonance, it sets the air column in the tube into oscillation at that column's fundamental frequency. Find the tension in the wire. [Speed of sound in air = 343 m/s].
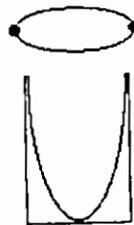

fig.(1)

(a)   98 N.
(b)   64 N.
(c)   77 N.
(d)   42 N.
(e)   30 N.

Question 151
Pipe A, which is 1.8 m long and open at both ends, oscillates at its third lowest harmonic frequency. Pipe B, which is closed at one end, oscillates at its second lowest harmonic frequency. The frequencies of pipes A and B match. They are both filled with air for which the speed of sound is 344 m/s. How long is pipe B?
(a)   0.9 m
(b)   1.0 m
(c)   0.6 m
(c)   3.6 m
(e)   1.8 m

Question 152
A 1024 Hz tuning fork is used to obtain a series of resonance levels in a gas column of variable length, with one end closed and the other open. The length of the column changes by 20 cm from one resonance to the next resonance. From this data, the speed of sound in this gas is:
(a)   20 m/s.
(b)   102 m/s.
(c)   51 m/s.
(d)   410 m/s.
(e)   205 m/s.

Question 153
Tube A (open at both ends) is twice as long as tube B (open at one end) as shown in figure 3. The ratio of their fundamental frequencies ($f1A/f1B$) is:
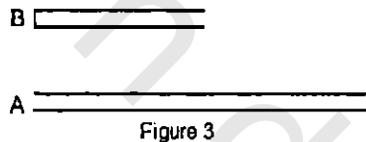
B ▭

A ▭
Figure 3

(a)   4
(b)   0.25
(c)   2
(d)   1
(e)   0.5

Question 154
A pipe is closed at one end and open at the other end. The length of the pipe is 1.00 m. The air column in the pipe can resonate with a sound source of frequency: [speed of sound in air = 343 m/s]
(a)   257 Hz
(b)   450 Hz
(c)   320 Hz
(d)   200 Hz
(e)   160 Hz

Question 155
In an air pipe, closed at one end, the three successive resonance frequencies are 425 Hz, 595 Hz, and 765 Hz. If the speed of sound in air is 340 m/s, the length of the pipe is:
(a)   1.5 m.
(b)   1.0 m.
(c)   0.5 m.
(d)   2.0 m.
(e)   2.5 m.

18-06

Question 156
0.45-35%

A tuning fork, of frequency of 512 Hz, is used to generate the fundamental resonance in an open, at both ends, air tube of length 30 cm. The frequency of the fork that used to generate the fundamental resonance in the same air column when one of its ends is closed is:
(a)   128 HZ.
(b)   1024 HZ.
(c)   512 HZ.
(d)   64 Hz.
(e)   256 Hz.

18-06

Question 157
0.37-32%

Organ pipe A, with both ends open, has a fundamental frequency of 340 Hz and length 0.4 m. The third harmonic of organ pipe B, with one end open, has the same frequency as the second harmonic of pipe A. How long is pipe B?
(a)   2.0 m.
(b)   0.1 m.
(c)   1.5 m.
(d)   0.4 m.
(e)   0.3 m.

18-06

Question 158
0 54-65%

A pipe is closed at one end and open at the other, and has a length of 0.500 m. The pipe is filled with air. What is the resonant frequency corresponding to the mode shown in figure 5? Use 344 m/s as the speed of sound in air.

Figure 5

(a)   172 Hz
(b)   429 Hz
(c)   344 Hz
(d)   515 Hz
(e)   860 Hz

18-06

Question 159
0.11-68%

Two pipes have the same length L. Pipe B open at one end and closed at the other, while pipe A open both ends. Which harmonic of pipe B matches the second harmonic of pipe A?
(a)   Never match.
(b)   The fundamental.
(c)   The fourth.
(d)   One needs to know the exact length.
(e)   The second.

18-06

Question 160
0.33-17%

The frequency of the fundamental mode of a sound wave in a 30.0-cm long tube closed at one end is 256 Hz. When the tube length is shortened to 12.0-cm, what is the new fundamental frequency?
(a)   640 Hz.
(b)   162 Hz.
(c)   256 Hz.
(d)   416 Hz.
(e)   102 Hz.