CLASS-9 SCIENCE EXTRA QUESTIONS

Chapter 12 - Sound

MCQ QUESTIONS

Multiple Choice Questions

1. Note is a sound

(a) of mixture of several frequencies

(b) of mixture of two frequencies only

(c) of a single frequency

(d) always unpleasant to listen

2. A key of a mechanical piano struck gently and then struck again but much harder this time. In the second case

(a) sound will be louder but pitch will not be different

(b) sound will be louder and pitch will also be higher

(c) sound will be louder but pitch will be lower

(d) both loudness and pitch will remain unaffected

3. In SONAR, we use

(a) ultrasonic waves

(b) infrasonic waves

(c) radio waves

(d) audible sound waves

4. Sound travels in air if

(a) particles of medium travel from one place to another

(b) there is no moisture in the atmosphere

(c) disturbance moves

(d) both particles as well as disturbance travel from one place to another.

5. When we change feeble sound to loud sound we increase its

(a) frequency (b) amplitude

(c) velocity(d) wavelength

6. In the curve (Fig.12.1) half the wavelength is

(a) A B (b) B D

(c) D E(d) A E

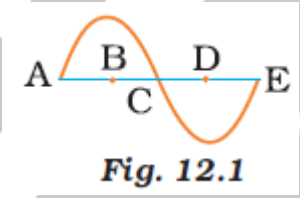


Fig. 12.1

7. Earthquake produces which kind of sound before the main shock wave begins

(a) ultrasound

(b) infrasound

(c) audible sound

(d) none of the above

8. Infrasound can be heard by

(a) dog(b) bat

(c) rhinoceros

(d) human beings

9. Before playing the orchestra in a musical concert, a sitarist tries to adjust the tension and pluck the string suitably. By doing so, he is adjusting

(a) intensity of sound only

(b) amplitude of sound only

(c) frequency of the sitar string with the frequency of other musical instruments

(d) loudness of sound

ANSWERS

1. (c) 2. (a) 3. (a) 4. (c) 5. (b) 6. (b) 7. (b) 8. (c) 9. (c)

Q.1. State Laws of Reflection of Sound (2)

Ans: According to the law of reflection of sound:

- The incident wave, the reflected wave and the normal lie in the same plane.
- The angle of incidence is equal to the angle of reflection.

Q.2. Harry standing 440 m away from a wall fired a gun and heard its echo 2 s later. How is an echo formed? Calculate the velocity of sound in air. (2)

Ans: Echo is formed due to the reflection of sound from a rigid surface under certain conditions.

Distance, D = 440 m

Time, t = 2 s

Using the formula

$$v = \frac{2D}{t}$$

$$v = 2 \times \frac{440\,m}{2\,s}$$

$$= 440\ m/s$$

Q.3. Why and how is reverberation removed in an auditorium or a big hall? (2)

Ans: For proper hearing, reverberation needs to be removed or reduced in an auditorium or a big hall.

To achieve this, the walls and ceilings of such halls are usually covered with sound absorbent materials like compressed fireboards, draperies or rough plaster.

Q.4. We hear thunder sound a few seconds after the flash is seen even though they occur simultaneously. Why? (2)

Ans: Sound travels a million times slower than light in air.

Speed of sound in air = 346 m/s

Velocity of light in air = 3×10^{8} m/s

Therefore, thunder sound is heard a few seconds after the flash is seen.

Q.5. Find the distance travelled by a sound wave of frequency 20 KHz, wavelength 1.7 cm in 10 s. (3)

Ans:

$$\text{Frequency} = 20\,\text{KHz} = 20 \times 1000\,\text{Hz}$$

$$\text{Wavelength} = 1.7\,\text{cm} = \frac{1.7}{100}\,\text{m}$$

$$\text{Time taken} = 10\,\text{s}$$

$$\text{Velocity} = \text{frequecy} \times \text{wavelength}$$

$$\therefore v = n \times l$$

$$\Rightarrow v = \frac{20 \times 1000 \times 1.7}{100}\,\text{m/s}$$

$$\Rightarrow v = 340\,\text{m/s}$$

Now,

$$\text{Distance} = \text{speed} \times \text{time}$$

$$D = v \times t$$

$$\therefore D = (340 \times 10)\text{m}$$

$$\Rightarrow D = 3400\,\text{m}$$

$$\Rightarrow D = 3.4\,\text{km}$$

Q.6. Are the particles of the medium dragged along with the wave as sound wave propagates through the medium? In which medium—solid, liquid or gas, does the sound wave travel fastest? (3)

Ans: **No,** the particles of the medium (material particles) are not dragged along with the wave. The particles of the medium simply oscillate about their mean positions at their fixed locations. And the disturbance is handed over from one particle to the next particle in contact.

Sound travels fastest in solid.

Q.7. Define time period of sound wave. What is its SI unit? How is it related with frequency? (3)

Ans: The time taken by sound wave to complete one oscillation in a medium is known as time period.

The SI unit of time period is second (s).

Time period is the reciprocal of frequency.

Q.8. How does sound reaches our ears? (3)

Ans: Sound moves through a medium (solid, liquid or gas) from the source to the listener. A particle of the medium that is in immediate contact with the vibrating object is first displaced from its equilibrium position. It then exerts a force on the adjacent particle which in turn results in displacement of its adjacent particle from its position of rest and so on. This process continues in the medium till the sound reaches our ears.

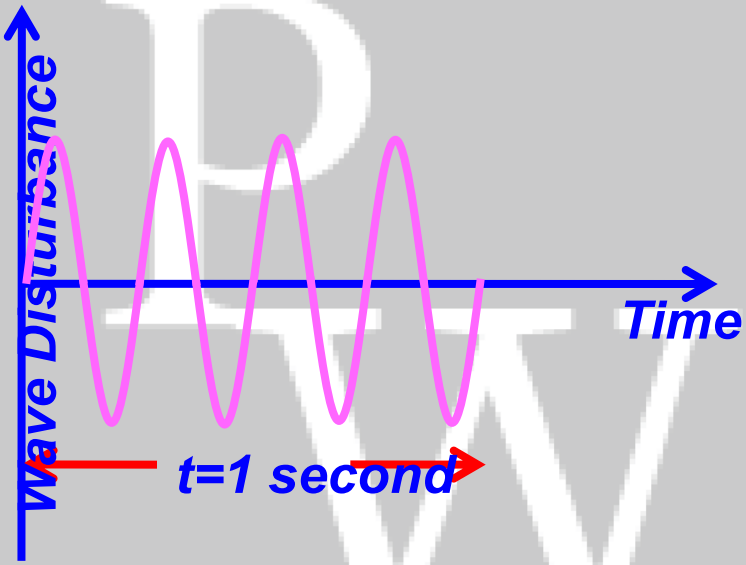
Q.9. What will happen to the loudness of a sound wave if its amplitude is doubled? Name a unit of sound. Is loudness affected by change in frequency? (3)

Ans: The loudness of sound is proportional to the square of the amplitude of the vibration of the sound wave. Therefore, the new sound will be four times louder than the original one.

The loudness is expressed in decibel (dB).

No, loudness of a sound will not be affected by change in its frequency even though its pitch will change.

Q.10. Define frequency of a sound wave. What is its SI unit and how is it related to pitch? What is the frequency of the wave shown below? (3)



Ans: The number of complete periodic oscillations of a sound wave per unit time is called the frequency of the sound wave.

The SI unit of frequency is hertz (Hz). Higher the frequency of a sound wave, higher is its pitch and vice-versa.

Number of complete oscillations in one second = 4.

Frequency of the wave = 4 Hz.

Q.11. How do sound waves propagate? (3)

Ans: When a vibrating object moves forward, it compresses the air in front of it creating a region of high pressure called compression. When it moves backwards, it creates a region of low pressure called rarefaction. As the object moves back and forth rapidly, a series of compressions and rarefactions is created in air which constitutes sound waves. Thus, sound waves propagate as longitudinal waves.

Q.12. What are the conditions for an echo to be heard? (5)

Ans: The conditions that have to be satisfied to hear an echo are as follows:

- The distance between the source of sound and the reflector should be at least 17.2 m.
- The size of the obstacle/reflector must be large compared to the wavelength of the incident sound.
- The intensity or loudness of sound should be sufficient for the reflected sound reaching the ear to be audible.
- The original sound should be of short duration.
- The time interval between the original sound and the reflected sound should be at least 0.1 s.

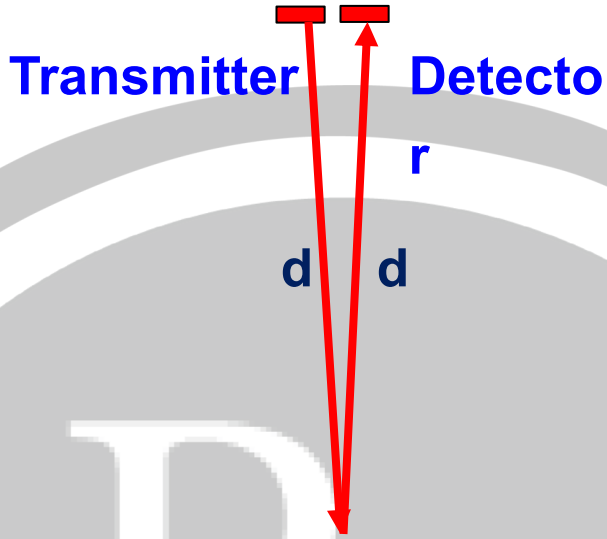
Q.13. Discuss SONAR. (5)

Ans: SONAR is the abbreviation for "Sound Navigation And Ranging".

It is a technique that uses sound propagation to navigate, communicate or to detect underwater objects such as submerged submarine, a sunken ship, iceberg, etc.

It consists of a detector and a transmitter. The ultrasonic waves produced by the transmitter kept in the ship are directed towards the ocean floor. These waves when reflected by the object and the ocean floor are

detected by the detector. The depth of the object can be calculated using time interval between the generation of the wave and reception of its echo and the speed of sound in water.



Speed of sound=v

Time interval between transmission and reception of ultrasound signal = t

Therefore, 2d =v x t.

But the detector and the transmitter are placed very close to each other.

So, Depth=d=(v x t)/2.