

NCERT Physics Questions

Chapter 11: Sound

Theory questions

Short theory questions

1. What is a medium for sound?

Ans: The matter or substance through which sound is transmitted is called a medium.

2. What is a wave in a medium?

Ans: A wave is a disturbance that moves through a medium when the particles of the medium set neighbouring particles into motion.

3. What is the meaning of a mechanical wave? Give example of mechanical and non mechanical wave.

Ans: Waves characterised by the motion of particles in the medium are called mechanical waves.

Example: mechanical-sound, non-mechanical-light.

4. Give the three characteristics of a sound wave.

Ans: frequency, amplitude, and speed.

5. Define wavelength and give its SI unit.

Ans: The distance between two consecutive compressions (C) or two consecutive rarefactions (R) is called the wavelength.

Its SI unit is metre (m).

6. Formal definition of one oscillation of a sound wave.

Ans: The change in density/pressure/periodic wave property from the

maximum value to the minimum value, then again to the maximum value, makes one complete oscillation.

7. Define frequency and give its SI unit.

Ans: The number of such oscillations of the wave per unit time is the frequency of the sound wave.

8. What is time period of a wave.

Ans: The time taken for one complete oscillation is called the time period of the sound wave.

9. Formula relation between frequency and time period of a wave.

Ans: $v = \frac{1}{T}$

10. What is pitch of a sound wave?

Ans: How the brain interprets the frequency of an emitted sound is called its pitch.

11. Define amplitude of a wave and its unit.

Ans: The magnitude of the maximum disturbance in the medium on either side of the mean value is called the amplitude of the wave. For sound its unit will be that of either density (kg/m^3) or pressure (Pascal).

12. What is loudness? What does the definition of loudness and pitch have in common?

Ans: Loudness is a measure of the response of the ear to the sound. In other words, it is how the brain interprets amplitude of sound, for a particular frequency.

Both loudness and pitch are subjective observations of the brain and ears, and not a properly measurable quantity.

13. What is a tone and a note? How is it different from noise?

Ans:

- *A sound of single frequency is called a tone.*
- *The sound which is produced due to a mixture of several frequencies is called a note and is pleasant to listen to.*
- *Noise is a sound of mixed frequencies which is **unpleasant** to listen to.*

14. Another name for sound quality. Also give an informal definition of quality of a sound.
Ans: timber of sound. The sound which is more pleasant is said to be of a rich quality.
15. Define speed of sound.
Ans: The distance which a point on a wave, such as a compression or a rarefaction, travels per unit time.
16. Give the formula of speed of sound using a) Time period, b) frequency.
Ans: a) $speed = \frac{\lambda}{T}$ b) $speed = \lambda \cdot \nu$
17. Define intensity of sound.
*Ans: The amount of sound energy passing each second **through unit area** is called the intensity of sound.*
18. When does the speed of sound remain same?
Ans: The speed of sound remains almost the same for all frequencies in a given medium under the same physical conditions.
19. Give the two properties that speed of sound depends on.
Ans:
- *Temperature of the medium,*
 - *The state of the medium, or the medium itself.*
20. State the law of reflection of sound.
Ans: The directions in which the sound is incident and is reflected make equal angles with the normal to the reflecting surface at the point of incidence, and the three are in the same plane.
21. What is the time delay between sound reflections for our brains to register it as a separate echo?
Ans: 0.1s
22. What is reverberation and how do we reduce it?
Ans: The repeated reflection that results in this persistence of sound is called reverberation. To reduce reverberation, the roof and walls of the auditorium are generally covered with sound-absorbent materials.

23. Audible range of sound for the average human.
Ans: 20Hz to 20kHz.
24. What is infrasound and ultrasound, and give some real world examples for each.
Ans: Sounds of frequencies below 20 Hz are called infrasonic sound or infrasound. Example: Rhinoceros communicating.
Frequencies higher than 20 kHz are called ultrasonic sound or ultrasound. Example: Echolocation in bats.
25. What is echocardiography?
Ans: Ultrasonic waves are made to reflect from various parts of the heart and form the image of the heart. This technique is called echocardiography.
26. Explain ultrasonography.
Ans: In this technique the ultrasonic waves travel through the tissues of the body and get reflected from a region where there is a change of tissue density. These waves are then converted into electrical signals that are used to generate images of the organ. These images are then displayed on a monitor or printed on a film. This technique is called 'ultrasonography'.

Long theory questions

1. Explain the propagation of sound in terms of
 - (a) its effect on each particle in the medium.
 - (b) pressure differences in the medium.
2. Definition and difference between longitudinal wave and transverse wave.
3. Define the peak and trough of a wave.
4. Give the difference between amplitude, intensity, and loudness of a sound wave. Are they related to one another?
5. Give 3 uses of reflection of sound to our advantage.
6. (*very big*) Briefly explain each of the five applications of ultrasound.