

## 12. Sound

Q 1 What are the uses of SONAR technique?

Mark (1)

Q 2 What does 'SONAR' stand for ?

Mark (1)

Q 3 Which part of the ear turns pressure variations into electrical signals?

Mark (1)

Q 4 What is intensity of sound?

Mark (1)

Q 5 Why sound wave is called longitudinal wave?

Mark (1)

Q 6 What is a sound?

Mark (1)

Q 7 Why sound waves are called mechanical waves?

Mark (1)

Q 8 What is a crest and a trough in a wave?

Mark (1)

Q 9 Can sound wave travel through vacuum?

Mark (1)

Q 10 What is amplitude of a wave?

Mark (1)

Q 11 What is characterized by the amplitude of the wave?

Mark (1)

Q 12 What is characterized by the frequency of the sound wave?

Mark (1)

Q 13 What is reverberation?

Mark (1)

Q 14 What is the audible range of the average human ear?

Mark (1)

Q 15 What should be the minimum distance between a sound source and reflector for a distinct echo?

Mark (1)

Q 16 What is a wave?

Mark (1)

Q 17 Explain why the ceilings of concert halls and conference halls are made curved?

Mark (1)

Q 18 What is law of reflection in sound?

Mark (1)

Q 19 Priya clapped her hand near a cliff and heard the echo after 5 seconds. If the speed of sound is 330 m/sec, then find the distance of the cliff from Priya?

Marks (2)

Q 20 What are 'infrasound' and 'ultrasound'?

Marks (2)

Q 21 Calculate the time in which a tuning fork of frequency 234 Hz completes 26 vibrations.

Marks (2)

Q 22 We hear thunder sound a few seconds after the flash is seen even though they occur simultaneously. Why?

Marks (2)

Q 23 A sound wave has a frequency of 1500 Hz and wavelength 25 cm. How long will it take to travel 3 km?

Marks (2)

Q 24 Why and how is reverberation removed in an auditorium or a big hall?

Marks (2)

Q 25 State Laws of Reflection of Sound

Marks (2)

Q 26 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.

Marks (2)

Q 27 What is the frequency of an oscillating body?

The frequency of a source is 80 Hz. Find the number of times it vibrates in a minute.

Marks (2)

Q 28 Explain how ultrasounds help to detect cracks and flaws in metal blocks.

Marks (3)

Q 29 Define time period of sound wave. What is its SI unit? How is it related with frequency?

Marks (3)

Q 30 Explain, how compressions and rarefactions are produced in air near a source of sound.

Marks (3)

Q 31 How does sound reaches our ears?

Marks (3)

Q 32 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?

Marks (3)

Q 33 How do sound waves propagate?

Marks (3)

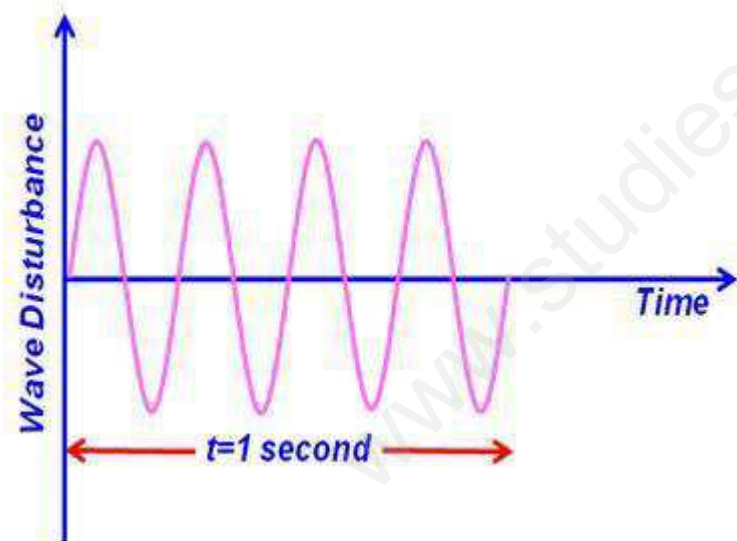
Q 34 Are the particles of the medium dragged along with the wave as sound wave propagates through the medium? In which medium—solid, liquid or gas, does the sound wave travel fastest?

Marks (3)

Q 35 Find the distance travelled by a sound wave of frequency 20 KHz, wavelength 1.7 cm in 10 s.

Marks (3)

Q 36 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?



Marks (3)

Q 37 What do you understand by frequency of a sound wave? What is the relationship between velocity of sound wave and its frequency?

The wavelength of sound emitted by a source is  $1.25 \times 10^{-2} \text{ m}$ . If the velocity of the sound is 342 m/s, what is the frequency of the sound?

Marks (3)

Q 38 Explain that sound is a mechanical wave. How do sound waves travel in different media? What is the approximate speed of sound in air?

Marks (3)

Q 39 What is the relevance of amplitude and of frequency of a vibrating body to sound produced by it?

Marks (3)

Q 40 Define echo. A sonar echo takes 2.2s to return from a whale. Find the distance of the whale below the surface of the water.

[Given the speed of sound in sea water at 25 °C = 1533m/s]

Marks (3)

Q 41 Define the terms.

1. Audible range of normal human ear
2. Ultrasonics
3. Infrasonics

When vibration is a necessary condition for production of sound, then why the vibrating pendulum does not produce sound?

Marks (3)

Q 42 Define speed of sound. Name the factors on which the speed of sound depends. Why the intensity of sound of a speaker is larger immediately after rain?

Marks (3)

Q 43 Explain The structure of human ear.

Marks (5)

Q 44 What is an echo? Calculate the minimum distance in air required from a surface reflecting sound to hear an echo at 20°C.

Marks (5)

Q 45 What is SONAR stands for? For what purpose it is used?

Suppose a sonar apparatus is attached to the ship and sends ultrasonic waves in the sea. When the waves reach the bottom of the sea, they are reflected back. If the ultrasonic waves take 6 seconds to travel from the ship to the bottom of the sea and back to the ship, then what will be the depth of the sea? [speed of sound in water = 1500ms<sup>-1</sup>].

Marks (5)

Q 46 Explain how defects in a metal block can be detected using ultrasound.

Marks (5)

Q 47 Discuss SONAR.

Marks (5)

Q 48 Explain the working and applications of SONAR.

Marks (5)

Q 49 Rajan and Mohan are standing at opposite ends of an aluminium rod. Rajan strikes the end of the rod with a stone. Calculate the ratio of times taken by the sound waves in air and in aluminium to reach Mohan. [Velocity in aluminium = 6420m/s]

Marks (5)

Q 50 Explain the statement 'Wave transfers energy and not the matter' with the help of an activity.

Marks (5)

Most Important Questions

Q 1 Fill in the blanks:

1. Sound is produced due to \_\_\_\_\_ of different objects.
2. Sound travels as a \_\_\_\_\_ wave through a material medium.
3. Sound travels as successive \_\_\_\_\_ and \_\_\_\_\_ in the medium.

Q 2 Fill in the blanks:

1. The distance between two consecutive compressions or two consecutive rarefactions is called the \_\_\_\_\_.
2. The change in the density or pressure from a maximum value to minimum and then back to the maximum is called an \_\_\_\_\_.
3. The number of periodic oscillations per unit time is called the \_\_\_\_\_ of the sound wave.

Q 3 Fill in the blanks:

1. The loudness of sound is proportional to the \_\_\_\_\_ of the amplitude of the vibration.
2. The speed of sound \_\_\_\_\_ as it moves from solid to gaseous state.
3. In any medium the speed of sound \_\_\_\_\_ with increase in temperature.

Q 4 Explain with an example how sound is produced?

Q 5 Describe with the help of a diagram how sound propagates through air?

Q 6 What do you understand by the terms compression and rarefaction?

Q 7 Explain with example to show that sound cannot travel through vacuum?

Q 8 What are longitudinal waves?

Q 9 Sound waves are longitudinal. Prove?

Q 10 What are the main characteristics of sound waves?

Q 11 Explain crest and trough with the help of the graphical representation of sound wave?

Q 12 Explain the terms Wavelength and Amplitude?

Q 13 Explain the difference between Frequency and Pitch of a sound wave?

Q 14 Explain time period with respect to a sound wave?

Q 15 Frequency of a wave motion is 250 Hz. What is its time period?

Q 16 What do you mean by an Oscillation of a sound wave?

Q 17 Derive a relation between speed, frequency and wavelength of a sound wave?

Q 18 A sound wave has a frequency of 2 kHz and wavelength 40 cm. Calculate its speed?

Q 19 Calculate the wavelength of a sound wave whose frequency is 220 Hz and speed is 440 m/s in a given medium?

Q 20 Calculate a) the wavelength b) the time period of a tuning fork of frequency 512 Hz that is set to vibrate. Velocity of sound in air is 320 m/s.

Q 21 What is the wavelength of sound waves produced in air by a vibrating tuning fork whose frequency is 256 Hz when the velocity of sound in air is  $330 \text{ m s}^{-1}$ ?

Q 22 Why the flash of lightning due to collision of clouds is seen much before the thunder, although both occur simultaneously?

Q 23 What do you understand by speed of sound? How does it depend upon the medium and temperature?

Q 24 What is reflection of sound? Explain the laws of reflection with respect to sound?

Q 25 What is Echo. Explain the conditions that have to be satisfied to hear an echo?

Q 26 Why do echoes produced in an empty auditorium usually decrease when it is full of audience?

Q 27 What is reverberation?

Q 28 A girl clapped his hands near a cliff and heard the echo after 5 s. What is the distance of the cliff from the person if the speed of the sound, velocity of sound in air is taken as 346 m/s?

Q 29 A boy fires a gun and hears the echo 2 seconds later. If he is 480 m away from a wall, calculate the velocity of sound in air?

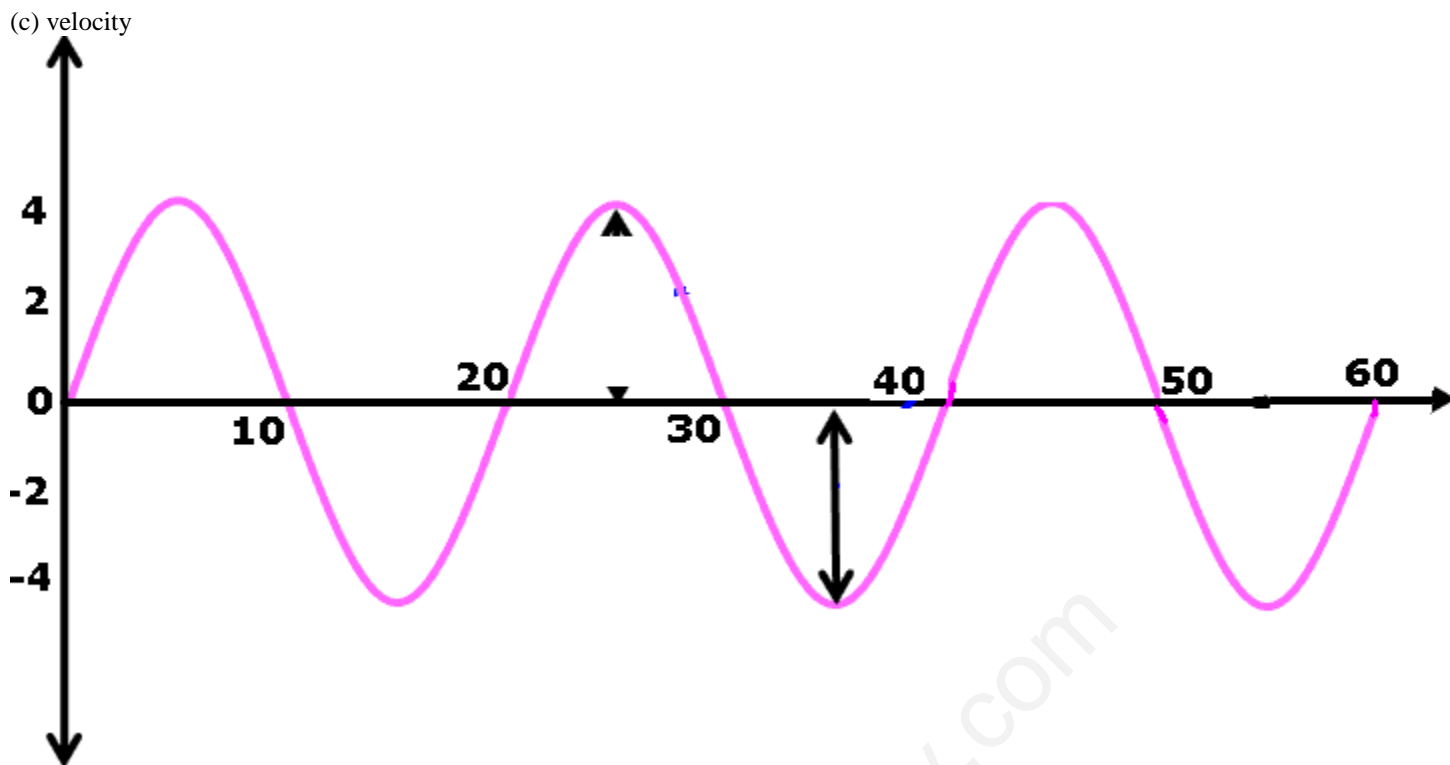
Q 30 Explain the term audible range, Infrasonic frequencies, Ultrasonic frequencies?

Q 31 Explain how is the principle of echo used by

- (a) The bat during its flight at night.
- (b) The dolphin to locate small fish as its prey.

Q 32 Figure shows a waveform of frequency 50 Hz in a string. The numbers in the string represent distance in centimeter. For this wave motion, find:

- (a) wavelength
- (b) amplitude, and



Q 33 What is ultrasound? Give some important applications of ultrasound?

Q 34 How Ultrasound is used to detect defects in metals?

Q 35 What is SONAR?

Q 36 Explain the working of SONAR.

Q 37 Suppose a ship sends a pulse of ultrasound and receives an echo 0.2 seconds later. If the speed of sound in water is 1000 m/s calculate its depth?

Q 38 With the help of a diagram, explain the structure of a human ear?