12

Sound

In the Chapter

- Sound is produced because of vibration of different objects.
- Sound travels as a longitudinal wave through a material medium.
- Sound travels as successive rarefactions and compressions in the medium.
- In sound propagation, it is the energy of the sound which travels and not the particles of the medium.
- Sound cannot move in vacuum.
- The change in density from one maximum value to the minimum value and again to the maximum value makes one complete oscillation.
- The distance between two consecutive compressions or two consecutive rarefactions is known as the wavelength, λ.
- The time taken by the wave for one complete oscillation of the density or pressure of the medium is known as the time period, T.
- The number of complete oscillations per unit time is called the frequency (ν), $\nu = 1/T$.
- The speed v, frequency ν, and wavelength λ, of sound are related by the equation, $v = \lambda\nu$.
- The speed of sound depends on the nature and the temperature of the transmitting medium.
- The law of reflection of sound suggests that the directions in which the sound is incident and reflected make equal angles with the normal to the reflecting surface and the three lie in the same plane.
- For hearing a distinct sound, the time interval between the original sound and the reflected one must be at least 0.1 s.
- The persistence of sound in an auditorium is the result of repeated reflections of sound and is known as reverberation.
- Sound properties like pitch, loudness and quality are determined by the corresponding wave properties.
- Loudness is a physiological response of the ear to the intensity of sound.
- The amount of sound energy passing each second through unit area is known as the intensity of sound.
- The audible range of hearing for average human beings is in the frequency range of 20 Hz – 20 kHz.
- Sound waves with frequencies below the audible range are called "infrasonic" and those above the audible range are called "ultrasonic".
- Ultrasound has many industrial and medical applications.

Intext Exercises

Page No. 162

1. How does the sound produced by a vibrating object in a medium reach your ear ?

Ans. Sounds after it is produced moves through a medium from the point of generation to the listener. When an object vibrates it sets the particle of the medium around it to vibrate. The particles do not travel all the way from the vibrating object to the ear. A particle of the medium in contact with the vibrating object is first displaced from its equilibrium position. It then exerts a force on the adjacent particle and get is displaced from its position of rest. After displacing the adjacent particle the first particle comes back to its original position. This process continues in the medium till the sound becomes feeble. The disturbance set by sound in the medium travels through the medium and not the particle of the medium.

Page No. 163

1. Explain how sound is produced by your school bell.

Ans. If it is an electric bell when the switch is pressed electric charges flow through the wire and the hammer strikes the gong. This produce vibrations. If it is a manual bell then vibrations are produced by hitting the round plate with a stick. When an object vibrates, then the air layers around it also start vibrating in exactly the same way. These layers of air carry sound waves from the sound producing object (bell in this case) to our ears. During the transmission no actual movement of air from the bell to our ear takes place. The air layers only vibrate back and forth and transfer the sound energy from one layer to the next layer till it reaches our ear.

2. Why are sound waves called mechanical waves?

Ans. A wave is a disturbance that moves through a medium and the particles of the medium set by neighbouring particles into motion. They in turn produce similar motion in others and the particle moves away from its initial position. This exactly happens during propagation of sound in a medium. Hence sound can be visualized as a wave. Sound waves are characterized by physical motion of particles in the medium and are called mechanical waves.

3. Suppose you and your friend are on the moon. Will you be able to hear any sound produced by your friend ?

Ans. We cannot hear the sound produced by our friend because there is no atmosphere in the moon. It is all vacuum on the surface of moon. Sound needs a medium to travel.

Page No. 166

1. Which wave property determines?

(a) loudness (b) pitch

Ans. (a) The loudness or softness of a sound is determined by its amplitude.

(b) The pitch of a sound is determined by its frequency.

2. Guess which sound has a higher pitch – guitar or car horn?

Ans. Car horn has a higher pitch.

Page No. 166

1. What are wavelength, frequency, time period and amplitude of a sound wave ?

Ans. (a) The distance between two consecutive crests or two consecutive troughs is called wavelength.

(b) The number of oscillations per unit time is called the frequency of the sound wave.

(c)The time period of a wave is the time taken by a wave to travel through a distance equal to its wavelength.

(d) The magnitude of the maximum displacement of the vibrating particles of the medium on either side of their mean undisturbed position is called the amplitude of the wave.

Or

The distance between two nearest points in a wave which are in the same phase of vibration is called the wavelength. It is represented by (lambda). Its SI unit is metre (m).

(ii) The magnitude of the maximum displacement of the vibrating particles of the medium on either side of their mean undisturbed position is called the amplitude of the wave. The extent to which the medium is compressed when the sound wave passes through the medium measures the amplitude.

It is usually represented by the letter 'A'. Its SI unit is metre (m).

2. How is the wavelength and the frequency of a sound wave related to its speed?

Ans. The relation between wavelenght (λ), frequency (υ) and speed of wave (v) is

$$v = v\lambda$$

3. Calculate the wavelength of a sound whose frequency is 200 Hz and speed is 440 ms^{-1} in a given medium.

Ans. Frequency $v = 200Hz$, speed $v = 440\ ms^{-1}$, wavelength $\lambda = ?$

From the relation, $v = v\lambda$

$$440 = 200\lambda$$

$$\lambda = \frac{440}{200} = 2.2m$$

4. A person is listening to a tone of 500 Hz sitting at a distance of 450 m from the source of the sound. What is the time interval between successive compressions from the source?

Ans. The time interval between two successive compressions or rarefactions is equal to the time period of the wave.

$$\therefore \text{Required time interval} = \text{Time period} = \frac{1}{\text{Frequency}}$$

$$= \frac{1}{500} = 0.0002\,s$$

$$= 2\times10^{-2}s - 2\,ms$$

Page No. 166

1. Distinguish between loudness and intensity of sound.

Ans. The amount of sound energy passing each second through unit area is called intensity of sound.

Loudness is a measure of the response of the ear to sound.

Even though two sounds are of equal intensity, we can hear one as louder than the other because our ear can detect it better.

Page No. 167

1. In which of the three media, air, water or iron, does sound travel the fastest at a particular temperature?

Ans. Sound travels fastest in iron.

Page No. 168

1. An echo returned in 3 s. What is the distance of the reflecting surface from the source, given that the speed of sound is 342 ms^{-1}?

Ans. Speed of sound, $V = 342\ ms^{-1}$

Time taken for hearing the echo,

$$t = 3\,s$$

Distance travelled by the sound

$= V \times t$

$= 342\ ms\text{-}1 \times 3\ s$

$= 1026\ m$

In 3 s sound has to travel twice the distance between the reflecting surface and the person. Hence the distance between the reflecting surface and the person

$= 1026\ m/2 = 513\ m$

Page No. 169

1. Why are the ceilings of concert halls curved ?

Ans. The ceilings of the concert halls is made curved so that the sound reflected from the ceilings reaches to all the corners of the hall.

Page No. 170

1. What is the audible range of the average human ear ?

Ans. (i) Human ear is sensitive to sound intensity ranging from 0 - 180 dB (decibel).

(ii) The human ear is sensitive to only those vibrations whose frequency lies between 20 hertz (20 Hz) to 20,000 hertz (or 20 kilohertz, 20 kHz). This frequency range of hearing, from 20 Hz – 20 kHz, is called audible range.

Sound waves having frequencies above 20,000 Hz and below 0 Hz cannot be heard by the normal human ear.

2. What is the range of frequencies associated with the following?

(a) Infrasound

(b) Ultrasound

Ans. (a) Infrasound : Sound of frequencies below 20 Hz.

(b) Ultrasound : Sound of frequencies above 20 kHz.

Page No. 172

1. A submarine emits a sonar pulse, which returns from an underwater cliff in 1.02 s. If the speed of sound in soft water is 1531 ms-1, how far away is the cliff ?

Ans. Time between transmission and detection, t = 1.02 s

Speed of ultrasound in sea water (salt water), $V = 1531\ ms^{-1}$

Distance travelled by the sonar pulse

$= 2 \times$ Depth of the sea

$= 2 \times d$

Where d = depth of the sea.

Distance = Speed × Time

$\Rightarrow \quad 2d = V \times t$

$\Rightarrow \quad 2d = 1531\ sm^{-1} \times 1.02\ s$

$\Rightarrow \quad 2d = 1561.62\ m$

$\Rightarrow \quad d = 1561.62\ m/2$

$\Rightarrow \quad d = 780.81\ m$

Thus, the distance of the cliff from the submarine is 780.81 m or 0.781 km.

Exercise

1. What is sound and how is it produced ?

Ans. (i) Sound is a from of energy which usually produces the sensation of hearing in ears.

(ii) Sounds can be produced in different way. They are –

(a) By stricking : For example, if we hit a metal plate with a stainless steel spoon and touch the plate gently we can feel the vibrations and also hear the sound.

(b) By plucking : When we pluck the wires of a guitar, sitar or any other string instrument, the wire vibrates and a sound is produced.

(c) By blowing air : When we whistle through the mouth or play a flute the air column vibrates, so a sound is produced.

(d) By rubbing : When we rub our palm or drag a table on the floor a sound is produced.

Thus, we see that a sound is produced by a body only when it vibrates.

2. Describe with the help of diagram how compressions and rarefactions are produced in air near a source of sound.

Ans. Air is the most common medium through which sound travels. A vibrating object when moves forward, first pushes the air in front of it and compress the air creating a region of high pressure. This region is called compression (C) as shown in Figure. It starts moving away from the surface of the vibrating object. As this occurs the surface moves backward creating a region of low pressure called rarefaction (R) as shown in the figure. As the object vibrates i.e. moves back and forth rapidly, a series of compression and rarefaction is set up in the air. These make the sound to propagates through the medium.

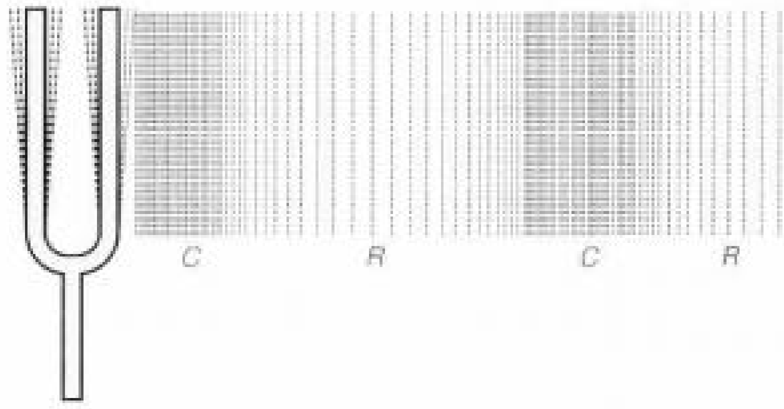

Fig. Vibrating tuning fork creates a series of compression (C) and rarefaction (R) in the medium.

3. Cite an experiment to show that sound needs a material medium for its propagation.

Ans. Take an electric bell and an air tight glass bell jar. The electric bell is suspended inside the air tight bell jar connected to a vacuum pump as shown in figure on next page.

(i) When we press the switch we will be able to hear the bell.

(ii) When the air in the jar is pumped out gradually, the sound becomes fainter although the same current is passing through the bell.

(iii) When less air is left in the bell jar we will hear a vary feeble sound.

(iv) When air is removed completely we will not be able to hear the sound of the bell.

(v) We can conclude that sound need a medium to travel.

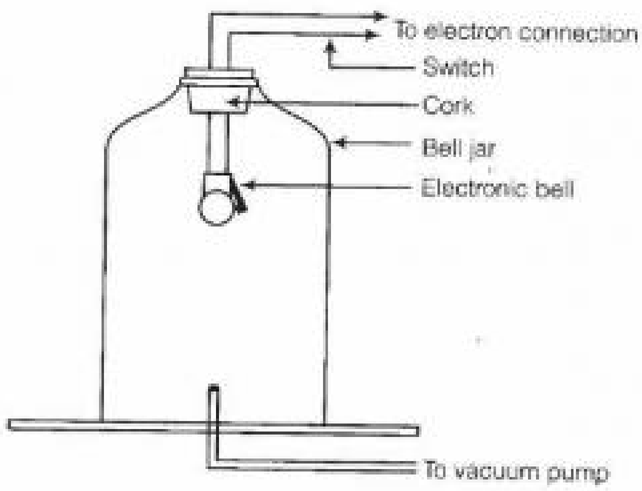

Fig. Bell jar experiment showing sound cannot travel in vacuum.

4. Why is sound wave called a longitudinal wave?

Ans. When a sound wave travels, the air molecules oscillate in the same direction in which the sound waves propagate. Hence sound waves are longitudinal waves.

5. Which characteristic of the sound helps your friend by his voice while sitting with others in a dark room.

Ans. The voice of different people have different frequency. How the brain interprets the frequency of an emitted sound is called pitch. Hence the pitch of sound helps us to identify our friend by his voice while sitting with other in a dark room.

6. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen. Why?

Ans. Thunder is heard a few seconds after the flash is seen because the speed of light is more than the speed of sound.

7. A person has a hearing range from 20 Hz to 20 kHz. What are the typical wavelengths of sound waves in air corresponding to these two frequencies? Take the speed of sound in air as 344 ms-1.

Ans. Case I

Frequency, $v = 20$ Hz

Speed of sound in air, $v = 344ms^{-1}$,

Wavelength, $\lambda = ?$

Speed = Wavelength × Frequency

$\Rightarrow \quad V = \lambda \times v$

$\Rightarrow \quad 344ms^{-1} = \lambda \times 20$ Hz

$$\Rightarrow \quad \lambda = \frac{344ms^{-1}}{20Hz} = 17.2m$$

Case II:

Frequency, $v = 20$ kHz = 20,000 Hz

Speed of sound in air,

$V = 344$ ms^{-1}

Wave length $\lambda = ?$

Speed = Wavelength × Frequency

$\Rightarrow \quad V = \lambda \times v$

$\Rightarrow \quad 344ms^{-1} = \lambda \times 20{,}000$ Hz

$$\Rightarrow \quad \lambda = \frac{344ms^{-1}}{20{,}000Hz} = 0.0172m$$

Thus, the wavelength of sound corresponds to 20 Hz and 20 kHz is 17.2 m and 0.0172 m, respectively.

8. Two children are at opposite ends of an aluminium rod. One strikes the end of the rod with a stone. Find the ratio of times taken by the sound wave in air and in aluminium to reach the second child.

Ans. Speed of sound in air

$V_1 = 346$ ms^{-1}

Speed of sound in aluminium,

$V_2 = 6420$ ms^{-1}

Let the length of aluminium rod be x metres.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Or $\text{Time} = \frac{\text{Distance}}{\text{Speed}}$

$$\text{Time taken in air} = \frac{\text{x m}}{346\text{ms}^{-1}} = \frac{\text{x}}{346}\text{s.}$$

Time taken in aluminium

$$= \frac{\text{xm}}{6420\text{ms}^{-1}} = \frac{\text{x}}{6420}\text{s}$$

$$\text{Required ratio} = \frac{\text{x}}{346}\text{s} = \frac{\text{x}}{6420}\text{s.}$$

$$= \frac{\text{x}}{346} \times \frac{6420}{\text{x}}$$

$= 18.55$

9. The frequency of a source of sound is 100 Hz. How many times does it vibrates in a minute?

Ans. Frequency of sound = 100 Hz

Number of vibrations in 1 minutes (60 seconds) = 100 x 60 = 6000

10. Does sound follow the same laws of reflection as light does? Explain.

Ans. Yes sound follows the same laws of reflection as light does.

The laws of reflection of sound are –

(i) The directions in which the sound is incident and reflected make equal angles with the normal to the reflecting surface.

(ii) The direction in which the sound is incident, the direction in which the sound is reflected and the normal to the reflecting surface all lie in the same plane.

11. When a sound is reflected from a distant object an echo is produced. Let the distance between the reflecting surface and the source of sound production remains the same. Do you hear echo sound on a hotter day?

Ans. $\text{Time} = \frac{\text{Distance}}{\text{Speed}}$

i.e. Time is inversely proportional to the speed. In any medium, as we increase the temperature, the speed of sound increase. Thus, on a hot day, due to high temperature, the speed of sound increases. Hence the time decreases. So we can hear the echo sooner.

12. Give two practical applications of reflection of sound waves.

Ans. (i) In stethoscopes used by the doctors, the sound of the patient's reaches the doctor's ears by multiple reflection of sound.

(ii) Generally the ceilings of concert halls, conference halls and cinema halls are curved so that sound after reflection reaches all corners of the hall evenly.

13. A stone is dropped from the top of a tower 500 m high into a pond of water at the base of the tower. When is the splash heard at the top ? Given, g = 10 ms^{-2} and speed of sound = 340 ms^{-1}

Ans. Distance covered by stone (s) = 500 m

Initial velocity, u = 0 ms^{-1}

Acceleration due to gravity,

$g = 10\text{ ms}^{-2}$

$S = ut + \frac{1}{2} gt^2$

$500 = \frac{1}{2} \quad 0 + \quad \times 10 \times t^2$

$500 = 5t^2$

$t^2 = 100$ or $t = 10$ s

Thus, in 10 s the stone reaches the pond.

Speed of sound $= 340\ ms^{-1}$

Time taken by sound to cover

$500m = \frac{500}{340} = 1.47 = 1.5s$

Total time taken $= (10 + 1.5)$ s

$= 11.5$ s

In 11.5 s the splash will be heard on top.

14. A sound wave travels at a speed of 339 m s-1. If its wavelength is 1.5 cm, what is the frequency of the wave ? Will it be audible ?

Ans. Speed $= 339\ ms^{-1}$

Wavelength $= 1.5$ cm $\frac{1.5}{100}$ m=

$= 0.015$ m

Speed = Wavelength × Frequency

$\Rightarrow$ $339\ ms^{-1} = 0.015 \times$ Frequency

$\Rightarrow$ Frequency $= \frac{339 ms^{-1}}{0.015 m} = 22600$ Hz

It will not be audible to the human ear.

15. What is reverberation? How can it be reduced?

Ans. (i) A sound created in a big hall will persist by repeated reflection from the walls unit it is reduced to a value where it is no longer audible. The repeated reflection that results in this persistence of sound is called reverberation.

(ii) To reduce the undesirable effects due to reverberation, roof and walls of the auditorium are generally covered with sound absorbent materials like compressed fiberboard rough plaster or draperies. The seat materials are also selected having sound absorption properties.

16. On what factors does the loudness of sound depend on?

Ans. The loudness or softness of a sound depends upon its amplitude. The amplitude of the sound wave depends upon the force with which an object is made to vibrate.

Loud sound can travel a larger distance as it is associated with higher energy whereas soft sound can travel a smaller distance as it is associated with less energy. A sound wave spreads out after it leaves its source of production and as it moves away from the source its amplitude as well as its loudness decreases. In text book, Fig 12.23 shows the wave shapes of a loud and soft sound of the same frequency. Loudness depends upon amplitude, intensity of sound and sensitivity of the ear.

17. Explain how bats use ultrasound to catch a prey.

Ans. Bats have weak eyes, so they cannot see their prey. They search out prey and fly in dark night by emitting and detecting reflections of ultrasonic waves. The high pitched ultrasonic squeaks of the bat are reflected from the obstacles or prey and return to bat's ear. The nature of reflections tells the bat where the obstacle or prey is and what it is like.

18. How is ultrasound used for cleaning?

Ans. Ultrasound is used to clean parts located in difficult positions, like spiral tube, odd shaped parts, electronic components etc. Objects to be cleaned are placed in a cleaning solution and ultrasonic waves are sent into the solution. Due to high frequency stir up or vibration, the particles of dust grease and dirt get detached and drop out. The objects get thoroughly cleaned.

19. Explain the working and application of a sonar.

Ans. Sonar employs ultrasonic waves for its working. Powerful pulses of ultrasound are sent out at regular intervals from a transmitter mounted on a ship. These pulses are intercepted by an object or the sea bottom, and get reflected.

The reflected sound (or echo) is detected by an underwater receiver mounted on the ship known as detector. The time interval between transmission and reception of the ultrasonic signal is recorded. Knowing the speed of ultrasound in sea water and the time interval between transmission and reception of the ultrasound signal at a point, the depth of the sea bed or any other obstacle at that point can be determined. Let,

Depth of the seas $= d$

Speed of sound in sea water $= v$

Time lapse between transmission and reception of signal $= t$

So,

Time taken by the sound to travel distance, $d = \frac{t}{2}$

Then,

Depth of the sea, $d = v \times \frac{t}{2}$

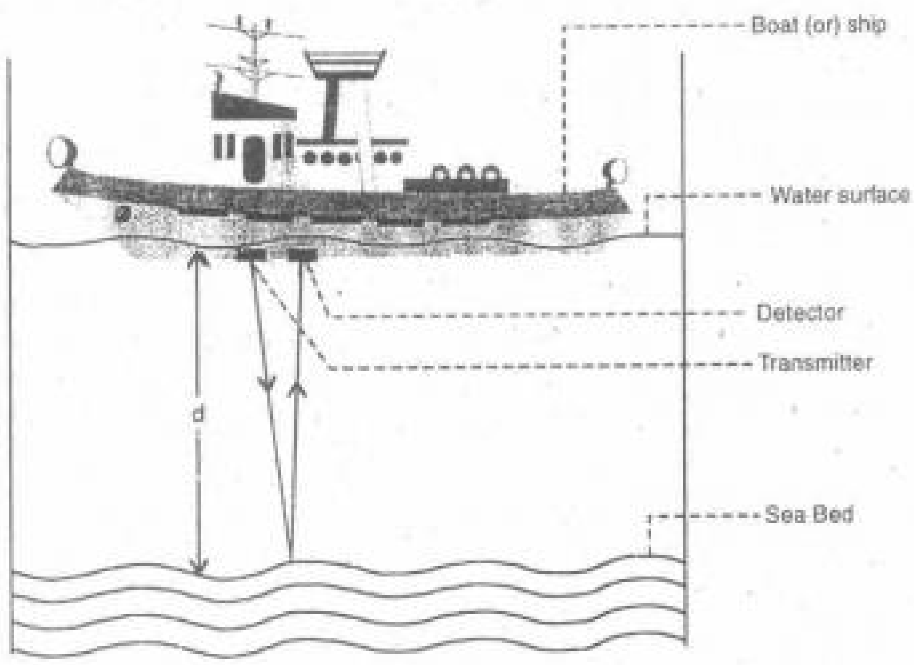

Fig. Reflection of ultrasonic waves from the sea bed is used for determining the depth of the sea.

20. A sonar device on submarine sends out a signal and receives an eacho 5 s later. Calculate the speed of sound in water if the distance of the object from the submarine is 3625 m.

Ans. Time between transmission and detection $= 5$ s

Distance of the object from the submarine = 3625 m

Distance travelled by ultrasound $= 2 \times 3625 = 7250$ m

Speed of sound in water

$$= \frac{\text{Distancetravelled}}{\text{Time taken}}$$

$$= \frac{7250\text{m}}{5\text{s}} = 1450\text{ms}^{-1}$$

21. Explain how defects in a metal block can be detected by using ultrasound.

Ans. Metallic components are generally used in construction of big structures like buildings, bridges, machines and scientific equipments. The cracks of holes inside the metal blocks which are invisible from outside reduces the strength of the structure. Ultrasonic waves are allowed to pass through the metal block and detectors are used to detect the transmitted waves. If there is a defect the ultrasound gets reflected back indicating the presence of flaws or defects.

22. Explain how the human ear works.

Ans. The outer ear is called 'Pinna'. It collects the sound from the surrounding. The collected sound passes through the auditory canal. At the end of the auditory canal there is a thick membrane called the ear drum or tympanic membrane. When compression of the medium produced due to vibration of the object reaches the ear drums the pressure on the outside of the membrane increases and forces the eardrum inward. Similarly, the eardrum moves outward when a rarefaction reaches. In this way the eardrum vibrates. The vibrations are amplified several times by three bones (the hammer, anvil and stirrup) in the middle ear which act as levers. The middle ear transmits the amplified pressure variations received from the sound wave to the inner ear.

In the inner ear, the pressure variations are turned into electrical signal by the cochlea. These electrical signals are sent to the brain via the auditory nerve, and the brain interprets them as sound.

Additional Questions

1. Name few sources of sound which we hear everyday.

Ans. Various sources of sounds which we hear everyday are human beings, birds, animals, bells, machine, vehicles, various electrical gadgets, etc.

2. Can you produce sound without utilizing your energy?

Ans. No, we cannot produce sound without utilizing energy.

3. Which form of energy do we use to produce sound while clapping our hands?

Ans. We use mechanical energy to produce sound while clapping our hands.

4. How do mammals like cow, dog, cat, etc. produce sound?

Ans. Vocal cords produce sound in most of the mammals like cow, dog, cat, etc.

5. How do fish produce sound?

Ans. Fishes produce sound by vibrating their air bladder.

6. What is the physical state of a medium?

Ans. A medium can be solid, liquid or gas.

7. Which is the most common medium through which sound travels?

Ans. Air is the most common medium through which sound travels.

8. What is wave motion?

Ans. Wave motion is the periodic disturbance produced in a medium by a virbating (oscillating) body.

9. What characterisitcs should the medium possess for a wave to travel through it?

Ans. For a wave to travel through a medium, the medium

(i) should possess inertia or mass so that kinetic energy can be stored.

(ii) should be elastic, so that potential energy can be stored.

(iii) should have uniform density.

(iv) should have minimum frictional force between the particles, so that the loss of energy is minimum.

10. What type of wave is sound?

Ans. Sound is a mechanical wave.

11. Can sound propagate through vacuum?

Ans. No, it needs a material medium for its propagation.

12. Why does sound need a medium to travel?

Ans. Sound needs a medium to travel because sound is vibrations of media (oscillations of media molecules relatively to a predefined system of coordinates.)

13. When the wire of a sitar is plucked, what type of waves are produced in the wire?

Ans. Transverse waves are produced in the wire.

14. Which type of waves are produced when a stone is dropped on the surface of water in a pond?

Ans. Transverse waves.

15. Which type of waves are produced when a freely suspended spring is pulled downward and released?

Ans. Longitudinal waves.

16. How are waves classified on the basis of medium of propagation? Give one example of each.

Ans. Mechanical wave: Waves which can be produced or propagated only in a material medium are called elastic waves or mechanical waves.

Example : Waves on water surface, waves on stretched strings, coiled springs and sound waves are elastic or mechanical waves.

Non-mechanical wave : The waves that do not require any material medium for their propagation are called non-mechanical waves.

Example : All electromagnetic waves like lightwaves, radiowaves, X-rays, etc.

17. Give two examples of longitudinal waves.

Ans. (i) **Sound waves:** When a sound wave travels, the air molecules oscillate in a direction parallel to the direction in which the sound waves propagate. Hence, sound waves are longitudinal waves.

(ii) Waves produced in a spring when it is compressed and released are longitudinal waves.

18. Name the low pressure region of the sound wave.

Ans. Rarefaction.

19. What is a trough?

Ans. The depression (or the valley) in a transverse wave is called a trough.

20. What is the difference between music and noise?

Ans. Noise is unpleasant to the ear, whereas music is pleasant to the ear and it is of rich quality.

21. What is a periodic wave?

Ans. A wave in which the particles of the medium oscillate continuously while propagating the disturbance is called a periodic wave.

22. Write factor on which pitch of a sound depends.

Ans. The pitch of a sound is directly proportional to its frequency of vibration.

23. Why is the roaring of lion different from the sound of a mosquito?

Ans. A roaring lion has low pitch but greater loudness while a mosquito has a high pitch but lesser loudness.

24. How can we detect the filling of a bottle under a tap by hearing its sound at a distance?

Ans. As the water level increases, the length of vibrating air column above water decreases thereby increasing the frequency.

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.

Ans. (a)

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.

Ans. (a)

3. In SONAR, we use :
(a) ultrasonic waves
(b) infrasonic waves
(c) radio waves
(d) audible sound waves

Ans. (a)

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

Ans. (b)

6. Earthquake produces which kind of sound before the main shockwave begins?
(a) ultrasound (b) infrasound
(c) audible sound (d) none of the above

Ans. (b)

7. Infrasound can be heard by :
(a) dog (b) bat
(c) rhinoceros (d) human beings

Ans. (c)

8. 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.

Ans. (c)