

## Chapter - 13

### Sound

#### Multiple Choice Questions

1. A list of mediums is given below.

- (i) wood
- (ii) water
- (iii) air
- (iv) vacuum

In which of these mediums can sound travel?

- (a) i & ii only
- (b) i, ii & iii only
- (c) iii & iv only
- (d) ii, iii & iv only

**Soln:**

Answer is (b) i, ii & iii only

**Explanation:**

Sound required a medium to travel. In vacuum there is no medium to transmit sound waves hence sound cannot travel in vacuum.

2. The loudness of sound depends on:

- (a) its amplitude.
- (b) its frequency.
- (c) its time period.
- (d) its speed.

**Soln:**

Answer is (a) its amplitude.

**Explanation:**

Loudness is directly proportional to the amplitude of sound waves. If the amplitude is high then sound will be louder and the sound will be feeble if the amplitude is low.

**3. Which of the following statements are correct?**

- (i) Sound is produced by vibrations.
- (ii) Sound requires a medium for propagation.
- (iii) Light and sound both require a medium for propagation.
- (iv) Sound travels slower than light.

- (a) i & ii only
- (b) i, ii & iii only
- (c) ii, iii & iv only
- (d) i, ii & iv only

**Soln:**

Answer is (d) i, ii & iv only

**Explanation:**

Statement iii) is wrong because light and sound are two different entities.

**4. An object is vibrating at 50 hertz. What is its time period?**

- (a) 0.02 s
- (b) 2 s
- (c) 0.2 s
- (d) 20.0 s

**Soln:**

Answer is (a) 0.02 s

**Explanation:**

If an object is vibrating at 50 hertz

$$50 = \frac{1}{T}$$

$$T = \frac{1}{50}$$

$$T = 0.02\text{s}$$

Its time period will be 0.02 sec

- 5. In order to reduce the loudness of a sound we have to**
- (a) decrease its frequency of vibration of the sound.**
  - (b) increase its frequency of vibration of the sound.**
  - (c) decrease its amplitude of vibration of the sound.**
  - (d) increase its amplitude of vibration of the sound.**

**Soln:**

Answer is (c) decrease its amplitude of vibration of the sound.

**Explanation:**

Sound is directly proportional to loudness of sound. Hence by decreasing amplitude loudness of the sound decreases.

- 6. Loudness of sound is measured in units of**
- (a) decibel (dB)**
  - (b) hertz (Hz)**
  - (c) metre (m)**
  - (d) metre/second (m/s)**

**Soln:**

Answer is (a) decibel (dB)

- 7. The loudness of sound is determined by the**
- (a) amplitude of vibration**
  - (b) ratio of amplitude and frequency of vibration**
  - (c) frequency of vibration**
  - (d) product of amplitude and frequency of vibration**

**Soln:**

Answer is (a) amplitude of vibration

**Explanation:**

Loudness is directly proportional to the amplitude of sound waves. If the amplitude is high then sound will be louder and the sound will be feeble if the amplitude is low.

- 8. 1 hertz is equal to**
- (a) 1 vibration per minute**
  - (b) 10 vibrations per minute**
  - (c) 60 vibrations per minute**
  - (d) 600 vibrations per minute**

**Soln:**

Answer is (c) 60 vibrations per minute

**Explanation:**

1Hz= 1 vibration/second

1 minute=60 seconds hence 1 hertz = 60 vibrations /minute

**9. Pitch of sound is determined by its**

- (a) frequency
- (b) amplitude
- (c) speed
- (d) loudness

**Soln:**

Answer is (a) frequency

**10. Ultrasound has frequency of vibration**

- (a) between 20 and 20,000 Hz
- (b) below 20 Hz
- (c) above 20,000 Hz
- (d) between 500 and 10,000 Hz

**Soln:**

Answer is (c) above 20,000 Hz

**Very Short Answer Questions**

**11. Lightning can be seen the moment it occurs. Paheli observes lightning in her area. She hears the sound 5 s after she observed lightning. How far is she from the place where lightning occurs? (speed of sound = 330 m/s).**

**Soln:**

Distance=330ms x 5s

=1650m

**12. Does any part of our body vibrate when we speak? Name the part.**

**Soln:**

Larynx or vocal cords vibrate when we speak.

**13. Boojho saw a cracker burst at night at a distance from his house. He heard the sound of the cracker a little later after seeing the cracker burst. Give reason for the delay in hearing the sound.**

**Soln:**

Speed of light is faster than speed of sound, hence Boojho heard the sound of the cracker a little later after seeing the cracker burst.

**14. When we hear a sound, does any part of our body vibrate? Name the part.**

**Soln:**

When we hear a sound our eardrum vibrates.

**15. Name two musical instruments which produce sound by vibrating strings?**

**Soln:**

Sitar and Veena

### Short Answer Questions

**16. A simple pendulum makes 10 oscillations in 20 seconds. What is the time period and frequency of its oscillation?**

**Soln:**

Time period : 2 s

frequency : 0.5 oscillations/sec

**Explanation:**

A pendulum makes 10 oscillations in 20 seconds.

So it makes 1 oscillation in  $\frac{20}{10}$ sec=2sec

Time period=2 sec

Frequency= $\frac{1}{t} = \frac{1}{2} = 0.5$  Hz

**17. We have learnt that vibration is necessary for producing sound. Explain why the sound produced by every vibrating body cannot be heard by us?**

**Soln:**

Every body has its own range of frequency. But we can only hear frequencies in the range of 20hz to 2000 hz so we cannot hear the sound of few vibrating bodies.

**18. Suppose a stick is struck against a frying pan in vacuum. Will the frying pan vibrate? Will we be able to hear the sound? Explain.**

**Soln:**

The frying pan will vibrate. We will not be able to hear the sound of vibration because sound cannot travel in vacuum.

**19. Two astronauts are floating close to each other in space. Can they talk to each other without using any special device? Give reasons.**

**Soln:**

In space there will be no medium for sound waves to travel and it will be vacuum. Sound cannot travel in vacuum hence sound cannot be heard without any special device.

**20. List three sources of noise pollution in your locality.**

**Soln:**

Industrial sirens, Vehicle honking and bursting crackers.

### Long Answer Questions

**21. We have a stringed musical instrument. The string is plucked in the middle first with a force of greater magnitude and then with a force of smaller magnitude. In which case would the instrument produce a louder sound?**

**Soln:**

Amplitude of vibration determines the loudness of the sound. When string is plucked with greater force amplitude of string will be larger. This makes the sound louder.

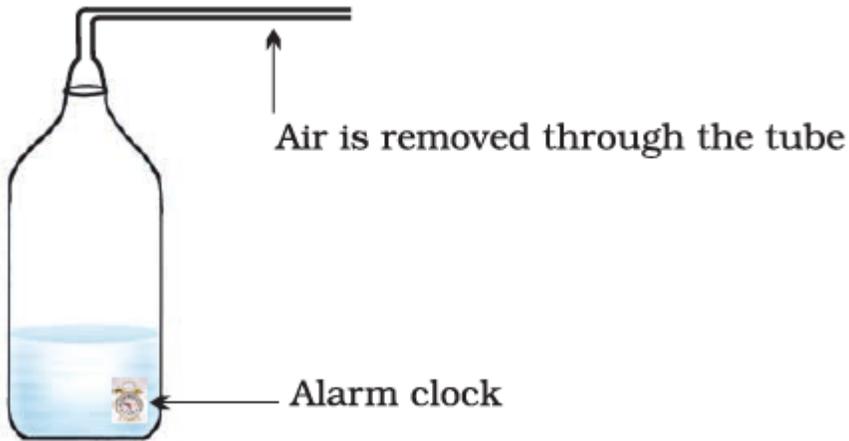
**22. How is sound produced and how is it transmitted and heard by us?**

**Soln:**

Sound is produced when the body starts vibrating by any force. These vibrations produce waves which travel through a medium to reach the destination (Our ear) where it will be heard.

We hear the sound by our ears. The shape of the outer part of the ear is like a funnel. When sound enters it, it travels down a canal at the end of which there is a thin stretched membrane. It is called the eardrum. The eardrum is like a stretched rubber sheet. Sound vibrations make the eardrum vibrate. The eardrum sends vibrations to the inner ear. From there, the signal goes to the brain. That is how we hear.

**23. An alarm bell is kept inside a vessel as shown in Fig. 13.1. A person standing close to it can distinctly hear the sound of alarm. Now if the air inside the vessel is removed completely how will the loudness of alarm get affected for the same person?**



**Fig. 13.1**

**Soln:**

Air needs a medium to get transmitted. If we slowly remove the air inside the bottle. Sound will not be having medium to travel as it will be vacuum. Due to vacuum loudness of the sound decrease gradually with quantity of the air in the bottle.

**24. The townhall building is situated close to Boojho's house. There is a clock on the top of the townhall building which rings the bell every hour. Boojho has noticed that the sound of the clock appears to be much clearer at night. Explain.**

**Soln:**

When sound is initiated speed, pitch, loudness all are initiated with vibration. During day time there are number of vibrations around us. This results in decrease of amplitude of vibrations. During night there will be no such disturbances which will make the sound clearer.

**25. Suggest three measures to limit noise pollution in your locality.**

**Soln:**

- i) Trees must be planted along the roads and around the buildings.
- ii) Use of horns should be minimised.
- iii) Silencers must be installed in transport vehicles and industrial machines.