Chapter: 11

Sound

Exercise MCQs

1. Which is an example of a longitudinal wave?

Ⓐ Sound wave Ⓑ Radio wave Ⓒ Light wave Ⓓ Water wave

2. How does sound travel from its source to your ear?

Ⓐ By changes in air pressure Ⓑ By electromagnetic wave
Ⓒ by vibrations in wires or strings Ⓓ by infrared waves

3. Which form of energy is sound?

Ⓐ Electrical Ⓑ Mechanical Ⓒ Thermal Ⓓ Chemical

4. Astronauts in space need to communicate with each other by radio links because:

Ⓐ Sound waves travel very slowly in space Ⓑ Sound waves travel very fast in space
Ⓒ Sound waves have low frequency in space Ⓓ Sound waves cannot travel in space

5. The loudness of sound is most closely related to its:

Ⓐ Frequency Ⓑ Wavelength Ⓒ period Ⓓ amplitude

6. For a normal person, the audible frequency range for sound waves lies between:

Ⓐ 10 Hz and 10 kHz Ⓑ 25 Hz and 25 kHz
Ⓒ 20 Hz and 20 kHz Ⓓ 30 Hz and 30 kHz

7. When the frequency of a sound wave is increased, which of the following will decrease? i. Wavelength ii. Period iii. Amplitude

Ⓐ i only Ⓑ i and ii only Ⓒ iii only Ⓓ i and iii only

Answer Key:

1	Ⓐ	5	Ⓓ
2	Ⓐ	6	Ⓒ
3	Ⓑ	7	Ⓑ
4	Ⓓ		

Short Questions

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1. What is the necessary condition for the production of sound?

Ans: Two necessary conditions for the production of sound:

- The body must vibrate for the production of sound.
- There must be a medium for the sound to travel through like air, water, etc.

2. What is the effect of the Medium on the Speed of Sound? In which medium sound travels faster: air, solid or liquid?

Ans: Sound waves can be transmitted only by any medium containing particles that can vibrate. The nature of the medium will affect the speed of the sound waves. In Solids, sound move fast because in solids the molecules are very near to each other.

3. What is meant by Reverberation?

Ans: Sometimes, when sound reflects from the walls, ceiling and floor of a room, the reflecting surfaces are too reflective and sound becomes garbled it is called reverberations.

4. Calculate the frequency of sound wave of speed 340 ms^{-1} and wavelength 0.5.

Ans: We know that:

$$v = f\lambda$$

$$f = \frac{v}{\lambda}$$

$$f = \frac{340}{0.5}$$

$$f = 680Hz$$

5. Sound is a form of wave. List at least three reasons to support the idea that sound is a wave.

Ans: The list of three reasons to support the idea that sound is a wave:

- Sound carries energy from one point to other through the medium that is also a property of wave.
- Sound waves have the property of interference; constructive interference causes louder and destructive interference cause inaudible sound or reduced sound.
- All waves are having the property to manifest phenomenon of reflection, diffraction and refraction, since sound is also wave.

6. What would happen to the loudness of sound with increase in its frequency?

Ans: Since loudness does not depend on frequency loudness will remain unchanged.

7. What is the difference between the Loudness and Intensity of sound? Derive the relationship between the two.

Ans: "Sound energy passing per second through a unit area held perpendicular to the direction of propagation of sound waves". The basic units are (Wm^{-2}).

"Loudness is the characteristic of sound by which loud and faint sounds can be distinguished".

Formula:

$$L - L_o = K(\log I - \log I_o) = K \log \frac{I}{I_o}$$

8. On what factors does the loudness of sound depend?

Ans: **Loudness depends upon following:**

- Amplitude of the vibrating body.
- Area of the vibrating body.
- Distance from the vibrating body.

9. What do you mean by the term Intensity level of the sound? Name and define the unit of intensity level of sound.

Ans: As we know that:

$$L - L_o = K(\log I - \log I_o) = K \log \frac{I}{I_o}$$

The difference ($L - L_o$) between the loudness (L) of an unknown sound and the loudness Lo is called the intensity level of the unknown sound.

There are two unit of intensity level of sound: - (a) Bel (bel) (b) decibel (db)

10. Which animal have loudest sound?

Ans: A blue whale's 180 dB rumble is the loudest animal sound ever recorded.

11. What is difference between Frequency and Pitch?

Ans: "Frequency is the number of occurrences of a repeating event per unit time" While "Pitch of the sound is a characteristic of sound by which a shrill sound can be distinguished from a grave one".

12. Describe the effect of change in amplitude on loudness and the effect of change in frequency on pitch of sound.

Ans: The loudness of the sound varies directly with the amplitude of the vibrating body. Higher amplitude has more loud sound.

Pitch of the sound varies directly with the frequency. A higher pitches means higher frequency and vice versa.

13. Define Acoustics.

Ans: The technique or method used to absorb undesirable sounds by soft and porous surfaces is called acoustics protection.

14. If we clap or speak in front of a building while standing at a particular distance, we rehear our sound after some time. Can you explain how does this happen?

Ans: This sound which we hear is called an echo and is a result of the reflection of sound from the surface.

15. What is the Audible frequency range for the Human Ear? Does this range vary with the age of people? Explain.

Ans: "The range of the frequencies which a human ear can hear is called the Audible frequency range".

A normal human ear can hear a sound only if its frequency lies between 20Hz and 20,000Hz.Different people have different range of audibility. It also decreases with age. Young children can hear sounds of 20,000 Hz but old people cannot hear sounds even above 15,000 Hz.

16. Explain that Noise is a Nuisance.

Ans: "A noise nuisance is an annoyance or a noise that is audible".

Impacts of Noise:

The impact of noise on human health is a matter of great concern. Noise pollution can affect us in several ways: Hearing problems, Poor cognitive function, cardiovascular issues, Sleep disturbance, Trouble communication, and mental health problems.

17. Describe the importance of Acoustic Protection.

Ans: Acoustic has great importance in our daily life.

- Office equipment's has increased significantly; the noise level remained almost the same.
- Productivity increases when the noise level decreases at the work place.
- Indoor environment of all places of work must ensure that people feel healthy both in mentally and physically terms.

18. What are the uses of Ultrasound in Medicine?

Ans: Some uses of Ultrasound in Medicine are:

- Ultrasound is used to diagnose and treat different ailment.
- Ultrasounds are used to help a doctor to evaluate the flow of blood in the

vessels.

- The heart can also be studied by using an ultrasound.
- Ultrasound is a helpful way to observe many of body's internal organs.

19. Why two tin cans with a string stretched between them could be better way to communicate than merely shouting through the air?

Ans: Two tin cans with a string stretched between them could be better way to communicate than merely shouting through the air because sound is a vibration of kinetic energy passed from molecule to molecule.

20. Why the sound of women is shrill as compared to men?

Ans: The sound of women is shriller than that of men because the frequency and pitch of sound of women is higher than that of men.

21. What is meant by Soundless Whistle?

Ans: Some people use soundless whistle to call dogs whose frequency lies between 20,000 Hz to 25,000 Hz. It is silent for human but not for dogs.

22. Define SONAR.

Ans: Ultrasound is used for locating objects lying deep on the ocean floor, etc. the technique is called SONAR.

23. How can noise pollution are reduced?

Ans: Noise pollution can be reduced to acceptable level by replacing the noisy machinery with environment friendly machinery and equipment or using hearing protection devices.

24. Define Echo Or Reflection of Sound?

Ans: When sound is incident on the surface of a medium it bounces back into the first medium. This phenomenon is called echo or reflection of sound.

25. Is there any difference between echo and reflection of sound?

Ans: **No,** there is no difference between echo and reflection.

26. Define Ultrasound.

Ans: Sounds of frequency higher than 20,000 Hz which are inaudible to normal human ear are called ultrasound or ultrasonic.

27. Why ultrasound is useful in medical field?

Ans: Because in medical field, ultrasonic waves are used to diagnose and treat different ailments.

Additional Short Questions

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1. How sound waves are produced?

Ans: All sounds are produced by the vibrations of objects.

2. What is the Intensity of sound of Rusting of leaves and Faintest Audible sound?

Ans: The intensity of sound of Rusting of leaves is 10 dB and the faintest audible sound is 0 dB.

3. Define Stethoscope.

Ans: A medical instrument for listening to the action of someone's heart or breathing and two tubes connected to earpieces.

4. Name two characteristics of sound?

Ans: 1. Loudness 2. Pitch

5. Define Quality of sound.

Ans: The characteristic of sound by which we can distinguish between two sounds of same loudness and pitch is called Quality of sound.

6. What is the difference between Musical sound and Noise.

Ans: Difference between Musical sound and Noise:

Musical sound	Noise
Such sounds which are pleasant to our ears are called Musical sound. **Example:** Guitar and Piano	Such sounds which are not pleasant to our ears are called Noise. **Example:** Transportation equipment

7. Why sound waves are called mechanical waves?

Ans: Mechanical waves need medium for the propagation and Sound waves also need medium for their propagation of sound. That's why sound waves called mechanical waves.