Physics Exam Question Paper - Sound

Grade: VII
Duration: 2 hours
Maximum Marks: 80

Instructions:

- You will not be allowed to write during the first 15 minutes. Use this time to read the question paper.
- The time given at the head of this Paper is the time allowed for writing the answers.
- Attempt all questions in Section A. Attempt as instructed in Section B.
- The intended marks for questions are given in brackets **[ ]**.

SECTION A (Objective & Short Answer)

Q1. Choose the correct answers from the given options: [10]

1. Sound waves are:
   (i) Transverse waves (ii) Longitudinal waves (iii) Electromagnetic waves (iv) None of these
2. The speed of sound is maximum in:
   (i) Air (ii) Water (iii) Steel (iv) Vacuum
3. The unit of frequency is:
   (i) Hertz (Hz) (ii) Joule (J) (iii) Newton (N) (iv) Decibel (dB)
4. The amplitude of a sound wave determines its:
   (i) Pitch (ii) Loudness (iii) Quality (iv) Speed
5. The minimum distance between two points which are in phase is called:
   (i) Wavelength (ii) Frequency (iii) Amplitude (iv) Time period
6. Infrasonic sounds have frequencies:
   (i) Less than 20 Hz (ii) Between 20 Hz and 20 kHz (iii) More than 20 kHz (iv) None of these
7. Which of the following cannot transmit sound?
   (i) Water (ii) Air (iii) Steel (iv) Vacuum
8. The phenomenon responsible for the reflection of sound is:
   (i) Refraction (ii) Diffraction (iii) Echo (iv) Absorption

9. The time taken for one complete vibration is called:
   (i) Frequency (ii) Time period (iii) Wavelength (iv) Amplitude
10. The SI unit of sound intensity is:
    (i) Watt (ii) Decibel (iii) Pascal (iv) Hertz

Q2. Fill in the blanks with appropriate terms: [5]

1. The speed of sound in air is approximately __ m/s.
2. Sound waves require a __ to propagate.
3. The reflection of sound waves causes __.
4. The human ear can hear sounds in the frequency range __ Hz.
5. __ is the property of sound that enables us to distinguish between two sounds of the same pitch and loudness.

Q3. State whether the following statements are True or False: [5]

1. Sound can travel through a vacuum.
2. The loudness of a sound depends on its frequency.
3. The speed of sound is the same in all mediums.
4. A shorter wavelength results in a higher frequency.
5. A tuning fork produces sound due to vibrations.

Q4. Name the following: [5]

1. The SI unit of frequency.
2. The type of wave in which particles vibrate parallel to the direction of wave propagation.
3. The phenomenon of multiple reflections of sound.
4. The frequency range of audible sound for humans.
5. The instrument used to measure sound level.

Q5. Match the following: [5]

Column A	Column B
Unit of sound intensity	Decibel / Newton
Speed of sound in air	$343 m/s$ / $1500 m/s$
Human audible range	20 Hz - 20 kHz / Above 20 kHz
Reflection of sound	Echo / Refraction
High frequency sound waves	Ultrasound / Infrasound

SECTION B (Descriptive & Numerical)

Q6. Answer all the following questions: [10]

1. Define sound and explain how it is produced.
2. What are the differences between transverse waves and longitudinal waves?
3. Explain the factors affecting the speed of sound in different media.
4. Describe the working of the human ear in hearing sound.
5. Explain the phenomenon of an echo and its applications.
6. Convert 50 dB into the logarithmic scale of sound intensity.
7. Discuss the applications of ultrasound in medicine and industry.

Q7. Distinguish between the following: [10]

1. Loudness and Pitch
2. Echo and Reverberation
3. Sound waves in solids and gases
4. Infrasonic and Ultrasonic sounds
5. Noise and Musical sound

Q8. Solve the following numerical problems: [20]

1. **(a)** A sound wave travels at a speed of $340 m/s$ and has a wavelength of 2 m. Find its frequency.
   (b) The frequency of a sound wave is 500 Hz. Find its time period.

2. **(a)** A person hears an echo from a building 3 seconds after producing a sound. If the speed of sound is $343 m/s$, find the distance of the building.
   (b) A tuning fork vibrates at 256 Hz. Find its wavelength in air (speed of sound = $340 m/s$).
3. **(a)** Explain how SONAR is used to measure depth in the ocean.
   (b) A submarine sends an ultrasonic wave and receives the echo after 4 seconds. If the speed of sound in water is $1500 m/s$, find the depth of the ocean.
4. **(a)** A sound wave has a wavelength of 1.5 m and a frequency of 400 Hz. Find its speed.
   (b) Convert a sound intensity of $10^{-6} W/m^2$ into decibels.

End of the Question Paper