WORKSHEET 2

CHAPTER 11 – SOUND

A. Tick (✓) the correct option.

1. The frequency of a wave travelling at a speed of 500 m s^{-1} is 25 Hz. Its time period will be
   a. 20 s. b. 0.05 s. c. 5 s. d. 0.04 s.
2. Sound wave of which of the following frequency is an ultrasonic sound?
   a. 15 Hz b. 150 Hz c. 15000 Hz d. 25000 Hz
3. In which of the following speed of sound is maximum?
   a. Air b. Water c. Steel d. Kerosene
4. The point of maximum negative displacement of a transverse wave is called
   a. crest. b. trough. c. amplitude. d. none of these.
5. Time period of a sound wave of frequency 100 Hz is
   a. 1 s. b. 0.1 s. c. 0.01 s. d. 0.001 s.

B. Fill in the blanks.

1. A _____ pitch sound is called a hoarse sound.
2. The SI unit of wave velocity is _____
3. The time required to produce one complete wave is called the _____ of the wave.
4. _____ is the characteristic of a sound that enables us to distinguish between two sounds of the same pitch and soundness produced by two different sources.
5. A transverse wave is represented by _____ graph.

C. State whether the following statements are true or false.

1. The substance or matter through which sound is transmitted is called medium.
2. Sound travels fastest in gases.
3. There is no pressure or density variation in longitudinal wave.
4. The distance between two consecutive crest or between two consecutive troughs is called the wavelength.
5. The loudness of sound is directly proportional to the density of the medium.

D. Match the following.

1. Wavelength	second (s)
2. Wave velocity	hertz (Hz)
3. Frequency	decibels (dB)
4. Time period	metre (m)
5. Loudness of sound	metre per second (m/s)

Name: ..... Teacher's signature: .....

Class: IX Date: .....

E. Answer the following questions.

Very short answer questions

1. How does the speed of sound wave depend on amplitude and wavelength?
2. Name three animals which can hear ultrasonic vibrations.

Short answer questions

1. State three characteristics of the medium required for the propagation of sound.
2. How do the following factors affect the speed of sound in air?
   - i. Frequency of the sound
   - ii. Temperature of the air
   - iii. Pressure of the air
   - iv. Moisture in air

Long answer questions

1. What are the properties of ultrasound?
2. What is SONAR? Explain its use.

ANSWERS

WORKSHEET 2

A. Tick (✓) the correct option.

1. d 2. d 3. c 4. b 5. c

B. Fill in the blanks.

1. low
2. metre per second
3. time period
4. Timbre
5. displacement distance

C. State whether the following statements are true or false.

1. T 2. F 3. F 4. T 5. T

D. Match the following.

1. Wavelength	metre (m)
2. Wave velocity	metre per second (m/s)
3. Frequency	hertz (Hz)
4. Time period	second (s)
5. Loudness of sound	decibels (dB)

E. Answer the following questions.

Very short answer questions

1. The speed of sound wave depends neither on amplitude nor on wavelength.
2. Bat, dog and monkey can hear ultrasonic vibrations.

Short answer questions

1. Three characteristics of the medium required for the propagation of sound are:
   i. The medium should be elastic.
   ii. The medium should be frictionless.
   iii. The medium must have the inertia.
2. i. The speed of sound does not depend on the frequency.
   ii. The speed of sound increases with increase the temperature.
   iii. The speed of sound does not depend on the pressure.
   iv. The speed of sound increases with increase the moisture (humidity).

Long answer questions

1. Ultrasounds have the following special properties which audible sound does not have.
   i. High energy: A wave carries energy with it. Due to its high frequency, an ultrasound has very high energy associated with it.
   ii. High directivity: When a low-frequency sound meets an obstacle, it easily bends round the corners and spreads in all directions. But, ultrasounds are able to travel along well-defined straight paths, even in the presence of obstacle. This mean they do not bend appreciably at the edges of the obstacle.
2. The word 'SONAR' stands for Sound Navigation And Ranging. This is a method for detecting and finding the depth of a sea or to locate underwater objects like submarines and sea rocks.

   The device used in this method is also called sonar.

   A sonar apparatus consists of two parts a. a transmitter b. a receiver. A sonar device is attached to the bottom-side of a ship. The transmitter of sonar is made to emit ultrasound in all the directions under the water. These ultrasound travel in straight lines till they hit an object such as a submarine, a sunken ship or the seabed. The waves are then reflected and are received back by the receiver of the sonar. The solar device measures the time taken by the ultrasound to travel from the ship to the object under the water, and back to the ship. The distance of the object from the ship is calculated.

   Let, the distance between the sonar and underwater object = d

   The time between sending ultrasound and receiving its echo from the under water object = t

   Speed of sound in water = v

   The total distance covered by the ultrasound from the sonar to the underwater object and back is $2d$.

   We know, $\text{speed} = \frac{\text{distance}}{\text{time}}$

   $$v = \frac{2d}{t}$$

   or $$d = \frac{vt}{2}$$

   This method of finding distances is also called echo ranging. Marine geologists use this method to determine the depth of the sea or to locate underwater objects like submarine and shipwrecks.