# PRACTICE PAPER 12 (2024-25)

## CHAPTER 11 SOUND

**SUBJECT: SCIENCE** **MAX. MARKS : 40**

**CLASS : IX** **DURATION : 1½ hrs**

**General Instructions:**

(i). **All** questions are compulsory.

(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.

(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.

(iv). There is no overall choice.

(v). Use of Calculators is not permitted

## SECTION – A

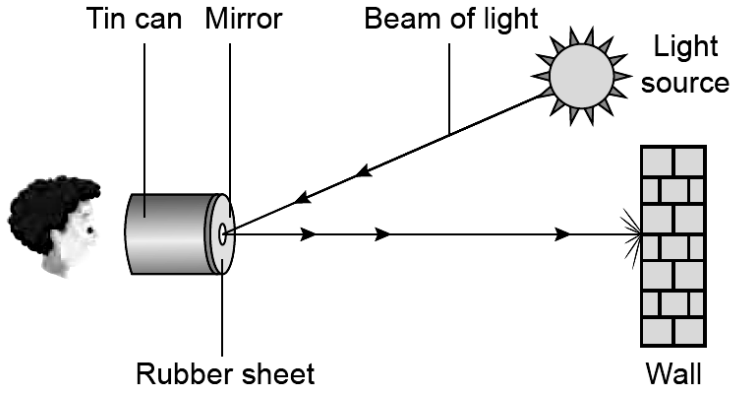
**Questions 1 to 10 carry 1 mark each.**

**1.** Crests and troughs are not formed in which type of waves:
(I) Transverse waves
(II) Longitudinal waves
(III) Electromagnetic waves
(IV) Sound waves
Options:
(a) (II) and (IV) (b) Only (I) and (II) (c) (I), (III) and (IV) (d) (II) and (IV)

**2.** Most television sets these days can be operated through a REMOTE CONTROL. How do most 'remotes' communicate with TV sets?
(a) Using radio waves (b) Using infrared rays
(c) Using ultraviolet rays (d) Using microwaves

**3.** If the speed of the wave is 120 m/s and its frequency is 2000 Hz, then wavelength for this wave in cm will be:
(a) 6 (b) 0.6 (c) 60 (d) 600

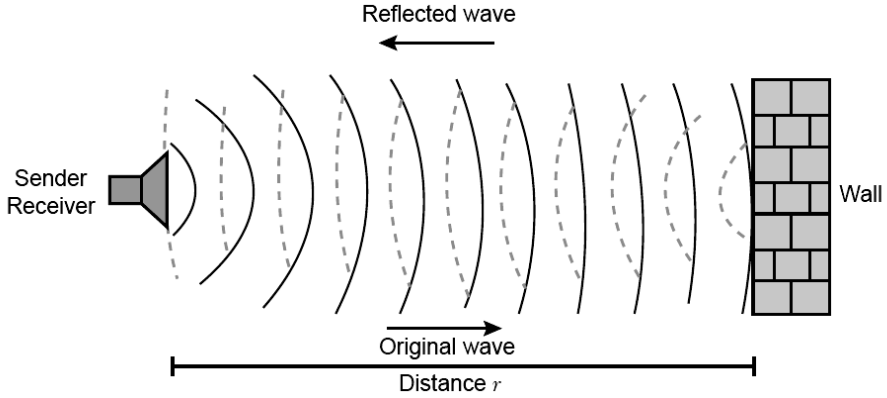
**4.** A student performs an experiment using the setup as shown.




The tin can is cut open from its bottom and a rubber sheet is stretched to cover it. A small mirror is glued to the rubber sheet. What would happen to the circular spot of light on the wall when the student speaks into the open end of the tin can?
(a) The sound produced vibrates the rubber diaphragm, which causes the movement of the light spot on the wall.
(b) The sound produced vibrates the rubber diaphragm, which causes the light spot to appear dim due to the scattering of light.
(c) The sound produced vibrates the surface of the mirror, which causes a change in the color of the light spot on the wall.

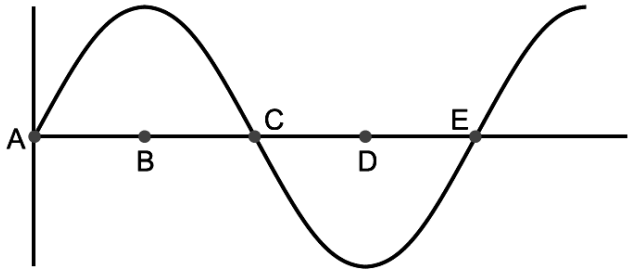
(d) The sound produced vibrates the walls of the tin can, which causes the light spot to appear diffused due to the scattering of light.

**5.** The image shows reflection of sound by a wall




What change would cause reverberation of the sound?
(a) Polishing the surface of the wall. (b) Erecting a wall behind the receiver.
(c) Placing the sender closer to the wall. (d) Increasing the frequency of the emitted sound.

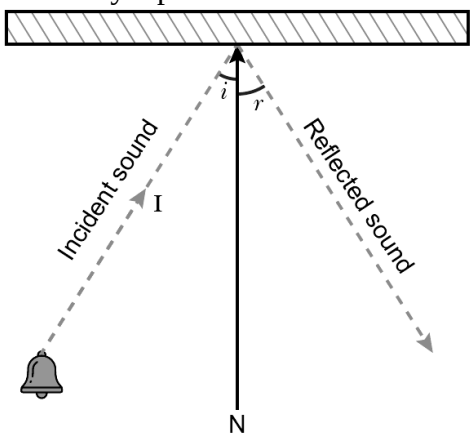
**6.** In the curve shown in figure half the wavelength is




(a) AB (b) BD (c) DE (d) AE

**7.** Which one of the following statements is incorrect?
(a) A sound of single frequency is called a tone.
(b) The sound which is produced due to a mixture of several frequencies is called a note and is pleasant to listen to.
(c) A high pitch sound corresponds to more number of compressions and refractions passing a fixed point per unit time.
(d) The quality or timber of sound is that characteristic which enables us to distinguish one sound from another having the different pitch and loudness.

**8.** The image shows reflection of sound by a polished wall.




Based on the image, what can be inferred about how sound reflects off the polished wall?
(a) The reflected sound follows the path of the incident sound.
(b) The angle of incidence (i) is equal to the angle of reflection (r).

(c) The angle of incidence (i) is smaller than the angle of reflection (r).
(d) The reflected sound follows a shorter path than that of the incident sound.

**In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.**
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

**9. Assertion (A):** Transverse waves are not produced in liquids and gases.
**Reason (R):** Light waves are transverse wave.

**10. Assertion (A):** Infrasonic waves are longitudinal waves of frequency greater than 20,000 Hz.
**Reason (R):** The maximum frequency of audible sound waves is 20,000 Hz.

## SECTION – B

**Questions 11 to 14 carry 2 marks each.**

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

**OR**

Why is sound wave called a longitudinal wave?

**12.** Calculate the wavelength of a sound wave whose frequency is 220 Hz and speed is 440 m/s in a given medium.

**13.** 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 m $s^{-1}$?

**OR**

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

**14.** When we put our ear to a railway track, we can hear the sound of an approaching train even when the train is far off but its sound cannot be heard through air. Why?

## SECTION – C

**Questions 15 to 17 carry 3 marks each.**

**15.** (i) Explain the terms crests and troughs of a wave.
(ii) Why is the ceiling and wall behind the stage of good conference halls or concert halls made curved?

**OR**

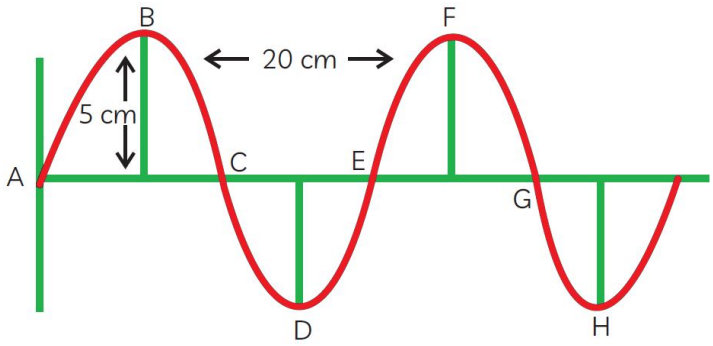
A person has a hearing range from 20 Hz to 20 kHz. What are the typical wavelengths of sound waves in air corresponding to these two frequencies? Take the speed of sound in air as 344 m $s^{-1}$.

**16.** What is reverberation? How can it be reduced?

**OR**

Give reasons for the following:
(i) The reverberation time of a hall used for speeches should be very short.
(ii) A vibrating body produces sound. However no sound is heard when a simple pendulum oscillates in air.
(iii) Sounds of same loudness and pitch but produced by different musical instruments like a violin and flute are distinguishable.

**17.** Waves of frequency 100 Hz are produced in a string as shown in figure.




Give its: (a) Amplitude (b) Wavelength (c) Velocity

## SECTION – D

**Questions 18 carry 5 marks each.**

**18.** Explain the working and application of a sonar with the help of diagram.

**OR**

(a) What is meant by the reflection of sound waves?
(b) Describe an activity to study the reflection of sound.

## SECTION – E (Case Study Based Questions)

**Questions 19 to 20 carry 4 marks each.**

**19. Read the following information and answer the questions based on information and related studied concepts.**

Lata, while visiting London, attended an opera performance. Its architecture and furnishings appealed her. The draperies, cushions, and curtains on the curved ceiling were all arranged correctly. Behind the stage, she noticed a soundboard. She was now curious as to whether each of these decorations was placed for the benefit of the hall's aesthetics or for a scientific cause.

(a) In an opera house, what are the functions of curtains, pillows, and draperies? (1)
(b) What are the benefits of the curved ceiling and soundboard? (2)
(c) Loudhailers and horns are designed to send sound in a particular direction without spreading in all directions as shown in the given figures. Justify the above statement. (1)

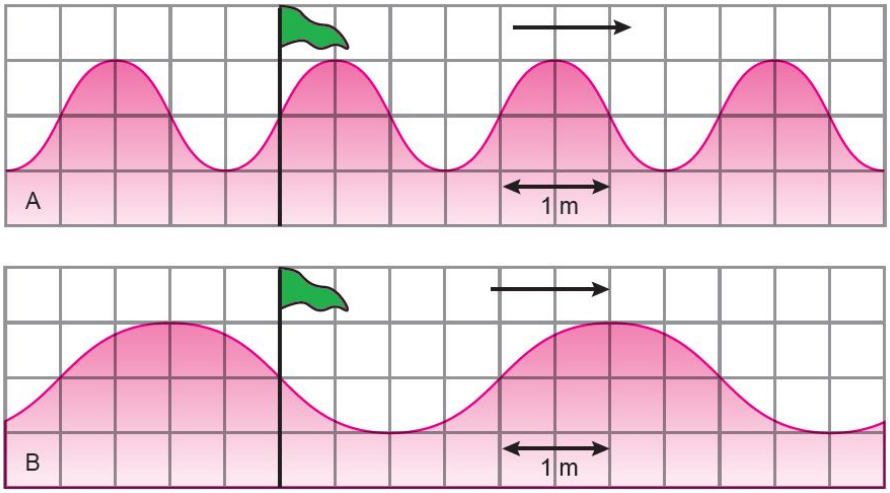
**20. Read the given passage and answer the questions that follow based on the passage and related studied concepts.**

If you drop a stone into a pond, ripples spread across the surface. The tiny waves carry energy but there is no flow of water across the pond. This wave effect is the result of up and down motions in the water. Waves are not only found on water. Sound travels as waves, so does light. Sound is a longitudinal wave form which travel by forming compressions and rarefaction along the direction of propagation. The speed of the waves is measured in m/s. Frequency is the number of waves passing any point per second. If the frequency is 5 Hz, then its time period is 1/5 s (0.2 s).

The distance between two consecutive compressions or two consecutive rarefactions is called the wavelength of the wave. Amplitude is the maximum distance that a point moves from its rest position when a wave passes. The speed, frequency and wavelength of any set of waves are linked by the equation :

Speed = Frequency × Wavelength

The waves in A below are travelling across water.




(i) What is the wavelength and amplitude of the waves in A? (1)

(ii) If two waves pass the flag every second, what is the frequency? (1)

(iii) Use the wave equation to calculate the speed of the waves in A. What is the wavelength of the waves in diagram B given above? (2)