HOT QUESTIONS

1 MARK QUESTIONS

1. What is SONAR?
2. Define one hertz.

3. Define wavelength.

4. Suppose you and your friend are on the moon. Will you be able to hear any sound produced by your friend?

5. Guess which sound has a higher pitch; guitar or car horn?

6. How are the wavelength and frequency of a sound wave related to its speed?

7. In which of the three media, air, water or iron, does sound travel the fastest at a particular temperature?

8. What is the audible range of the average human ear?

9. What is sound and how is it produced?

10. Why is sound wave called a longitudinal wave?

11. Which characteristic of the sound helps you to identify your friend by his voice while sitting with others in a darkroom?

12. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen, why?

13. The frequency of a source of sound is 100 Hz. How many times does it vibrate in a minute?

14. Name the two types of mechanical waves.

15. What is a wave?

16. What is a transverse wave?

17. What is a longitudinal wave?

18. What is a trough?

19. What do you understand by the term infrasonic vibrations?

20. Which of the following sound wavers we can hear: 10 Hz, 500 Hz, 1500 Hz, 12000 Hz, 25000 Hz?

21. What do you understand by the term ultrasonic vibrations?

22. What do you understand by the term echo?

23. Name the term associated with the travelling disturbance in a medium.

24. Do waves transport energy?

25. Do waves transport matter?

26. Do the particles of the medium move from one place to another in a medium?

27. Does the velocity of wave motion depend on the nature of the medium?

28. Does the velocity of wave motion depend on the nature or motion of the source?

29. What is the other name of a long flexible spring?

30. Can you produce both types of waves (i.e., longitudinal and transverse) on a slinky?

31. Where is the density of air higher; at compressions or at rarefactions?

32. Name the quantity that represents the length of one complete wave.

33. What is the distance between two consecutive crests in a wave called?

34. Is the amplitude of a wave the same, as the amplitude of the vibrating body producing the wave?

2-MARKS QUESTIONS

1. How moths of certain families are able to escape captures from bats? What is the range of frequencies associated with
(a) infra sound? (b) ultrasound?

2. A person fires a gun standing at a distance of 55 m from a wall. If the speed of sound is 330 ms-1, find the time for an echo to be heard.

3. The pulse rate of a man is 80 beats in one minute. Calculate its frequency.

4. Which wave property determines: (a) loudness, (b) pitch?

5. Distinguish between loudness and intensity of sound.

6. Why are the ceilings of concert halls curved?

7. What is the range of frequencies associated with:
(a) Infra sound? (b) Ultrasound?

8. When a sound is reflected from a distant object, an echo is produced. Let the distance between the reflecting surface and the source of sound production remains the same. Do you hear echo sound on a hotter day?

9. Give two practical applications of reflection of sound waves.

10. What is reverberation? How can it be reduced?

11. Explain how bats use ultrasound to catch their prey.

12. How is ultrasound used for cleaning?

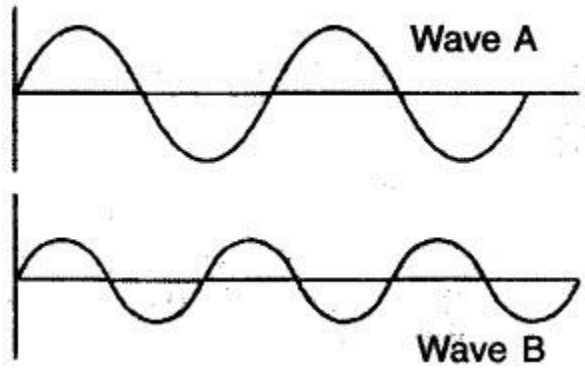
13. Explain how defects in a metal block can be detected using ultrasound.

14. Explain why can echoes not be heard in a small room.

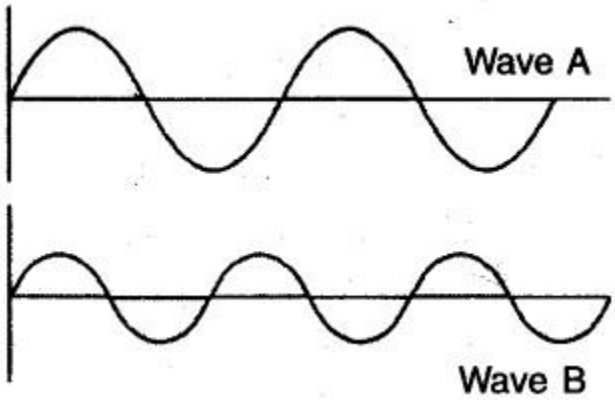
15. Sound is produced due to a vibratory motion, then why a vibrating pendulum does not produce sound?

16. Prove that: $v = f\lambda$, where the symbols have their usual meanings.

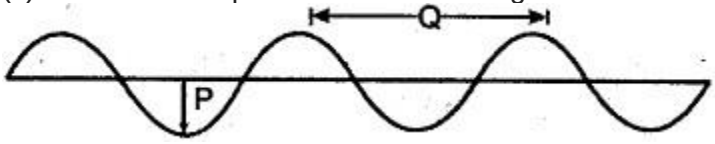
17. Two sound waves A and B are shown in the figure. Identify the sound wave hiving:
(i) high frequency
(ii) low frequency.



18. Two sound waves A and B are shown in figure. Identify the sound wave having:
(i) small amplitude
(ii) large amplitude



19. A sound wave travelling in a medium is represented as shown in figure,
(i) Which letter represents the amplitude of the sound wave?
(ii) Which letter represents the wavelength of the sound wave?



3-MARKS QUESTIONS

1. Distinguish between transverse and longitudinal waves. (Three points)

2. State three characteristics of a musical sound. On what factors do they depend.

3. A stone is dropped into a well 44 m deep and the sound of splash is heard after 3.12 sec. Find the speed of sound in air.

4.(a) The sound of which of the following frequencies are audible to human ears: 2 Hz, 5 Hz, 20 Hz, 200 Hz, 2000 Hz.
(b) How paths of, certain families are able to escape capture?

5. How does the sound produced by a musical instrument, reach your ears? Astronauts need radio transmitter to talk to each other on moon. Why?

6. How does the sound produced by a vibrating object in a medium reach your ear?

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

8. Does sound follow the same laws of reflection as light does? Explain.

9. Explain the working and application of SONAR.

10. What are longitudinal waves? Give two examples.

11.(a) Draw the sound waves for a low pitched and the high-pitched sound.
(b) Write one use of ultrasonography.
(c) Which wave property determines pitch?

5 MARKS QUESTIONS

1. With the help of a labelled diagram show that sound needs a material medium for its propagation.

2.(a) A particular transmitter of Aakash Vani broadcasts at 420.5 m wavelength. Given the speed of radio waves 3×10^8 ms^{-1}. Calculate the frequency at which the radio station broadcasts its programme.
(b) What is the direction of oscillations of the medium particles through which a:
(i) transverse wave is propagating?
(ii) longitudinal wave is propagating?

3. Draw a well labelled diagram of the human ear. Explain its working.

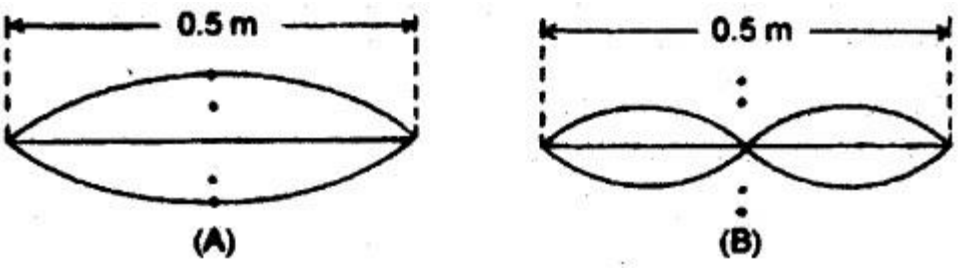
4.(a) What is reverberation? Write two ways of reducing reverberation.
(b) Distinguish between tone and note.
(c) With the help of a simple diagram, explain how defects in a metal block can be detected using ultrasound.

APPLICATION BASED QUESTIONS

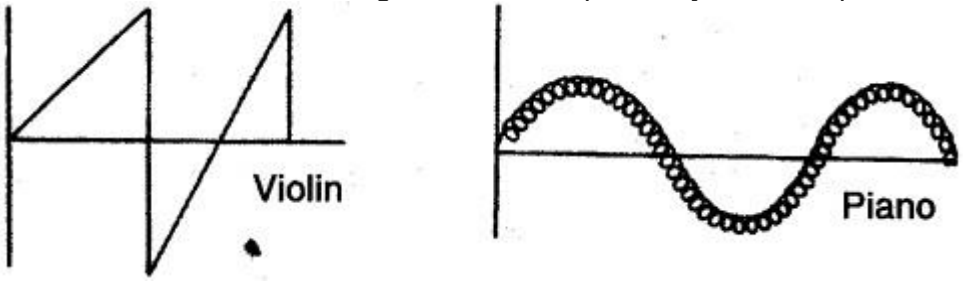
1. The given graph (Fig.) shows the displacement versus time relation for a disturbance travelling with velocity of 1500 ms^{-1}. Calculate the wavelength of the disturbance.

2. Which of the below two graphs (a) and (b) (Fig.) representing the human voice is likely to be the male voice? Give reason for your answer.

3. A stretched wire 0.5 m long is made to vibrate in two different modes as shown in diagram (A) and (B) given below:
(i) If the wavelength of the wave produced in mode (A) is 1 m, what is the wavelength of the wave produced in mode (B) of the following diagram?
(ii)In which case is the note produced louder? Give a reason for your answer.
(iii) In which case is the pitch of the note produced higher? Give a reason for your answer.



4. Two musical notes of same pitch and loudness are played on a violin and a piano. -The waveforms are as shown in figures below. Explain why the wave patterns are different.



Higher Order Thinking Skills (HOTS) Questions

1. How do your account for the fact that two strings can be used to give notes of the same pitch and loudness but of different quality?

2. A person standing between two vertical cliffs and 640 m away from the nearest cliff shouted. He heard the first echo after 4 seconds and the second echo 3 seconds later. Calculate (i) the velocity of sound in air and (ii) the distance between the cliffs.

3. The stem of a tuning fork is pressed against a table top. Answer the following questions: (i) Would the above action produce any audible sound? (ii) Does the above action cause the table to set into vibrations? (iii) If the answer above is yes, what type of vibrations are they? (iv) Under what conditions does the above action led to resonance.

4. State any two characteristics of a wave motion.

5. A longitudinal wave of wavelength 1 cm travels in air with a speed of 330 ms−1. Calculate the frequency of the wave. Can (his wave be heard by a normal human being?

6. If the amplitude of a wave is doubled, what will be the effect on its loudness?

7. How do the frequency and amplitudes affect a musical sound?

8. Give one example each of natural vibration, forced vibration and resonance.

9. Mention one practical use of echoes.

10. How does a stretched string on being set into vibration, produce the audible sound?

11. Will the sound be audible if the string is set into vibration on the surface of the moon? Give reason for your answer.

12. What change, if any, would you expect in the characteristics of musical sound when we increase: (i) its frequency, and (ii) its amplitude?

Reasoning Questions

1. Name the subjective property of sound related to its frequency and of light related to its wavelength.

2. Two friends were playing on identical guitars whose strings were adjusted to give notes of the same pitch. Will the quality of the fwti notes be the same? Give a reason for your answer.

3. Sound made in front of a tall building 18 m away is repeated. Name the phenomenon and briefly explain it.

4. A sound source produces 40 crests and 40 troughs in 0.4 s. Find the frequency of the wave.

5. A Sonar emits pulses on the surface of water which are detected after reflection from the bottom. If the time interval between the emission and detection of the pulse is 2 s, find the depth of water. Take velocity of sound in water as 1531 ms^{-1}.

Important Questions

1. 20 waves pass through a point in 2 seconds. If the distance between one crest and adjacent trough is 1.5 m. Calculate (a) the frequency. (b) the wavelength.

2. (a) The sound of an explosion on the surface of lake is heard by a boatman 100 in away and a diver 100 m below the point of explosion. Of the two persons mentioned (boatman or diver), who would hear the sound first and why?
(b) Calculate the wavelength of a sound wave whose frequency is 220 Hz and speed is 440 ms^{-1} in a given medium.

3. A source is producing 1500 sounds waves in 3 seconds. If the distance covered by a compression and an adjacent rarefaction be 68 cm, find (a) frequency (b) wavelength and (c) velocity of sound wave.

4. In a submarine equipped with sonar, the time between transmission of ultrasonic signals and the reception of the echo after reflection is found to be 80 sec. Find the distance of the obstacle (from submarine), speed of sound in water is 1530 m s'1 .

5. If the frequency of a tuning fork is 400 Hz and the speed of sound is air is 340 ms^{-1}. Find how far sound travels when tuning fork makes 16 vibrations.

6. A laboratory uses an ultrasonic scanner to trace tumour in tissue. The operating frequency of the scanner is 4.2 x 10^6 Hz. Calculate the wavelength of sound in the tissue if the speed of the sound is 1700 ms^{-1}. [SA II- 2014]

NUMERICAL PROBLEMS

1. A human heart on an average is found to beat 75 times a minute. Calculate its frequency.

2. A person has hearing range of 20 Hz to 20 kHz. Calculate the wavelengths of sound waves in air corresponding to above frequencies? Take speed of sound in air as 340 ms^{-1}.

3. What is the frequency of a wave whose time period is 0.05 s?
Solution.

4. If 25 waves were produced per second, what is the frequency in Hz?

5. A source is producing 15 waves in 3.0 s. The distance between a crest and a trough is 10.0 cm. Find: (a) the frequency, (b) the wavelength, and (c) the velocity of the wave.

6. A body is vibrating 6000 times in one minute. If the velocity of sound in air is 360 ms^{-1}, find (r) frequency of the vibration in Hz, (ii) wavelength of the sound produced.

7. A source of a wave produces 30 crests and 30 troughs in 0.3 seconds. What is the time period of the wave?

8. A boat at anchor is rocked by waves, whose consecutive crests are 100 m apart. If the wave velocity of moving crests is 20 ms-1, calculate the frequency at which the boat will rock?

9. A longitudinal wave is produced on a toy slinky, such that frequency of wave is 20 Hz and the speed of the wave is 30 cms^{-1}. What is the minimum separation between the consecutive compressions on the slinky?

10. A child hears an echo from a cliff 4 seconds after the sound from a powerful cracker is produced. How far away is the cliff from the child? (Take velocity of sound in air as 340 ms^{-1})

11. Calculate the wavelength of a sound wave whose frequency is 220 Hz and speed is 440 ms^{-1} in a given medium.

12. A person is listening to a tone of 500 Hz sitting at a distance of 450 m from the source of the sound. What is the time interval between successive compressions from the source?

13. An echo is returned in 3 s. What is the distance of the reflecting surface from the source, given the speed of sound is 342 ms-1?

14. 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 ms^{-1}, how far away is the cliff?

15. 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 ms^{-1}.

16. Two children are at opposite ends of an aluminium rod. One strikes the end of the rod with a stone. Find the ratio of times taken by the sound Wave in air and in aluminium to reach the second child. Given, velocity of sound in air and aluminium are 346 ms-1 and 6420 ms^{-1} respectively.

17. A sound wave travels at a speed of 399 ms-1. If its wavelength is 1.5 cm, what is the frequency of the wave? Will it be audible?