

**SOLVED QUESTION BANK BY JSUNIL CHAPTER - SOUND FOR IX**

**One mark questions**

1. What do you understand by sound waves?

Ans: A wave is periodic disturbance produced by vibration of the vibrating body.

2. What is the amount of sound energy passing per second through unit area known as?

Ans. The amount of sound energy passing per second through unit area is called intensity of sound.

3. Is sound wave in air longitudinal or transverse wave?

Ans: In air, sound wave is longitudinal because the particles of medium move back and forth parallel to the direction of propagation of the disturbance.

4. Name two quantities that vary periodically at a place in air as a sound wave travels through it.

Ans: A series of compressions (C) and rarefactions (R).

5. An airplane produces a sound wave with frequency of 5 KHz and wavelength 30 m. In how much time would the sound wave cover the distance of 4 Km?

Ans:  $v = n \lambda = 5 \text{ KHz} \times 30 \text{ m} = 150 \text{ m/s}$

Now, the sound wave covers the distance of 4 Km =4000m

So time taken by the sound wave cover the distance of 4 Km =  $4000\text{m}/150\text{ m/s}$   
= 26.67 sec

6. With the help of a diagram show how longitudinal waves like sound waves travel in air.

Ans: When a vibrating object moves forward, it pushes and compresses the air in front of it forming a region of high pressure called compression (C).

When the vibrating object moves backward, it forms a region of low pressure called rarefaction (R).



7. Can we hear the ringing of a mobile phone placed in a vacuum chamber?

Ans: No. Sound need material medium for propagation

9. Can two astronauts talk on moon as they do on the surface of the earth?

Ans: No, due to absence of medium air

10. A sound wave produces 20 compressions and 20 rarefactions in 0.05 seconds. What will be the frequency of the wave?

Ans. Here, in 0.05 s, number of vibrations produced is 20

So, in 1s, number of vibrations produced is  $20/0.05=400$ times

Hence,, The frequency of the wave= 400Hz

### **Two marks questions**

1. Explain how echoes are used by bats to judge the distance of an obstacle?

Ans: Bats emit high frequency ultrasonic squeaks while flying and listen to the echoes produced by the reflection of their squeaks from the objects in their path. From the time taken by the echo to be heard, bats can judge the distance of the object in their path and hence avoid it by changing the direction. Bats search their prey at night by the method of echolocation

2. State the special properties of ultrasound that make it useful to us .In general, how these properties are utilized.

Ans: Ultrasound is sound of very high frequency greater than 20 kHz. For this it posses high power and Good directionality

Ultrasonic sound is used to clean objects like electronic Components, used to detect cracks in metal blocks, used in ultra sound scanners for getting images of internal organs of the human body used to break small stones formed in the kidneys into fine grains.

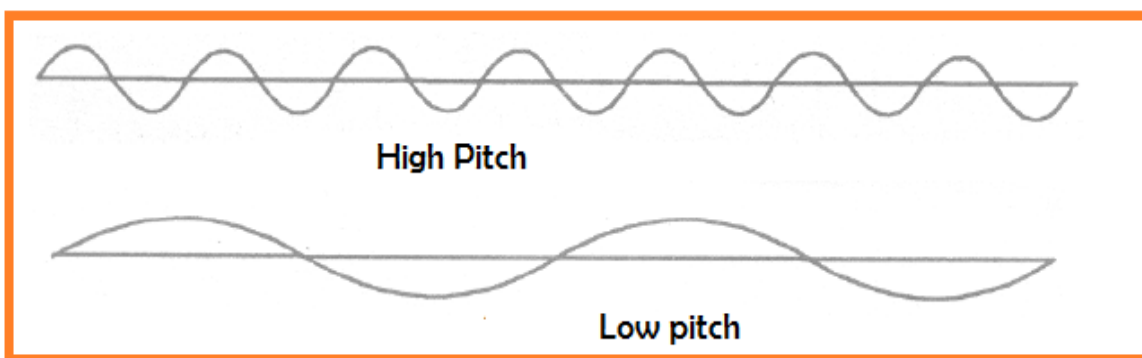
3. Why is soft furnishing avoided in concert halls?

Ans: soft furnishing avoided in concert halls to reduce reverberation.

4. Draw a diagram depicting low pitched sound and high pitched sound and write main difference between the two?

Ans: How the brain interprets the frequency of an emitted sound is called the pitch of sound. The pitch of sound (shrillness or flatness) depends on the frequency of vibration.

If the frequency is high, the sound has high pitch and if the frequency is low, the sound has low pitch



5. Distinguish between longitudinal and transverse waves. Give one example each.

Ans: Kind of waves in which the particles oscillate back and forth parallel to the direction of propagation of the direction of disturbance is called longitudinal waves. Sound propagates in air as longitudinal waves.

Kind of waves in which the particles oscillate up and down perpendicular to the propagation of the direction of disturbance is called transverse waves

.Sound propagate in water as a transverse waves .

6. An explosion takes place at the moon. After what time would it be heard at the earth?

Ans: Sound wave requires a material medium for the propagation. As there is no medium on the moon, so the sound wave cannot propagate on the moon.

### **Three marks questions**

1. Two sources A and B vibrate with the same amplitude. They produce sounds of frequencies 1 kHz and 30 kHz respectively. Which of the two waves will have greater power?

Ans: The energy of a wave is proportional to its frequency. Higher frequency means higher energy.

Hence waves of greater frequency have greater power

2. Find the time period of the source of a sound wave whose frequency is 400Hz.

Ans:  $t = 1/n = 1/400 = 0.0025 \text{ sec}$

3. A sound wave travels at a speed of 340m/s. If its wavelength is 2 cm, what is the frequency of the wave? Will it be in the audible range?

Ans:  $v = n\lambda \Rightarrow n = v/\lambda = [340\text{m/s}]/0.02\text{m} = 17000\text{Hz}$

yes it is be in the audible range because The range of human hearing is between 20 hertz and 20,000 hertz

4. The grandparents and parents of a two year girl are playing with her in a room. A sound source produces a 28kHz sound. Who in the room is most likely to hear the sound?

Ans: A sound source produces a 28 kHz sound = 28000Hz

No one can hear sound because the range of human hearing is between 20 hertz and 20,000 hertz

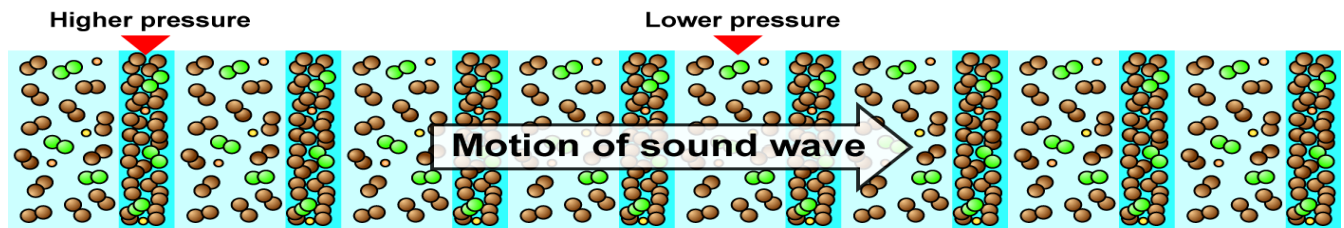
### **Five marks questions**

1. Sound cannot travel in vacuum. Describe an experiment to demonstrate this.

Ans: Take an electric bell and hang this bell inside an empty bell-jar fitted with a vacuum pump .Initially, one can hear the sound of the ringing bell. Now, pump out some air from the bell-jar using the vacuum pump. It will be observed that the sound of the ringing bell decreases. If one keeps on pumping the air out of the bell-jar, then at one point, the glass-jar will be devoid of any air. At this moment, no sound can be heard from the ringing bell although one can see that the prong of the bell is still vibrating. When there is no air present inside, we can say that a vacuum is produced. Sound cannot travel through vacuum. This shows that sound needs a material medium for its propagation.

2. With the help of a diagram describe how compression and rarefaction pulses are produced in air near a source of sound.

Ans: : When a vibrating object moves forward, it pushes the molecules of the air in front of it and create region of high pressure and high density called compression. As the compression produced in the air travels forward, the vibrating body moves backward. They create a region of low pressure in the air commonly called rarefaction.



3. Explain briefly how a flaw in a metal component can be detected using ultrasound?

Ans: The ultrasound waves are allowed to pass through metal block to which are fitted detectors to detect the waves. If the metal block has a very small defect, such as an air bubble or a crack, then the ultrasound waves are reflected from such spots. The reflected ultrasonic waves indicates that metal block is defective.

4. Explain the working and application of SONAR.



Ans: Sonar is a device fitted in sailing ships, trawlers, war ships, etc., to locate submarines or shoals of fish or depth of ocean bed.

To find the depth of an ocean, a strong ultrasonic wave from the ship is sent towards the bottom of ocean. On striking the bottom of ocean, the ultrasonic wave is reflected upward towards the ship. The reflected wave is received by a suitable receiver. The time taken by the wave to travel from the source of sound to the receiver is recorded. Knowing the velocity of sound in water, the depth of ocean floor is calculated by the following formula: Depth of ocean floor = [Velocity of sound in sea water x Time]/2

5. A monkey drops a coconut from the top of a tree. He hears the sound of the coconut hitting the ground 2.057 seconds after dropping it .If the monkey was 19.6 meters above the ground, what is the speed of sound in air?(take  $g = 9.8\text{m/s}^2$ ).

Ans. Case I : When stone reaches the surface of the water.  $u = 0$ ,  $h = 19.6$  m,  
 $g = 9.8$  m/s<sup>2</sup>,  $t_1 = ?$

Applying,  $h = ut_1 + \frac{1}{2}gt_1^2 \Rightarrow 19.6 \text{ m} = 0 \times t_1 + \frac{1}{2} \times 9.8 \times t_1^2 \Rightarrow t_1^2 = 4 \Rightarrow \therefore$   
 $t_1 = 2$  s

Case II : When sound of splash reaches to the boy  $t_2 = 2.057 - 2 \text{ s} = 0.057\text{sec}$

Speed =  $d/t = 19.6/0.057$  m/sec = 343.8596=344m/s

6. Explain working of Human ear?



Ans: The perception of sound starts with the eardrum. The eardrum vibrates in response to sound waves in the ear canal. The three delicate bones of the inner ear transmit the vibration of the eardrum to the side of the cochlea. Fluid in the spiral of the cochlea vibrates and creates waves that travel up the spiral. The spiral channel starts out large and gets narrower near the end. The nerves near the beginning see a relatively large channel and respond to longer-wavelength, lower-frequency sound. The nerves at the small end of the channel respond to shorter-wavelength, higher-frequency sound.

