

Ch-11 Sound

1. Sound is a mechanical energy which produces sensation of hearing. Sound is produced due to vibration of different objects.
2. Sound wave propagates as compressions & rarefactions in the medium. Sound waves are longitudinal waves.
3. **Characteristics of a Sound Wave** – Sound waves are produced due to variations in pressure & density of the medium.
 - a. **Compression** is the portion of the medium where a temporary increase in volume & a decrease in density takes place when a sound wave passes through the medium.
 - b. **Rarefaction** is the portion of the medium where a temporary increase in volume & consequently a decrease in density takes place when sound wave passes through the medium.
 - c. **Crest** is the portion of the medium where the density (or pressure) has a value larger than its average value.
 - d. **Trough** is the portion of the medium where the density (or pressure) has a value smaller than the average value.
 - e. **Amplitude** is the magnitude of the maximum disturbance in the medium on either side of the mean position.
 - f. **Oscillation** is the change in density (or pressure) from maximum value to the minimum value and again to the maximum value.
 - g. **Frequency** enables us to know as to how many times a particular event occur in a given time.
 - h. **Time Period** is the time taken for one complete oscillation in density (or pressure) of the medium.
 - i. **Wavelength** is the distance between two consecutive compressions or two consecutive rarefactions.
4. **Characteristics of Sound** –
 - a. Loudness or intensity.
 - b. Pitch or frequency.
 - c. Quality or timbre.
5. **Reflection of Sound** –
 - a. An **Echo** is the phenomenon of repetition of sound of a source by reflection from an obstacle.
 - b. **Multiple echoes** are heard when sound is repeatedly reflected from a number of obstacles at suitable distance.
 - c. Megaphone, stethoscope ear trumpet, hearing aid etc are based on phenomenon of multiple reflection of sound.
 - d. **Reverberation** is the phenomenon of persistence of audible sound after the source has stopped emitting sound.
 - e. Reverberation is reduced by carpeting the floor, upholstering furniture & covering the walls with some absorbing material like curtains etc.
6. **Range of Frequencies** –

- a. Audible range of hearing of average human being is in the frequency range of 20Hz to 20KHz.
- b. Infrasound has a frequency below 20Hz. Ultrasound has a frequency above 20 kHz.
- c. Ultrasound finds application in industry, medical service & communications.

7. **Human Ear –**

- a. **Outer ear** collects sound waves.
- b. **Middle ear** amplifies the sound waves.
- c. **Inner ear** converts the amplified sound energy into electrical energy & conveys to the brain as nerve impulse for interpretation.