MODULE 1: WAVE MOTION AND ITS APPLICATIONS

Important Questions

Part A: One word or sentence questions (1 mark)

1. A motion that repeats itself at regular intervals of time is called periodic motion
2. Simple harmonic motion can be defined as a motion in which the acceleration of the body is directly proportional to its displacement from a fixed point and is always directed towards the fixed point.
3. The time required to complete one vibration is known as period (T). ($T = \frac{2\pi}{\omega}$)
4. The number of vibrations made by the body in one second is known as the frequency
5. Frequency is the reciprocal of the period. ($f = \frac{1}{T}$) . SI unit of frequency is hertz (Hz).
6. The propagation of disturbance from one point to another without the translatory motion of the particles of the medium is called wave motion. Wave motion is a periodic motion in which the particles of the medium execute the simple harmonic motion.
7. The amplitude of a wave is the maximum displacement of any particle of the medium in the path of the wave.
8. The distance travelled by a wave in one second is called the wave velocity.
9. In the case of a transverse wave, the distance between two adjacent crests or troughs is equal to the wavelength.
10. In the case of a longitudinal wave, the distance between two successive compressions or rarefactions is equal to the wavelength.
11. The principle of superposition of waves states that if two or more waves travel in a medium, each wave produces its own displacement and the resultant displacement of a particle at any point is the vector sum of the displacements due to each wave.
12. The periodic variations in the intensity of sound due to the superposition of two sound waves of slightly different frequencies are called beats.
13. In the case of beats, when the intensity rises to the maximum, we use the term waxing of sound and when it falls to the minimum, we use the term waning of a sound.
14. The number of beats produced per second is called beat frequency.
15. Sound waves having a frequency above 20 kHz are ultrasonic waves.
16. Sounds of frequency below 20 Hz are called infrasonics.

17. The branch of science which deals with the planning of a building or a hall intending to provide the best audible sound to the audience is called acoustics of the building.
18. The prolongation of audible sound in a room or hall after the sound has ceased to emit sound is called reverberation.
19. Reverberation time is the time for which the sound persists in a room or hall after the original sound is cut off.
20. If the time interval between the instance of hearing the original sound and the reflected sound from the reflecting surface is greater than 1 / 10th of a second, the original sound and the reflected sound can be separately heard. Such a reflection of sound is called echo.

Part B: Short Answer type questions (3 mark)

1. Examples of periodic motion
2. Define simple harmonic motion. Write examples.
3. Derive the relation between wavelength, frequency and wave velocity
4. Numerical problems using the equation: $v = f\lambda$
5. Write a short note on sound waves
6. Write a short note on light waves
7. Mention three applications of ultrasonics.
8. Mention any three methods to control reverberation time
9. Distinguish between echo and reverberation.

Part C: Essay type questions (7 marks)

1. Show that simple harmonic motion is the projection of uniform circular motion along the diameter of the circle.
2. Derive the expression for velocity and acceleration of a particle executing SHM
3. Distinguish between longitudinal waves and transverse waves
4. Explain the characteristics of waves (Amplitude, phase, period, frequency, wavelength, wave velocity).
5. Discuss the principle of superposition of waves and formation of beats
6. Write a note on acoustics of buildings (reverberation, echo, noise).