

ENGINEERING PHYSICS**UNIT II****WAVES AND FIBRE OPTICS****Contents**

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- 2.1. Oscillatory motion

Basic Definitions**Motion**

When the position of the body in the space changes with times, the body is said to be in motion.

Types of motion

1. Translational motion
2. Rotational motion.
3. Periodic motion
4. Vibrational or Oscillatory motion

Translational motion

If an object is moving linearly with time, then the motion is said to be in Translational motion.

Example: Car moving in a road. Train moving in a track, Rocket launching etc.

Rotational motion

If an object rotates about an axis then the motion is said to in Rotational motion.

Example: Bob moving around the pendulum.

Periodic motion

If the body repeats its movement at regular intervals of time then it is said to be in

periodic motion.

Example: Motion of planets round the sun, rotational motion of the earth about its own

Oscillatory motion

When a body rotates to and fro movement repeatedly then the motion is said to be oscillatory motion.

Example: Motion of a pendulum, oscillation of loaded spring, to and fro motion of the prongs of tuning fork.

2.2. SIMPLE HARMONIC MOTION

Definition

If the acceleration of particle is directly proportional to its displacement from its equilibrium position and it is always directed towards equilibrium position, then the motion of the particle is said to Simple Harmonic Motion

Types of Simple Harmonic Motion:

- (i) Linear Simple Harmonic Motion
- (ii) Angular Simple Harmonic Motion

(i) Linear Simple Harmonic Motion

If the displacement of the particle executing simple harmonic motion is linear then it is linear SHM

Example: Motion of simple pendulum.

(ii) Angular Simple Harmonic Motion

If the displacement of the particle executing simple harmonic motion is Angular then it is angular SHM.

Example: Torsional oscillation.

2.3. CHARACTERISTIC OF SIMPLE HARMONIC MOTION

a) Amplitude

The maximum displacement of the particle from its mean position is known as the amplitude.

b) Displacement:

The distance moved by the particle from its mean position is called displacement.

$$\text{Displacement (y)} = A \sin \omega t$$

c) Time Period:

The time taken for the particle to complete one oscillation is known as Period.. It is given the symbol T . **Time Period,**

$$T = \frac{2\pi}{\omega}$$

d) Frequency:

Number of oscillations occurred in one second is called frequency.

$$f = \frac{1}{T}$$

e) Phase:

The position and direction of motion of a vibrating particle is expressed by a physical quantity called the phase.