

Chapter One: Oscillatory Motion

1) Periodic Motion

- ✓ Periodic *motion* is a motion of an object that regularly repeats to a given position after a fixed time interval.

2) Examples of Periodic Motion

- a) Motion of hands of the clock.
- b) Motion of planets around the sun.

3) Oscillatory Motion

- ✓ To and fro motion of an object from its mean position.

4) Examples of Oscillatory Motion

- a) Simple pendulum
- b) Spring movement
- c) Alternating currents
- d) Vibrating of string in musical instruments.

5) Frequency

- ✓ Is the number of cycles made in one second. SI unit of frequency is called Hertz (Hz).

6) Period

- ✓ Is the time taken to make one complete cycle. SI unit of period is second (s).

7) Simple Harmonic motion

- ✓ **Is the motion under influence of a type of a force described by Hook's law.**

8) Examples Simple Harmonic motion

- a) Simple pendulum

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b) Mass spring system

c) A swing

d) A steel ball rolling in a curved dish

9) Reference of SHM?

- ✓ **Is the mass attached at the end of the spring displacement, velocity, acceleration, energy, and period.**

10) Hook's law?

- ✓ Hook's law states that the restoring force applied by a spring is the proportional to the displacement of the spring and opposite in direction.

11) Restoring force

- ✓ Is a force which acts to bring a body to its equilibrium position.

12) Force constant (spring constant)

- ✓ Is the ratio between force and displacement. $K = F/X$

13) Energy

- ✓ Energy (E) is the ability to do a work work.

14) Types of energy

a) Potential energy

b) Kinetic energy

15) Kinetic energy

- ✓ Is energy of any moving object has. ($KE = 1/2mv^2$)

Note:

- ✓ **Kinetic energy is zero at the end points and a maximum at the midpoint.**

16) Potential energy

- ✓ Is the stored energy, which is either a stored in gravitational field or stretched elastic materials. ($PE = 1/2kx^2$)

Note:

- ✓ **Potential energy is zero at the midpoint and a maximum at the endpoints.**

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17) Total mechanical energy

- ✓ Is the sum of Kinetic energy and Potential energy. ($E = \frac{1}{2}kA^2$)

18) Equilibrium position

- ✓ When the spring is neither stretched nor compressed.

19) Amplitude

- ✓ The amplitude is the maximum displacement from mean position in either direction.

20) Displacement

- ✓ The displacement of SHM is the distance from equilibrium position in either direction.

21) VELOCITY

- ✓ Is the rate of change of displacement per unit time.

Note:

- ✓ Velocity is **zero** at the **end points** and a **maximum** at the **midpoint** in either direction.

22) Acceleration

- ✓ **Is the change of velocity per unit time.**

Note:

Acceleration is **zero** at the **center** of oscillation and **maximum** at the **end points**.

23) Simple pendulum

- ✓ Is the mass on the end of a string which oscillates in harmonic motion.

24) Period of simple pendulum depends on:

- ✓ The length of string
- ✓ The acceleration due to the gravity.

25) Applications of simple Harmonic Motion

a) Pendulum

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b) Car shock absorber

c) Hearing

26) Pendulum

Is an object that has small mass, which is suspended from a light wire or string.

