

**Shree Sanatan Dharm Education Centre**  
**Class XI Assignment**  
**Topic: Simple Harmonic Motion**

- 1) The time period of an oscillating body is given by  $T = 2\pi\sqrt{m/Adg}$ . What would be the force equation for the body?
- 2) Two simple pendulums of unequal length meet each other at mean positions while oscillating. What is their phase difference?
- 3) Velocity and displacement of a body executing SHM are out of phase  $\pi/2$ . How?
- 4) A particle executes SHM of amplitude  $A$ . At what positions of its displacement will its i) velocity be zero and maximum and ii) acceleration be zero and maximum
- 5) What provides the restoring force in the following cases i) Simple pendulum ii) Spring iii) column of Hg in a U tube.
- 6) The amplitude of a simple pendulum is doubled. How does this affect i) time period ii) maximum velocity iii) maximum acceleration.
- 7) The frequency of oscillation of a mass  $m$  suspended by a spring is  $f_1$ . If the length of the spring is cut by one half, the mass oscillates with frequency  $f_2$ . Determine the value of  $f_1/f_2$ .
- 8) A simple harmonic motion is represented by  $d^2x/dt^2 + ax = 0$ . What is its time period?
- 9) Does the function  $y = \sin^2\omega t$  represent a periodic or a simple harmonic motion? What is the period of the motion?
- 10) The length of a simple pendulum is increased by 21%. What is the percentage increase in the time period?

**Worksheet**

- 1) A bob of simple pendulum of mass 1 g is oscillating with a frequency of 5 vibrations per second and its amplitude is 3 cm. Find its kinetic energy at the lowest point.
- 2) A body weighing 10 g has a velocity of 6 cm/s after 1 second of its starting from mean position. If the time period is 6 seconds find the kinetic energy and the total energy.
- 3) A spring balance has a scale that reads from 0 to 50 kg. the length of the scale is 20 cm. A body suspended from the spring when displaced and released oscillates with a period of 0.60 seconds. What is the weight of the body?
- 4) A spring of force constant 1200 N/m is mounted horizontally on a horizontal table. A mass of 3.0 kg is attached to the free end of the spring pulled sideways to a distance of 2.0 cm and released. What is the frequency of the mass released ii) What is the maximum acceleration of the mass iii) what is the maximum speed of the mass?
- 5) A test tube weighing 10 g and external diameter 2 cm is floated vertically in water by placing 10 g of mercury at its bottom. The tube is depressed in water a little and then released. Find the time of oscillation. Take  $g = 10\text{m/s}^2$ .