

Board – CBSE

Class – 11

Topic – Oscillations

1 marks questions

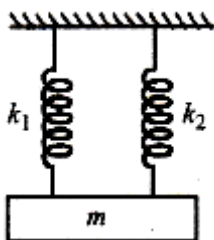
1. At what distance from the mean position, is the kinetic energy in a simple harmonic oscillator equal to potential energy?
2. Can a simple pendulum experiment be done inside a satellite?
3. Give some practical examples of S.H.M?

2 marks questions

4. A particle executing SH.M has a maximum displacement of 4 cm and its acceleration at a distance of 1 cm from its mean position is 3 cm/s^2 . What will be its velocity when it is a distance of 2 cm from its mean position?
5. What is ratio of frequencies of the vertical oscillations when two springs of spring constant K are connected in series and then in parallel?
6. The kinetic energy of a particle executing S.H.M. is 16J when it is in its mean position. If the amplitude of oscillations is 25cm and the mass of the particle is 5.12 kg. Calculate the time period of oscillations?
7. A simple pendulum is executing Simple harmonic motion with a time T . If the length of the pendulum is increased by 21%. Find the increase in its time period?

3 marks questions

8. A mass = m suspend separately from two springs of spring constant k_1 and k_2 gives time period t_1 and t_2 respectively. If the same mass is connected to both the springs as shown in figure. Calculate the time period 't' of the combined system?



9. Show that the total energy of a body executing SHN is independent of time?
10. Determine the time period of a simple pendulum of length = 1 when mass of bob = m kg?
11. Which of the following relationships between the acceleration a and the displacement x of a particle involve simple harmonic motion?

4 marks questions

12. Cylindrical piece of cork of density ρ of base area A and height h floats in a liquid of density ρ_1 . The cork is depressed slightly and then released. Show that the cork oscillates up and down simple harmonically with a period

$$T = 2\pi \sqrt{\frac{h\rho}{\rho_1 g}}$$

Where ω is the density of cork. (Ignore damping due to viscosity of the liquid).

13. Which of the following examples represent (nearly) simple harmonic motion and which represent periodic but not simple harmonic motion?
- a) The rotation of earth about its axis.
 - b) Motion of an oscillating mercury column in a U-tube.
 - c) Motion of a ball bearing inside a smooth curved bowl, when released from a point slightly above the lower most point.
 - d) General vibrations of a polyatomic molecule about its equilibrium position.

5 marks questions

14. A body describes simple harmonic motion with amplitude of 5 cm and a period of 0.2 s. find the acceleration and velocity of the velocity of the body when the displacement is
- a) 5 cm
 - b) 3 cm
 - c) 0 cm
15. Show that for a particle in linear SHM the average kinetic energy over a period of oscillation equals the potential energy over the same period.