Chapter- 14

Oscillation

Very Short Answer Type Questions

01. (a) Define non-repetitive motion (b) Define periodic motion (c) Define oscillatory motion (d) What is Harmonic oscillation.

02. The particle executing S.H.M. The amplitude of motion is A. State those positions of the particle in terms of 'A' when,
(i) P.E. is one-fourth of the total energy (ii) P.E. and K.E. are equal

03. How will the period of a simple pendulum change when its length is doubled?

04. What is the acceleration of a body executing simple harmonic motion when its velocity is maximum?

05. On average a human heart is found to beat 75 times in a minute. Calculate its frequency and period.

06. How would the period of the spring-mass system change, when it is made to oscillate horizontally and then vertically?

07. A vibrating simple pendulum of period T is placed in a lift which is accelerating upwards. What will be the effect on its time period?

08. A vibrating simple pendulum of period T is placed in a lift which is accelerating downwards. What will be the effect on the time period?

09. Two simple pendulums of equal length cross each other at the mean position. What is their phase difference?

10. Define the force constant of a spring. Give its S.I. unit and dimensional formula.

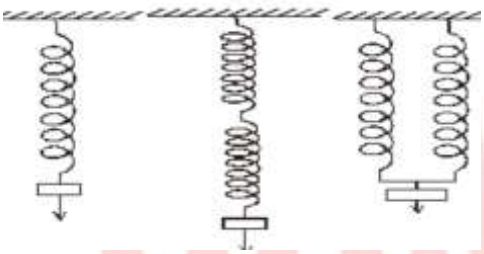
11. Show that in S.H.M., the acceleration is directly proportional to its displacement at the given instant.

12. The length of a second's pendulum on the surface of the earth is 100 cm. What will be the length of a second's pendulum on the surface of the moon?

13. At what displacement (i) the P.E. of a simple harmonic oscillator is maximum. (ii) the K.E. is maximum?

14. The bob of a oscillatory simple pendulum is made of ice. How will the period of the swing change when the ice starts melting?

15. Two identical springs have the same force constant of 147 Nm^{-1}. What elongation will be produced in each spring case, as shown in the figure?



16. The frequency of oscillations of a mass m suspended by a spring is υ_1 . If the length of spring is cut to one-half; the same mass oscillates with frequency υ_2 . Determine the value of. $\frac{\upsilon_1}{\upsilon_2}$,

17. Which of the following functions of time represent (a)simple harmonic (b)periodic but not simple harmonic and(c) non-periodic motion ? Give period for each case of periodic motion (ω is any positive constant)

(a) sin ωt – cos ωt

(b) sin3ωt

(c)3cos(π/-2ωt)

18. The periodic time of a mass suspended by a spring of force constant K is T. If the spring is cut in three equal pieces, what will be the force constant of each part? If the same mass is suspended from one piece, what will be the periodic time?

19. Two identical pendulums are oscillating with amplitudes 2 cm and 6 cm. Calculate the ratio of their energies of oscillation.

20. A block rests on a horizontal table which is executing S.H.M. in the horizontal plane with an amplitude A. What will be the frequency of oscillation, the block will just start to slip?

21. Spring has spring constant k = 15 N/cm. It is cut into two equal parts; which are joined in parallel. What is the spring constant of combination?

22. A pendulum clock normally shows the correct time. On an extremely cold day, its length decreases by 0.2%. Compute the error in time per day.

23. A body oscillates with S.H.M according to the equation (in SI units) $x = 5\cos\{2\pi t + \frac{\pi}{4}$

At=1.5s. calculate the displacement, speed, and acceleration of the body

24Give the expression for potential and kinetic energy in S.H.M**.**Find the total energy of the particles executing

25. A particle is executing S.H.M. given by y =5 cos (2π t/T+ϕ)
The period of vibration is the 20s. At t= 0, the particle is displaced 2 units. Determine
(i) its initial phase
(ii) The phase angle corresponding to the displacement of 3 m

26. Define simple harmonic motion. What is the relation between S.H.M & uniform circular motion? Hence find expressions for displacement, velocity, acceleration & time period of a body executing in S.H.M? At what positions, the velocity & acceleration are maximum & minimum?