DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 4**

Topic :- OSCILLATIONS

1. Two identical blocks A and B, each of mass m resting on smooth floor, are connected by a light spring of natural length L and the spring constant k, with the spring at its natural length. A third identical block at C (mass m) moving with a speed (v) along the line joining A and B collides with A. The maximum compression in the spring is proportional to

a) $v\sqrt{\frac{m}{2k}}$ b) $m\sqrt{\frac{v}{2k}}$ c) $\sqrt{\frac{mv}{k}}$ d) $\frac{mv}{2k}$

2. The length of a spring is l and its force constant is k. When a weight W is suspended from it, its length increases by x. If the spring is cut into two equal parts and put in parallel and the same weight W is suspended from them, then the extension will be

a) $2x$ b) x c) $\frac{x}{2}$ d) $\frac{x}{4}$

3. A simple pendulum of length l has been set up inside a railway wagon sliding down a frictionless inclined plane having an angle of inclination $\theta = 30^0$ with the horizontal. What will be its period of oscillation as recorded by an observer inside the wagon?

a) $2\pi\sqrt{\frac{2l}{\sqrt{3}\,g}}$ b) $2\pi\sqrt{2l/g}$ c) $2\pi\sqrt{l/g}$ d) $2\pi\sqrt{\frac{\sqrt{3}l}{2g}}$

4. Which of the following equations does not represent a simple harmonic motion

a) $y = a\sin\omega\, t$ b) $y = a\cos\omega\, t$
c) $y = a\sin\omega t + b\cos\omega t$ d) $y = a\tan\omega\, t$

5. A body is executing simple harmonic motion with an angular frequency 2 rad/s. The velocity of the body at 20 mm displacement, when the amplitude of motion is 60 mm, is

a) 40 mm/s b) 60 mm/s c) 113 mm/s d) 120 mm/s

6. A piece of wood has dimensions a, b and c. Its relative density is d. It is floating in water such that the side c is vertical. It is now pushed down gently and released. The time period is

a) $T = 2\pi\sqrt{\left(\frac{abc}{g}\right)}$ b) $T = 2\pi\sqrt{\left(\frac{b\,a}{dg}\right)}$ c) $T = 2\pi\sqrt{\left(\frac{g}{dc}\right)}$ d) $T = 2\pi\sqrt{\left(\frac{a\,c}{g}\right)}$

7. The metallic bob of a simple pendulum has the relative density ρ. The time period of this pendulum is T. If the metallic bob is immersed in water, then the new time period is given by

a) $T\frac{\rho - 1}{\rho}$ b) $T\frac{\rho}{\rho - 1}$ c) $T\sqrt{\frac{\rho - 1}{\rho}}$ d) $T\sqrt{\frac{\rho}{\rho - 1}}$

8. A particle executes a simple harmonic motion of time period T. Find the time taken by the particle to go directly from its mean position to half the amplitude

a) $T/2$ b) $T/4$ c) $T/8$ d) $T/12$

9. A simple harmonic oscillator has a period T and energy E. the amplitude of the oscillator is doubled. Choose the correct answer.

a) Period and energy get doubled b) Period gets doubled while energy remains the same

c) Energy gets double while period remains the same d) Period remains the same and energy becomes four times

10. On a planet a freely falling body takes 2 s when it is dropped from a height of 8 m, the time period of simple pendulum of length 1 m on that planet is

a) 3.14 s b) 16.28 s c) 1.57 s d) None of these

11. A simple pendulum has time period T_1. The point of suspension is now moved upward according to the relation $y = k\,t^2$, $(k = 1\ \text{ms}^{-2})$ where y is the vertical displacement. The time period now becomes T_2. The ratio of $\frac{T_1^2}{T_2^2}$ is $(\text{g} = 10\ \text{ms}^{-2})$

a) $6/5$ b) $5/6$ c) 1 d) $4/5$

12. A particle of mass m is located in a one dimensional potential field where potential energy is given by $(x) = A(1 - \cos px)$, where A and p are constants. The period of small oscillations of the particle is

a) $2\pi\sqrt{\frac{m}{A\,p}}$ b) $2\pi\sqrt{\frac{m}{A\,p^2}}$ c) $2\pi\sqrt{\frac{m}{A}}$ d) $\frac{1}{2\pi}\sqrt{\frac{AR}{m}}$

13. An object is attached to the bottom of a light vertical spring and set vibrating. The maximum speed of the object is 15 cm/s and the period is 628 $milli\text{-}seconds$. The amplitude of the motion in centimeters is

a) 3.0 b) 2.0 c) 1.5 d) 1.0

14. The length of the second's pendulum is decreased by 0.3 cm when it is shifted to Chennai from London. If the acceleration due to gravity at London is 981 cms^{-2}, the acceleration due to gravity at Chennai is (assume $\pi^2 = 10$)
    a) 981 cms^{-2} b) 978 cms^{-2} c) 984 cms^{-2} d) 975 cms^{-2}

15. The velocity of a particle performing simple harmonic motion, when it passes through its mean position is
    a) Infinity b) Zero c) Minimum d) Maximum

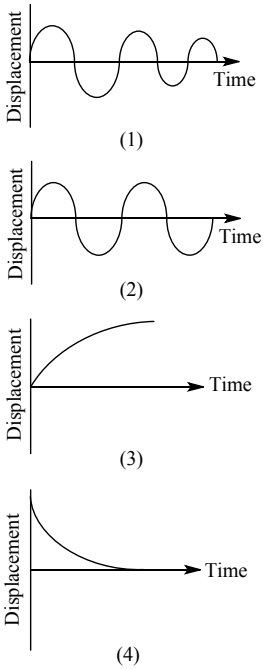
16. A girl swings on cradle in a sitting position. If she stands what happens to the time period of girl and cradle?
    a) Time period decreases b) Time period increases
    c) Remains constant d) First increases and then remains constant

17. For a simple pendulum, the graph between T^2 and L is
    a) A straight line passing through the origin b) Parabola
    c) Circle d) Ellipse

18. The motion which is not simple harmonic is
    a) Vertical oscillations of a spring b) Motion of simple pendulum
    c) Motion of a planet around the sun d) Oscillation of liquid column in a U-tube

19. In a simple harmonic oscillator, at the mean position
    a) Kinetic energy is minimum, potential energy is maximum
    b) Both kinetic and potential energies are maximum
    c) Kinetic energy is maximum, potential energy is minimum
    d) Both kinetic and potential energies are minimum

20. Which of the following figure represent(s) damped simple harmonic motions?



a) Fig. 1 alone b) Fig. 2 alone c) Fig. 4 alone d) Fig. 3 and 4