# DPP
DAILY PRACTICE PROBLEMS

**CLASS : XITH** **SUBJECT : PHYSICS**
**DATE :** **DPP NO. : 8**

## Topic :- OSCILLATIONS

1. $U$ is the PE of an oscillating particle and $F$ is the force acting on it at a given instant. Which of the following is true?
   a) $\frac{U}{F} + x = 0$ b) $\frac{2U}{F} + x = 0$ c) $\frac{F}{U} + x = 0$ d) $\frac{F}{2U} + x = 0$

2. Two particles executes S.H.M. of same amplitude and frequency along the same straight line. They pass one another when going in opposite directions, and each time their displacement is half of their amplitude. The phase difference between them is
   a) 30° b) 60° c) 90° d) 120°

3. A particle executes linear simple harmonic motion with an amplitude of 2 cm. When the particle is at 1 cm from the mean position the magnitude of its velocity is equal to that of its acceleration. Then its time period in second is
   a) $\frac{1}{2\pi\sqrt{3}}$ b) $2\pi\sqrt{3}$ c) $\frac{2\pi}{\sqrt{3}}$ d) $\frac{\sqrt{3}}{2\pi}$

4. To show that a simple pendulum executes simple harmonic motion, it is necessary to assume that
   a) Length of the pendulum is small
   b) Mass of the pendulum is small
   c) Amplitude of oscillation is small
   d) Acceleration due to gravity is small

5. A lift is ascending with an acceleration equal to g/3. Its time period of oscillation is$T$. What will be the time period of a simple pendulum suspended from its ceiling in stationary lift?
   a) 2 $T$ b) 3 $T$ c) $(\sqrt{3/4})T$ d) $2T/\sqrt{3}$

6. If the displacement equation of a particle be represented by $y = A\sin PT + B\cos PT$, the particle executes
   a) A uniform circular motion
   b) A uniform elliptical motion
   c) A S.H.M.
   d) A rectilinear motion

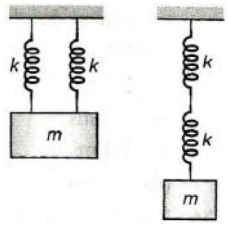
7. A simple pendulum is set into vibrations. The bob of the pendulum comes to rest after some time due to
   a) Air friction
   b) Moment of inertia
   c) Weight of the bob
   d) Combination of all the above

8. A mass $m$ attached to a spring oscillates every 2 $s$. If the mass is increased by 2 $kg$, then time-period increases by 1 $s$. The initial mass is
   a) 1.6 $kg$
   b) 3.9 $kg$
   c) 9.6 $kg$
   d) 12.6 $kg$

9. If a simple pendulum oscillates with an amplitude of 50 nm and time period of 2 s, then its maximum velocity is
   a) 0.10 $ms^{-1}$
   b) 0.15 $ms^{-1}$
   c) 0.8 $ms^{-1}$
   d) 0.26 $ms^{-1}$

10. The displacement of a particle executing SHM is given by $y = 5\sin\left(4t + \frac{\pi}{3}\right)$
    If $T$ is the time period and mass of the particle is $2g$, the kinetic energy of the particle when $t = \frac{T}{4}$ is given by
    a) 0.4 $J$
    b) 0.5 $J$
    c) 3 $J$
    d) 0.3 $J$

11. Two identical springs are connected in series and parallel as shown in the figure. If $f_s$ and $f_p$ are frequencies of arrangements, what is $\frac{f_s}{f_p}$?

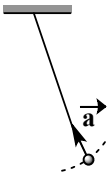


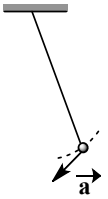

    a) 1:2
    b) 2:1
    c) 1:3
    d) 3:1

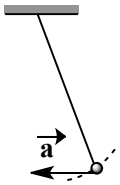
12. The scale of a spring balance reading from 0 to 10 $kg$ is 0.25 $m$ long. A body suspended from the balance oscillates vertically with a period of $\pi/10$ second. The mass suspended is (neglect the mass of the spring)
    a) 10 $kg$
    b) 0.98 $kg$
    c) 5 $kg$
    d) 20 $kg$

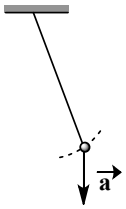
13. A mass $m$ is vertically suspended from a spring of negligible mass; the system oscillates with a frequency $n$. What will be the frequency of the system if a mass 4 $m$ is suspended from the same spring
    a) $n/4$
    b) $4n$
    c) $n/2$
    d) $2n$

14. A simple pendulum is oscillating without damping. When the displacement of the bob is less than maximum, its acceleration vector $\vec{a}$ is correctly show in figure.

a) 


b) 


c) 


d) 

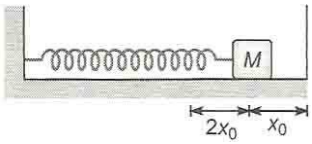

15. A particle starts SHM from the mean position. Its amplitude is $a$ and total energy $E$. At one instant its kinetic energy is $3\frac{E}{4}$. Its displacement at that instant is

a) $\frac{a}{\sqrt{2}}$ b) $\frac{a}{2}$ c) $\frac{a}{\sqrt{\left(\frac{3}{2}\right)}}$ d) $\frac{a}{\sqrt{3}}$

16. A man measures the period of a simple pendulum inside a stationary lift ad finds it to be $T$ second. If the lift accelerates upwards with an acceleration g/4, then the period of pendulum will be

a) $2T\sqrt{5}$ b) T c) $\frac{2T}{\sqrt{5}}$ d) $\frac{T}{4}$

17. One end of a spring of force constant $k$ is fixed to a vertical wall and the other to a block of mass $m$ resting on a smooth horizontal surface. There is another wall at a distance $x_0$ from the black. The spring is then compressed by $2x_0$ and released. The time taken to strike the wall is

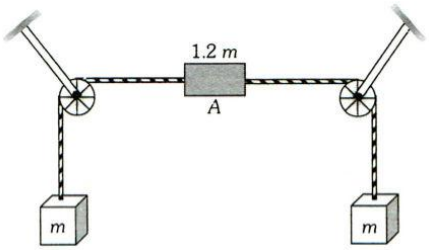



a) $\frac{1}{6}\pi\sqrt{\frac{k}{m}}$ b) $\sqrt{\frac{k}{m}}$ c) $\frac{2\pi}{3}\sqrt{\frac{m}{k}}$ d) $\frac{\pi}{4}\sqrt{\frac{k}{m}}$

18. If $x$, $v$ and $a$ denote the displacement, the velocity and the acceleration of a particle executing simple harmonic motion of time period $T$, then, which of the following does not change with time?

a) $a^2T^2 + 4\pi^2v^2$ b) $\frac{aT}{x}$ c) $aT + 2\pi v$ d) $\frac{aT}{v}$

19. In the figure, the vertical sections of the string are long. $A$ is released from rest from the position shown. Then




a) The system will remain in equilibrium
b) The central block will move down continuously
c) The central block will undergo simple harmonic motion
d) The central block will undergo periodic motion but not simple harmonic motion

20. A horizontal platform vibrates with simple harmonic motion in the horizontal direction with a period 2 s. A body of mass 0.5 kg is placed on the platform. The coefficient of static friction between the body and platform is 0.3. What is the maximum frictional force on the body when the platform is oscillating with amplitude 0.2 m? Assume $\pi^2 = 10 = g$.

a) 0.5 N b) 1 N c) 1.5 N d) 2 N