DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 6**

Topic :- OSCILLATIONS

1. A particle of mass 1 kg is moving in SHM with an amplitude 0.02 m and a frequency of 60 Hz. The maximum force in newton acting on the particle is
   a) 188 π^2 b) 144π^2 c) 288π^2 d) None of these

2. The maximum velocity of a particle, executing simple harmonic motion with an amplitude 7 m, is 4.4 ms^{-1}. The period of oscillation is
   a) 0.01 s b) 10 s c) 0.1 s d) 100 s

3. A body executing simple harmonic motion has a maximum acceleration equal to 24 m s^{-2} and maximum velocity of 16 ms^{-1}, the amplitude of the simple harmonic motion is
   a) $\frac{1024}{9}$ m b) $\frac{32}{3}$ m c) $\frac{64}{9}$ m d) $\frac{3}{32}$m

4. The potential energy of a simple harmonic oscillator when the particle is half way to its end point is (where E is the total energy)
   a) $\frac{1}{8}E$ b) $\frac{1}{4}E$ c) $\frac{1}{2}E$ d) $\frac{2}{3}E$

5. The minimum phase difference between two simple harmonic oscillations,
   $y_1 = \frac{1}{2}\sin\omega t + \frac{\sqrt{3}}{2}\cos\omega t$
   $y_2 = \sin\omega t + \cos\omega t$, is
   a) $\frac{7\pi}{12}$ b) $\frac{\pi}{12}$ c) $-\frac{\pi}{6}$ d) $\frac{\pi}{6}$

6. The length of simple pendulum is increased by 1%. Its time period will
   a) increase by 2% b) increase by 1%
   c) increase by 0.5% d) decrease by 0.5%

7. In case of a forced vibration, the resonance wave becomes very sharp when the

a) Restoring force is small
b) Applied periodic force is small
c) Quality factor is small
d) Damping force is small

8. The pendulum bob has a speed of $3 ms^{-1}$ at its lowest position. The pendulum is 0.5 m long. The speed of the bob, when the length makes an angle of 60° to the vertical will be $(g = 10\ ms^{-2})$

a) $\frac{1}{2}\ ms^{-1}$ b) $\frac{1}{3}\ ms^{-1}$ c) $3\ ms^{-1}$ d) $2\ ms^{-1}$

9. If a simple pendulum is taken to a place where g decreases by 2% then the time period
a) increases by 0.5%
b) increases by 1%
c) increases by 2.0%
d) decreases by 0.5%

10. Time period of a spring mass system is T. If this spring is cut into two parts whose lengths are in the ratio 1:3 and the same mass is attached to the longer part, the new time period will be

a) $\sqrt{\frac{3}{2}}T$ b) $\frac{T}{\sqrt{3}}$ c) $\frac{\sqrt{3}T}{2}$ d) $\sqrt{3}T$

11. A weightless spring of length 60 cm and force constant 200 N/m is kept straight and unstretched on a smooth horizontal table and its ends are rigidly fixed. A mass of 0.25 kg is attached at the middle of the spring and is slightly displaced along the length. The time period of the oscillation of the mass is

a) $\frac{\pi}{20}s$ b) $\frac{\pi}{10}s$ c) $\frac{\pi}{5}s$ d) $\frac{\pi}{\sqrt{200}}s$

12. Identify correct statement among the following
a) The greater the mass of a pendulum bob, the shorter is its frequency of oscillation
b) A simple pendulum with a bob of mass M swings with an angular amplitude of 40°. When its angular amplitude is 20°, the tension in the string is less than $Mg\cos 20°$.
c) As the length of a simple pendulum is increased, the maximum velocity of its bob during its oscillation will decrease
d) The fractional change in the time period of a pendulum on changing the temperature is independent of the length of the pendulum

13. The average acceleration of a particle performing SHM over one complete oscillation is

a) $\frac{\omega^2 A}{2}$ b) $\frac{\omega^2 A}{\sqrt{2}}$ c) Zero d) $A\omega^2$

14. A particle is moving in a circle with uniform speed. Its motion is

a) Periodic and simple harmonic
b) Periodic but no simple harmonic
c) A periodic
d) None of the above

15. The differential equation of a particle executing SHM along y-axis is
a) $\frac{d^2y}{dt^2} + \omega^2 y = 0$
b) $\frac{d^2y}{dt^2} + \omega^2 y^2 = 0$
c) $\frac{d^2y}{dt^2} - \omega^2 y = 0$
d) $\frac{d^2y}{dt^2} + \omega y = 0$

16. A simple harmonic oscillator has an amplitude a and time period T. The time required by it to travel from $x = a$ to $x = a/2$ is
a) $T/6$
b) $T/4$
c) $T/3$
d) $T/2$

17. If the length of a pendulum is made 9 times and mass of the bob is made 4 times then the value of time period becomes
a) $3T$
b) $3/2T$
c) $4T$
d) $2T$

18. Two simple pendulums whose lengths are $100cm$ and $121cm$ are suspended side by side. Their bobs are pulled together and then released. After how many minimum oscillations of the longer pendulum, will the two be in phase again
a) 11
b) 10
c) 21
d) 20

19. Resonance is an example of
a) Tuning fork
b) Forced vibration
c) Free vibration
d) Damped vibration

20. When a mass m is attached to a spring, it normally extends by 0.2 m. The mass m is given a slight addition extension and released, then its time period will be
a) $\frac{1}{7} sec$
b) $1\ sec$
c) $\frac{2\pi}{7}\pi$
d) $\frac{2}{3\pi}\ sec$