PRERNA EDUCATION
IIT-JEE | NEET | BOARDS | NTSE | KVPY | OLYMPIADS

Chapter : OSCILLATIONS

Assignment 1

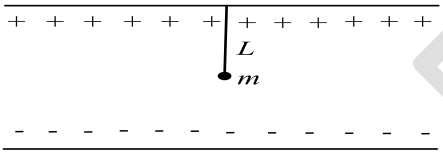
Class 11

DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 1**

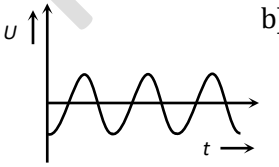
Topic :- OSCILLATIONS

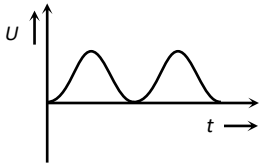
1. A small sphere carrying a charge q is hanging in between two parallel plates by a string of length L. Time period of pendulum is T_0. When parallel plates are charged, the time period changes to T. The ratio T/T_0 is equal to

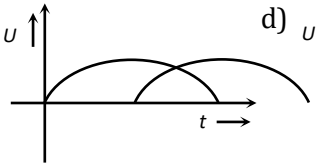


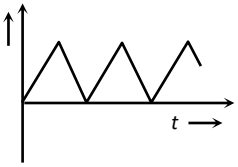
a) $\left(\frac{g+\frac{qE}{m}}{g}\right)^{1/2}$ b) $\left(\frac{g}{g+\frac{qE}{m}}\right)^{3/2}$ c) $\left(\frac{g}{g+\frac{qE}{m}}\right)^{1/2}$ d) None of these

2. The bob of a simple pendulum executes simple harmonic motion in water with a period t, while the period of oscillation of the bob is t_0 in air. Neglecting frictional force of water and given that the density of the bob is $(4/3 \times 1000\ \text{kg} - \text{m}^3)$. What relationship between t and t_0 is true?
a) $t = t_0$ b) $t = t_0/2$ c) $t = 2t_0$ d) $t = 4t_0$

3. As a body performs S.H.M., its potential energy U. Varies with time as indicated in
a) 

b) 

c) 

d) 

4. Two simple pendulum of length 0.5 m and 20 m respectively are given small linear displacement in one direction at the same time. They will again be in the phase when the pendulum of shorter length has completed… oscillations.

a) 5 b) 1 c) 2 d) 3

5. A simple harmonic oscillator has a period of 0.01 s and an amplitude of 0.2 m. The magnitude of the velocity in m $\sec^{-1}$ at the centre of oscillation is
a) 20π b) 100 c) 40π d) 100π

6. A body has a time period T_1 under the action of one force and T_2 under the action of another force, the square of the time period when both the forces are acting in the same direction is
a) $T_1^2 T_2^2$ b) T_1^2/T_2^2 c) $T_1^2 + T_2^2$ d) $T_1^2 T_2^2/(T_1^2 + T_2^2)$

7. For a simple pendulum the graph between L and T will be
a) Hyperbola b) Parabola c) A curved line d) A straight line

8. A mass of 4 kg suspended from a spring of force constant 800 Nm^{-1} executes simple harmonic oscillations. If the total energy of the oscillator is $4J$, the maximum acceleration (in ms^{-2}) of the mass is
a) 5 b) 15 c) 45 d) 20

9. A spring of force constant k is cut into two pieces such that one piece is double the length of the other. Then the long piece will have a force constant of
a) $(2/3)k$ b) $(3/2)k$ c) $3k$ d) $6k$

10. There is a body having mass m and performing S.H.M. with amplitude a. There is a restoring force $F = -Kx$, where x is the displacement. The total energy of body depends upon
a) K, x b) K, a c) K, a, x d) K, a, v

11. If a body of mass 0.98 kg is made to oscillate on a spring of force constant 4.84 N/m, the angular frequency of the body is
a) 1.22 rad/s b) 2.22 rad/s c) 3.22 rad/s d) 4.22 rad/s

12. The amplitude of vibration of a particle is given by $a_m = (a_0)/(a\omega^2 - b\omega + c)$; where a_0, a, b and c are positive. The condition for a single resonant frequency is
a) $b^2 = 4ac$ b) $b^2 > 4ac$ c) $b^2 = 5ac$ d) $b^2 = 7ac$

13. The period of oscillation of a simple pendulum of constant length at earth surface is T. Its period inside a mine is
a) Greater than T b) Less than T c) Equal to T d) Cannot be compared

14. In a simple pendulum, the period of oscillation T is related to length of the pendulum l as
a) $\frac{l}{T}$ = constant b) $\frac{l^2}{T}$ = constant c) $\frac{l}{T^2}$ – constant d) $\frac{l^2}{T^2}$ = constant

15. Starting from the origin a body oscillates simple harmonically with a period of 2 s. After what time will its kinetic energy be 75% of the total energy?

a) $\frac{1}{6}$s b) $\frac{1}{4}$s c) $\frac{1}{3}$s d) $\frac{1}{12}$s

16. A mass m is suspended from a spring of length l and force constant K. The frequency of vibration of the mass is f_1. The spring is cut into two equal parts and the same mass is suspended from one of the parts. The new frequency of vibration of mass is f_2. Which of the following relations between the frequencies is correct

a) $f_1 = \sqrt{2}f_2$ b) $f_1 = f_2$ c) $f_1 = 2f_2$ d) $f_2 = \sqrt{2}f_1$

17. How does time period of a pendulum very with length?

a) $\sqrt{l}$ b) $\sqrt{\frac{l}{2}}$ c) $\frac{1}{\sqrt{l}}$ d) $2l$

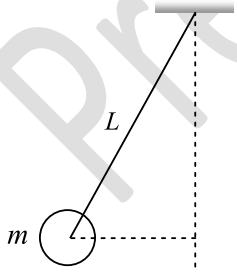
18. A particle is vibrating in a simple harmonic motion with an amplitude of 4 cm. At what displacement from the equilibrium position, is its energy half potential and half kinetic

a) 1 cm b) $\sqrt{2}$ cm c) 3 cm d) $2\sqrt{2}$ cm

19. A simple pendulum has a time period T_1 when on the earth's surface and T_2 when taken to a height $2R$ above the earth's surface where R is the radius of the earth. The value of (T_1/T_2) is

a) 1/9 b) 1/3 c) $\sqrt{3}$ d) 3

20. A ball of mass $(m)0.5\ kg$ is attached to the end of a string having length $(L)0.5\ m$. The ball is rotated on a horizontal circular path about vertical axis. The maximum tension that the string can bear is 324 N. The maximum possible value of angular velocity of ball (in radian/s) is



a) 9 b) 18 c) 27 d) 36