DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. : 7**

Topic :- OSCILLATIONS

1. The period of oscillation of a simple pendulum of length L suspended from the roof of a vehicle which moves without friction down an inclined plane of inclination α is given by

   a) $2\pi\sqrt{\frac{L}{g\cos\alpha}}$ b) $2\pi\sqrt{\frac{L}{g\sin\alpha}}$ c) $2\pi\sqrt{\frac{L}{g}}$ d) $2\pi\sqrt{\frac{L}{g\tan\alpha}}$

2. Out of the following functions representing motion of a particle which represents SHM

   (1) $y = \sin\omega t - \cos\omega t$ (2) $y = \sin^3\omega t$

   (3) $y = 5\cos\left(\frac{3\pi}{4} - 3\omega t\right)$ (4) $y = 1 + \omega t + \omega^2 t^2$

   a) Only (1) and (2) b) Only (1)

   c) Only (4) does not represent SHM d) Only (1) and (3)

3. A simple pendulum has a length l. The inertial and gravitational masses of the bob are m_i and m_g respectively. Then the time period T is given by

   a) $T = 2\pi\sqrt{\frac{m_g l}{m_i g}}$ b) $T = 2\pi\sqrt{\frac{m_i l}{m_g g}}$

   c) $T = 2\pi\sqrt{\frac{m_i \times m_g \times l}{g}}$ d) $T = 2\pi\sqrt{\frac{l}{m_i \times m_g \times g}}$

4. The total energy of a simple harmonic oscillator is proportional to

   a) Square root of displacement b) Velocity

   c) Frequency d) Square of the amplitude

5. The displacement of a particle from its mean position (in metre) is given by $y = 0.2\sin(10\pi t + 1.5\pi)\cos(10\pi t + 1.5\pi)$. The motion of particle is

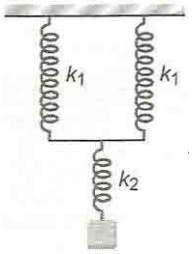
   a) Periodic but not S.H.M.

   b) Non-periodic

   c) Simple harmonic motion with period 0.1 s

   d) Simple harmonic motion with period 0.2 s

6. What will be the force constant of the spring system shown in figure?



a) $\frac{k_1}{2} + k_2$ b) $\left[\frac{1}{2k_1} + \frac{1}{k_2}\right]^{-1}$ c) $\frac{1}{2k_1} + \frac{1}{k_2}$ d) $\left[\frac{2}{k_1} + \frac{1}{k_2}\right]^{-1}$

7. A particle is executing SHM of period $24x$ and of amplitude 41 cm with O as equilibrium position. The minimum time in seconds taken by the particle to go from P to Q. where OP = - 9 cm and OQ =40 cm is

a) 5 b) 6 c) 7 d) 9

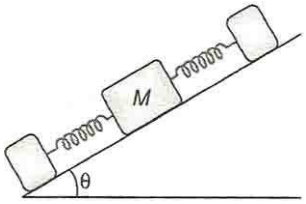
8. The velocity of particle in simple harmonic motion at displacement y from mean position is

a) $\omega\sqrt{a^2 + y^2}$ b) $\omega\sqrt{a^2 - y^2}$ c) ωy d) $\omega^2\sqrt{a^2 - y^2}$

9. The ratio of frequencies of two pendulum are 2:3, then their lengths are in ratio

a) $\sqrt{2/3}$ b) $\sqrt{3/2}$ c) $4/9$ d) $9/4$

10. On a smooth inclined plane, a body of mass M is attached between two springs. The other ends of the springs are fixed to firm support. If each spring has force constant k, the period of oscillation of the body (assuming the springs as massless) is



a) $2\pi[M/2k]^{1/2}$ b) $2\pi[2M/k]^{1/2}$
c) $2\pi[Mg\sin\theta/2k]^{1/2}$ d) $2\pi[2Mg/k]^{1/2}$

11. A body is vibrating in simple harmonic motion. If its acceleration is 12 cm s^{-2} at a displacement 3 cm, then time period is

a) 6.28 s b) 3.14 s c) 1.57 s d) 2.57 s

12. Which one of the following statements is true for the speed v and the acceleration a of a particle executing simple harmonic motion

a) When v is maximum, a is maximum
b) Value of a is zero, whatever may be the value of v
c) When v is zero, a is zero
d) When v is maximum, a is zero

13. A body is moving in a room with a velocity of 20 m/s perpendicular to the two walls separated by 5 $meters$. There is no friction and the collisions with the walls are elastic. The motion of the body is

a) Not periodic
b) Periodic but not simple harmonic
c) Periodic and simple harmonic
d) Periodic with variable time period

14. The periodic time of a particle doing simple harmonic motion is 4 s. The taken by it to go from its mean position to half the maximum displacement (amplitude)

a) 2s
b) 1s
c) $\frac{2}{3}$ s
d) $\frac{1}{3}$ s

15. A uniform spring of force constant k is cut into two pieces, the lengths of which are in the ratio 1: 2. The ratio of the force constants of the shorter and longer piece is

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

16. A particle is executing simple harmonic motion with frequency f. The frequency at which its kinetic energy change into potential energy is

a) $f/2$
b) f
c) $2\,f$
d) $4\,f$

17. A mass M, attached to a spring, Oscillates with a period of 2 s. If the mass is increased by 4 kg, the time period increases by 1 s. Assuming that Hooke's law is obeyed, the initial mass M was

a) 3.2 kg
b) 1 kg
c) 2 kg
d) 8 kg

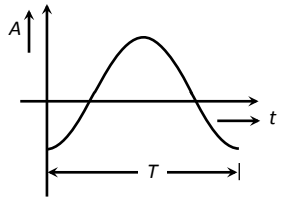
18. The kinetic energy and the potential energy of a particle executing S.H.M. are equal. The ratio of its displacement and amplitude will be

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

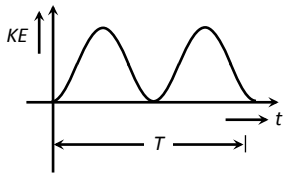
19. Which one of the following equations of motion represents simple harmonic motion
Where k,k_0,k_1 and a are all positive

a) Acceleration $= -k_0x + k_1x^2$
b) Acceleration $= -k(x + a)$
c) Acceleration $= k(x + a)$
d) Acceleration $= kx$

20. Acceleration A and time period T of a body in S.H.M. is given by a curve shown below. Then corresponding graph, between identic energy (K.E) and time t is correctly represented by



a)



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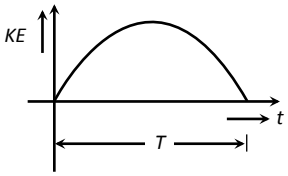
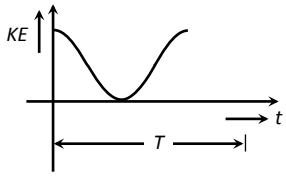


c)



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