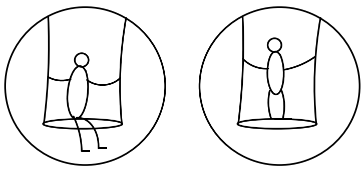
DPP
DAILY PRACTICE PROBLEMS

Class : XIth **Subject : PHYSICS**

Date : **DPP No. : 10**

Topic :-OSCILLATIONS

1. 

A child swings sitting and standing inside swing as shown in figure, then period of oscillations have the relation

a) $(T)_{Sitting} = (T)_{\text{Standing}}$ b) $(T)_{Sitting} > (T)_{\text{Standing}}$

c) $(T)_{Sitting} < (T)_{\text{Standing}}$ d) $2(T)_{Sitting} = (T)_{\text{Standing}}$

2. A particle is subjected simultaneously to two SHM's one along the x-axis and the other along the y-axis. The two vibrations are in phase and have unequal amplitudes. The particle will execute

a) Straight line motion b) Circular motion c) Elliptic motion d) Parabolic motion

3. A block is placed on a frictionless horizontal table. The mass of the block is m and springs are attached on either side with force constants K_1 and K_2. If the block is displaced a little and left to oscillate, then the angular frequency of oscillation will be

a) $\left(\frac{K_1+K_2}{m}\right)^{1/2}$ b) $\left[\frac{K_1K_2}{m(K_1+K_2)}\right]^{1/2}$ c) $\left[\frac{K_1K_2}{(K_1-K_2)m}\right]^{1/2}$ d) $\left[\frac{K_1^2+K_2^2}{(K_1+K_2)m}\right]^{1/2}$

4. Two linear SHMs of equal amplitude A and angular frequencies ω *and* 2ω are impressed on a particle along the axes x and y recpectively. If the initial phase difference between them is $\pi/2$, the resultant path followed by the particle is

a) $y^2 = x^2(1-x^2/A^2)$ b) $y^2 = 2x^2(1-x^2A^2)$

c) $y^2 = 4x^2(1-x^2/A^2)$ d) $y^2 = 8x^2(1-x^2/A^2)$

5. If a watch with a wound spring is taken on to the moon, it

a) Runs faster b) Runs slower c) Does not work d) Shown no change

6. The displacement x(in metre) of a particle in simple harmonic motion is related to time t(in second) as

$$x = 0.01\cos\left(\pi t + \frac{\pi}{4}\right)$$

The frequency of the motion will be

a) 0.5 Hz b) 1.0 Hz c) $\frac{\pi}{2}$ Hz d) π Hz

7. A simple pendulum is attached to the roof of a lift. If time period of oscillation, when the lift is stationary is T. Then frequency of oscillation, when the lift falls freely, will be

a) Zero b) T c) $1/T$ d) None of these

8. A highly rigid cubical block A of small mass M and side L is fixed rigidly on the cubical block of same dimensions and low modulus of rigidity η such that the lower face of A completely covers the upper face of B. the lower face of B is rigidly held on a horizontal surface. A small force F is applied perpendicular to one of the side faces of A. after the force is withdrawn, block A executes small oscillations, the time period of which is given by

a) $2\pi\sqrt{ML\eta}$ b) $2\pi\sqrt{M\eta/L}$ c) $2\pi\sqrt{ML/\eta}$ d) $2\pi\sqrt{M/\eta L}$

9. A heavy brass sphere is hung from a weightless inelastic spring and as a simple pendulum its time period of oscillation is T. When the sphere is immersed in a non-viscous liquid of density $1/10$ that of brass, it will act as a simple pendulum of period

a) T b) $\frac{10}{9}T$ c) $\sqrt{\left(\frac{9}{10}\right)}T$ d) $\sqrt{\left(\frac{10}{9}\right)}T$

10. If a simple harmonic is represented by $\frac{d^2x}{dt^2}+\alpha x=0$, its time period is

a) $\frac{2\pi}{\alpha}$ b) $\frac{2\pi}{\sqrt{\alpha}}$ c) $2\pi\alpha$ d) $2\pi\sqrt{\alpha}$

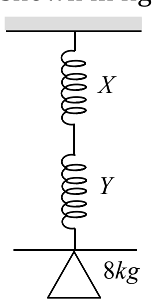
11. A body of mass 4 kg hangs from a spring and oscillates with a period 0.5 s on the removel of the body, the spring is shortented by

a) 6.3 cm b) 0.63 cm c) 6.25 cm d) 6.3 cm

12. Two particles A and B execute simple harmonic motion of period T and $5T/4$. They start from mean position. The phase difference between them when the particle A complete an oscillation will be

a) $\pi/2$ b) Zero c) $2\pi/5$ d) $\pi/4$

13. A body of mass 8 kg is suspended through two light springs X and Y connected in series as shown in figure. The readings in X and Y respectively are



a) 8 kg, zero b) zero, 8 kg c) 8 kg, 8 kg d) 2 kg ,6 kg

14. A simple pendulum is suspended from the ceiling of a stationary elevator and its period of oscillation is T. The elevator is then set into motion and the new time period is found to be longer. Then the elevator is

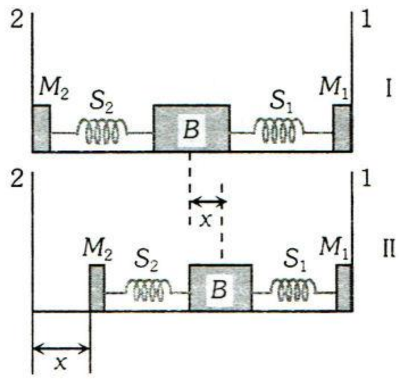
a) Accelerated upward b) Accelerated downward

c) Moving downward with nonuniform speed d) Moving downward with uniform speed

15. A spring (spring constant $=k$) is cut into 4 equal parts and two parts are connected in parallel. What is the effective spring constant?

a) $4\ k$ b) $16\ k$ c) $8\ k$ d) $6\ k$

16. A block (B) is attached to two unstretched springs S_1 and S_2 with spring constants k and 4 k, respectively (see figure I). The other ends are attached to identical supports M_1 and M_2 not attached to the walls. The springs and supports have negligible mass. There is no friction anywhere. The block B is displaced towards wall 1 by a small distance x (figure II) and released. The block returns and moves a maximum distance y towards wall 2. Displacements x and y are measured with respect to the equilibrium position of the block B. The ratio $\frac{y}{x}$ is



a) 4 b) 2 c) $\frac{1}{2}$ d) $\frac{1}{4}$

17. In S.H.M. maximum acceleration is at

a) Amplitude b) Equilibrium

c) Acceleration is constant d) None of these

18. A particle executing simple harmonic motion along y-axis has the its motion described by the equation $y = A\sin(\omega t) + B$. The amplitude of the simple harmonic motion is

a) A b) B c) $A + B$ d) $\sqrt{A + B}$

19. A particle executes simple harmonic oscillation with an amplitude a. The period of oscillation is T. The minimum time taken by the particle to travel half of the amplitude from the equilibrium is

a) $\frac{T}{4}$ b) $\frac{T}{8}$ c) $\frac{T}{12}$ d) $\frac{T}{2}$

20. Maximum speed of a particle in SHM is $v_{max.}$ Then average speed of a particle in SHM is equal to

a) $\frac{v_{\max}}{2}$ b) $\frac{\pi v_{\max}}{2}$ c) $\frac{v_{\max}}{2\pi}$ d) $\frac{2v_{\max}}{\pi}$