1. A silver atom in a solid oscillates in simple harmonic motion is some direction with a frequency of 10^{12}per second. What is the force constant of the bonds connecting one atom with the other? (Take, molecular weight of silver = 108 and Avogadro number =$6.02 \times 10^{23} g\ mol^{-1}$) **[JEE Main 2018]**

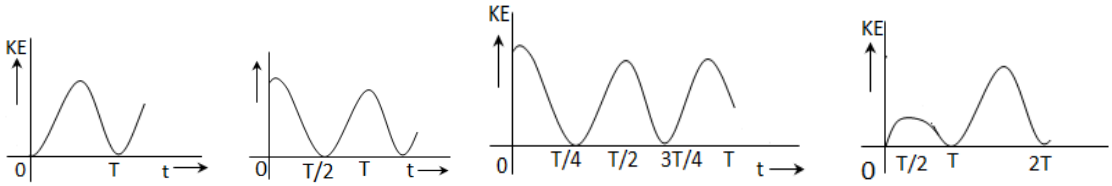
a. 6.4 N/m b. 7.1 N/m c. 2.2 N/m d. 5.5 N/m

2. If a spring of stiffness k is cut into two parts A and B of length $l_A : l_B$ = 2 : 3, then the stiffness of spring A is given by **[AIEEE 2011]**

a. $\frac{5}{2}K$ b. $\frac{3K}{5}$ c. $\frac{2K}{5}$ d. K

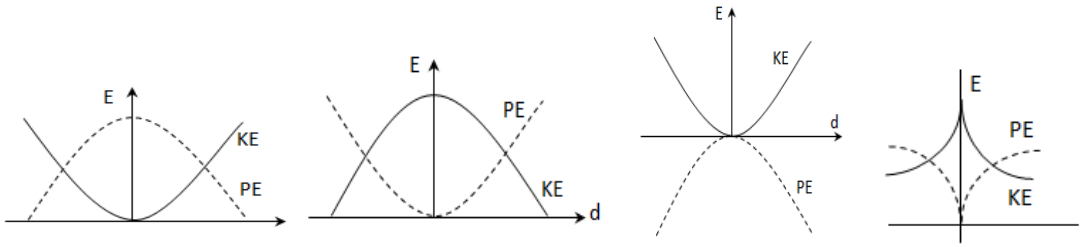
3.A particle is executing simple harmonic motion with a time period T.At time t = 0, it is at its position of equilibrium.The kinetic energy-time graph of the particle will look, like **[JEE Main 2017 Offline]**

(a) **(b)** **(c)** **(d)**



4. For a simple pendulum, a graph is plotted between its Kinetic energy (KE) and Potential Energy (PE) against its displacement d. Which one of the following represents these correctly? (graphs are schematic and not drawn to scale) **[JEE Main 2015]**

(a) **(b)** **(c)** **(d)** .



5.Two simple pendulums of length 1 m and 4 m respectively are both given small displacement in the same direction. The shorter pendulum has completed how many number of oscillations in the period longer pendulum completes one oscillation **[JEE Main 2013]**

(a). 2 **(b).** 7 **(c).** 5 **(d).** 3

6.Both of a simple pendulum of length l is made of iron. The pendulum is oscillating over a horizontal coil carrying direct current. If the time period of the pendulum is T, then **[JEE Main 2013]**

(a). $T < 2\pi\sqrt{\frac{l}{g}}$ and damping is smaller than in air alone

(b). $T = 2\pi\sqrt{\frac{l}{g}}$ and damping is larger than in air alone

(c). $T > 2\pi\sqrt{\frac{l}{g}}$ and damping is smaller than in air alone

(d). $T < 2\pi\sqrt{\frac{l}{g}}$ and damping is larger than in air alone

7. The amplitude of a damped oscillator decreases to 0.9 times its original magnitude is 5sec. In another 10 s, it will decrease to α times its original magnitude, where α equals **[JEE Main 2013]**

(a). 0.7 **(b).** 0.81 **(c).** 0.729 **(d).** 0.6

8. A pendulum made of a uniform wire of cross-sectional area A has time period T. When an addional mass M is added to its bob, the time period changes T_M. If the Young's modulus of the material of the wire is Y, then 1/Y is equal to (g = gravitational acceleration) **[JEE Main 2015]**

(a). $\left[\left(\frac{T_M}{T}\right)^2 - 1\right]\frac{A}{Mg}$ **(b).** $\left[\left(\frac{T_M}{T}\right)^2 - 1\right]\frac{Mg}{A}$ **(c).** $\left[1 - \left(\frac{T_M}{T}\right)^2\right]\frac{A}{Mg}$ **(d).** $\left[1 - \left(\frac{T}{T_M}\right)^2\right]\frac{A}{Mg}$

9. A particle performs simple harmonic motion with amplitude A. Its speed is tripled at the instant that it is at a distance $\frac{2}{3}A$ from equilibrium position. The new amplitude of the motion is

[JEE Main2016Offline]

(a). $\frac{A}{3}\sqrt{41}$ **(b)** 3A **(c).** $A\sqrt{3}$ **(d)** 7/3 A

10.A particle moves with simple harmonic motion in a straight line. In first τ sec, after starting from rest it travels a distance a and in next τ sec, it travels 2a, in same direction, then **[JEE Main 2014]**

(a). amplitude of motion is 3a **(b).** time period of oscillations is 8 τ

(c). amplitude of motion is 4 τ **(d).** time period of oscillations is 6 τ

11.An ideal gas enclosed in a vertical cylindrical container supports a freely moving piston of mass M. The piston and the cylinder have equal cross sectional area A. When the piston is in equilibrium, the volume of the gas is V_o and its pressure is P. The piston is slightly displaced from the equilibrium position and released. Assuming that the system is completely, isolated from its surrounding, the piston executes a simple harmonic motion with frequency
[JEE Main 2013]

(a). $\frac{1}{2\pi}\frac{A\gamma P_0}{V_0 M}$ **(b).** $\frac{1}{2\pi}\frac{V_0 M P_0}{A^2\gamma}$ **(c).** $\frac{1}{2\pi}\sqrt{\frac{A^2\gamma P_0}{MV_0}}$ **(d).** $\frac{1}{2\pi}\sqrt{\frac{V_0 M}{A\gamma P_0}}$
