Q1. 21 January Shift 2

The kinetic energy of a simple harmonic oscillator is oscillating with angular frequency of $176 \mathrm{rad/s}$. The frequency of this simple harmonic oscillator is ____ Hz. $\left[\text{take } \pi = \frac{22}{7}\right]$.

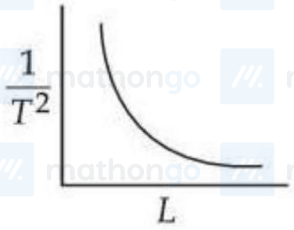
(1) 14 (2) 28 (3) 176 (4) 88

Q2. 22 January Shift 2

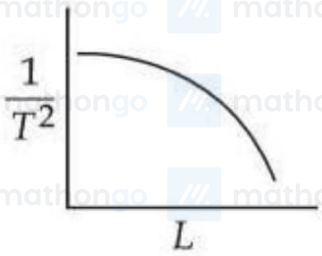
Using a simple pendulum experiment g is determind by measuring its time period T. Which of the following plots represent the correct relation between the pendulum length L and time period T ?

(1)

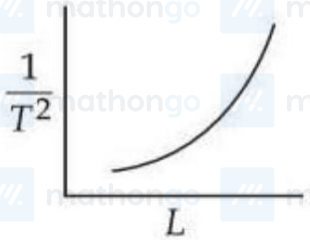
(2)



(3)

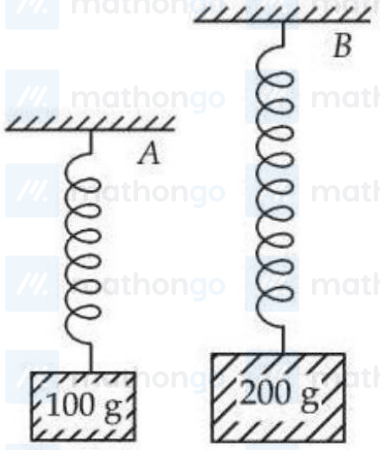


(4)



Q3. 23 January Shift 1

Two blocks with masses 100 g and 200 g are attached to the ends of springs A and B as shown in figure. The energy stored in A is E. The energy stored in B, when spring constants k_A, k_B of A and B, respectively satisfy the relation



$4k_A = 3k_{B'}$, is :

(1) $\frac{4}{3}E$ (2) 4E

(3) 3E (4) $2E$

Q4. 23 January Shift 1

A simple pendulum of string length 30 cm performs 20 oscillations in 10 s. The length of the string required for the pendulum to perform 40 oscillations in the same time duration is ____ cm. [Assume that the mass of the pendulum remains same.]

(1) 7.5 (2) 0.75 (3) 120 (4) 15

Q5. 24 January Shift 1

A cylindrical block of mass M and area of cross section A is floating in a liquid of density ρ and with its axis vertical. When depressed a little and released the block starts oscillating. The period of oscillation is ____.

(1) $\pi\sqrt{\frac{2M}{\rho Ag}}$ (2) $\pi\sqrt{\frac{\rho A}{Mg}}$ (3) $2\pi\sqrt{\frac{\rho A}{Mg}}$ (4) $2\pi\sqrt{\frac{M}{\rho Ag}}$

Q6. 28 January Shift 1

The displacement of a particle, executing simple harmonic motion with time period T, is expressed as $x(t) = A\sin\omega t$, where A is the amplitude. The maximum value of potential energy of this oscillator is found at $t = T/2\beta$. The value of β is ____.

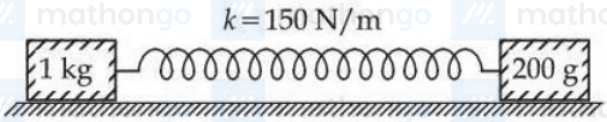
Q7. 28 January Shift 2

The time period of a simple harmonic oscillator is $T = 2\pi\sqrt{\frac{k}{m}}$. Measured value of mass (m) of the object is 10 g with an accuracy of 10 mg and time for 50 oscillations of the spring is found to be 60 s using a watch of 2 s resolution. Percentage error in determination of spring constant (k) is ____ \%.

(1) 7.60 (2) 3.35 (3) 3.43 (4) 6.76

Q8. 28 January Shift 2

As shown in the figure, a spring is kept in a stretched position with some extension by holding the masses 1 kg and 0.2 kg with a separation more than spring natural length and are released. Assuming the horizontal surface to be frictionless, the angular frequency (in SI unit) of the system is : $k = 150\ \mathrm{N/m}$



(1) 5 (2) 27 (3) 20 (4) 30

ANSWER KEYS

1. (1) **2.** (2) **3.** (1) **4.** (1) **5.** (4) **6.** 2 **7.** (4) **8.** (4)