Assignment 8

The due date for submitting this assignment has passed. Due on 2019-03-27, 23:59 IST.

As per our records you have not submitted this assignment.

1) A stationary wave is represented by the equation, \( y = 3 \cos \left( \frac{\pi x}{8} \right) \sin (15 \pi t) \) where \( x \) and \( y \) are in cm and \( t \) is in seconds. The distance between the consecutive nodes is (in cm)

(a) 8
(b) 12
(c) 14
(d) 16

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a)

2) Two stretched strings of same material are vibrating under same tension in fundamental mode. The ratio of their frequencies is 1:2 and ratio of the lengths of the vibrating segments is 1:4. Then the ratio of the radii of the strings is

(a) 2:1
(b) 4:1
(c) 3:2
(d) 8:1

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d)
3) A thin uniform wooden rod $AB$ of length $L$ and mass $M$ is hinged without friction at the end. A small block of clay of mass $m$ moving horizontally with velocity $v$ strikes the end $B$ of the rod and gets stuck to it. The angular velocity of the system about $A$ just after the collision is

\[ \frac{mv}{(mL + ML)} \]

(a) $\frac{mv}{(mL + ML)}$

(b) $3\frac{mv}{(mL + ML)}$

(c) $\frac{(m\ell + ML)}{3\ell}$

(d) $3\frac{mv}{(3m\ell + ML)}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(d)

4) A copper rod and a steel rod are to have lengths $L_c$ and $L_s$ such that the difference between their lengths is the same at all ambient temperatures. If the coefficients of linear expansion of copper and steel are respectively $\alpha_c$ and $\alpha_s$, the lengths are related to the coefficients of linear expansion as

(a) $\frac{L_c}{L_s} = \frac{\alpha_c}{\alpha_s}$

(b) $L_c - L_s = \alpha_c - \alpha_s$

(c) $L_c/L_s = \alpha_s/\alpha_c$

(d) $L_c/L_s = (\alpha_c/\alpha_s)^{1/2}$

No, the answer is incorrect.
Score: 0
Accepted Answers:
(c)
5) A soft iron rod has its length increased by 0.3% on increasing its temperature by $\Delta T$. The percentage increase in the area of a circular hole in a sheet of the same material (soft iron) increasing its temperature by $\Delta T$ will be

(a) 0.3%
(b) −0.3%
(c) 0%
(d) 0.6%

No, the answer is incorrect.
Score: 0
Accepted Answers: (d)

6) A simple pendulum has a time period $T$ in vacuum. Its time period when it is completely immersed in a liquid of density one-eighth of the density of material of the bob is

(a) $\sqrt{\frac{7}{8}} T$
(b) $\sqrt{\frac{5}{8}} T$
(c) $\sqrt{\frac{3}{8}} T$
(d) $\sqrt{\frac{8}{7}} T$

No, the answer is incorrect.
Score: 0
Accepted Answers: (d)

7) For a simple pendulum, the graph between $T^2$ and $L$ is

(a) a straight line passing through the origin
(b) parabola
(c) circle
(d) ellipse

No, the answer is incorrect.
A thin uniform bar of length 120 cm is made to oscillate about an axis through its end. Find the period of oscillation. \((g = 980 \text{ cm/s}^2, \pi = 3.14)\)

(a) 1.236 s
(b) 1.794 s
(c) 2.166 s
(d) 2.986 s

No, the answer is incorrect.

What is the distance between the centre of suspension and the centre of oscillation of a uniform cylindrical metal rod used as a second pendulum i.e., its time period \(T = 2 \text{ s}. \quad (g = 4 \text{ cm/s}^2, \pi = 3.14)\)

(a) 99.19 cm
(b) 79.12 cm
(c) 69.25 cm
(d) 59.92 cm

No, the answer is incorrect.

A stretched string is observed to vibrate with a frequency 30 c.p.s in the fundamental note when the length of the string is 60 cm. The mass per unit length of the string is 0.5 gm/cm. Find the tension of the string.

(a) \(9.72 \times 10^5 \text{ dyne}\)
(b) \(6.48 \times 10^5 \text{ dyne}\)
(c) \(11.20 \times 10^5 \text{ dyne}\)
(d) \(4.23 \times 10^5 \text{ dyne}\)
A string is stretched by suspending a load of 5 kg. The mass per unit length of the string is 5 gm/m. The travelling waves are sent through the string by oscillating one of the ends with a frequency of 250 Hz. Calculate the wavelength of the travelling wave. \( g = 10 \text{ m/s}^2 \)

(a) 0.1 m
(b) 0.2 m
(c) 0.3 m
(d) 0.4 m

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a)

The length of a metal rod at 15°C is 50 cm and at 90°C, it is 50.15 cm. The coefficient of linear expansion of the material of rod is

(a) \( 4.0 \times 10^{-6} / ^\circ \text{C} \)
(b) \( 2.4 \times 10^{-6} / ^\circ \text{C} \)
(c) \( 4.2 \times 10^{-5} / ^\circ \text{C} \)
(d) \( 4.0 \times 10^{-5} / ^\circ \text{C} \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(a)
A metal rod having linear expansion coefficient, $\alpha = 4.0 \times 10^{-5}/^\circ C$. At the temperature of its length is 100 cm. The temperature at which it is shortened by 1 mm is

(a) -40°C  
(b) -30°C  
(c) -20°C  
(d) -10°C

No, the answer is incorrect.  
Score: 0  
Accepted Answers:  
(d)