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Física 2º 3

①

$m = 3\,kg$ a) $E_{TM} = \frac{1}{2} K \cdot Y^2$

$A = 4\,cm = 0{,}04\,m$ $\omega = \sqrt{\frac{K}{m}} \rightarrow \omega = 2\pi \frac{1}{2} = \pi$

$T = 2\,s$

$\pi = \sqrt{\frac{K}{m}} \rightarrow K = 29{,}61\ N/m$

$$\left[E_{TM} = \frac{1}{2}\, 29{,}61 \cdot 0{,}04^2 = 0{,}024\ J\right]$$

b)

$v_{max} \rightarrow K_{max} = \frac{1}{2} m v^2$

$0{,}024 = \frac{1}{2} \cdot 3 \cdot v^2$

$1{,}5\, v^2 = 0{,}024 \rightarrow \left[v = \pm \sqrt{\frac{0{,}024}{1{,}5}} = \pm 0{,}126\ m/s^2\right]$

c)

$K_{x1} = \frac{1}{2} m \cdot \left(\frac{v}{3}\right)^2 = \frac{1}{2} \cdot 3 \cdot \left(\frac{0{,}126}{3}\right)^2 = 0{,}002646\ J$

$U_{x1} = E_{TM} - K = 0{,}024 - 0{,}002646 = 0{,}021354\ J$

$U_{x1} = \frac{1}{2} \cdot K \cdot x_1^2 \rightarrow 0{,}021354 = \frac{1}{2} \cdot 29{,}61 \cdot x_1^2$

$$\left[x_1 = \pm \sqrt{0{,}00142} = \pm 0{,}0379\ m\right]$$

②

$L = L$, $m = m$, $\phi = \phi$, $T = T$

a) $F = m \cdot a \rightarrow \sum \tau = I \cdot \alpha$ $\sin\phi \rightarrow mg = h \cdot \frac{\omega}{T}$

$\sin\phi \cdot g = \frac{\sqrt{\frac{g}{L}}}{T}$ $\cdot \left[\phi = \arcsin\left(\frac{g\sqrt{g/L}}{T}\right) + \alpha\right]$

b) $\alpha = \frac{\pi}{3}$

$\phi = \arcsin\left(\frac{g\sqrt{3}L}{v^2}\right) + \frac{\pi}{3}$

(4)

$P_1 = 5\,m$ a) $\omega = 2\pi f = 2\pi\,1000 = 2000\pi\ rad/s$

$P_2 = 5{,}17\,m$ $P_1(x,t) = P_0 \cdot \sin(kx - \omega t)$

$v = \frac{\lambda}{T} \rightarrow \lambda = v \cdot T \rightarrow \lambda = 340 \cdot \frac{1}{1000} = 0{,}34\,m$

$K = \frac{2\pi}{\lambda} = \frac{2\pi}{0{,}34} = 18{,}48\ rad/s$

$t_1 = \frac{x_2}{v} = \frac{5}{340} = 0{,}0147\,s$

$t_2 = \frac{x_1}{v} = \frac{5{,}17}{340} = 0{,}0152\,s$

$P_1(x,t) = \sin(18{,}48 \cdot 5 - 2000\pi \cdot 0{,}0147) = 0{,}0371\,m$

$P_2(x,t) = \sin(18{,}48\ 5{,}17 \cdot 2000\pi \cdot 0{,}0152) = 0{,}0371\,m$

$[P_T = 2P_0 + 0{,}0743\,m]$

b)

$\omega = 2\pi f = 2\pi 500 = 1000\pi$

$\lambda = y = \frac{340}{500} = 0{,}68\,m$

$K = \frac{2\pi}{\lambda} = \frac{2\pi}{0{,}68} = 4{,}24\ rad/s$

$t_1 = 0{,}01475$, $t_2 = 0{,}0152\,s$

$\sin(4{,}24 \cdot 5 - 1000\pi \cdot 0{,}0147) = 0{,}0186\,m$

$\sin(4{,}24 \cdot 5{,}17 - 1000\pi \cdot 0{,}0152) = 0{,}0186\,m$

$[P_T = 2P_0 + 0{,}037\,m]$