HT3

1

Caso 1º (Equilibrio)

$$mg = \rho g A d_0 \qquad (1)$$

Caso 2º (desplazado x).

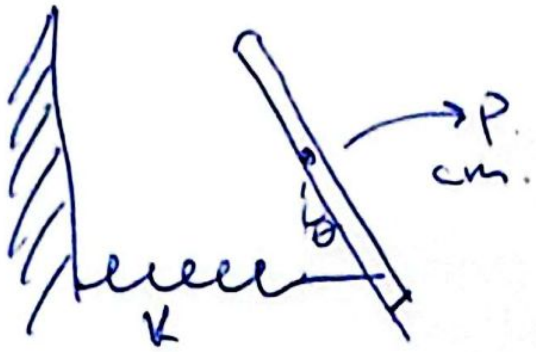
a) $$m\ddot{x} = mg - \rho g A (d_0 + x)$$

usando (1)

$$\ddot{x} = -\frac{g}{d_0} x$$

b) $$\omega = \sqrt{g/d_0} \quad y \quad T = 2\pi \sqrt{d_0/g}$$

2



$$I_{cm} = \frac{1}{12} M L^2$$

$$\tau = I_{cm} \ddot{\theta}$$

$$\tau = -K \frac{L}{2} \operatorname{sen}\theta \left(\frac{L}{2}\right) \cos\theta$$

Aproximación ángulos pequeños.

$$\operatorname{sen}\theta \sim \theta \quad , \quad \cos\theta \sim 1$$

$$\Rightarrow -K \frac{L^2}{4} \theta = \frac{1}{12} M L^2 \ddot{\theta}$$

$$\ddot{\theta} = -\frac{3K}{M} \theta$$

$$\boxed{T = 2\pi \sqrt{\frac{M}{3K}}}$$

3)

$x \rightarrow$ desplazamiento del resorte.

$$\tau = -ML^2\ddot{\theta}$$

$$MgL\,\text{sen}\theta + Kxh\cos\theta = -ML^2\ddot{\theta}$$

Ángulos pequeños

$$x = h\theta, \quad \text{sen}\theta \sim \theta, \quad \cos\theta \sim 1.$$

$$\therefore \quad ML^2\ddot{\theta} = -(MgL + Kh^2)\theta$$

$$\Rightarrow \quad \nu = \frac{1}{2\pi}\sqrt{\frac{MgL + Kh^2}{ML^2}}$$

4

Tomando el resultado del ej. 3 de la H1.

$$g(r) = \frac{GMr}{R_T^3}$$

$$\Rightarrow m\ddot{r} = -mg(r)$$

$$\Rightarrow \ddot{r} = -\frac{GM}{R_T^3} r$$

$$\therefore T = 2\pi \sqrt{\frac{R_T^3}{GM}} = 5061.08 s$$

$$= 84.35 min$$

$$\boxed{\frac{T}{2} = 42.18 min}$$