P3/ Panta (C2)

$$\Rightarrow \boxed{l = 2c \operatorname{sen}\frac{\beta}{2}}$$

a) $\rightarrow E = \underbrace{\frac{1}{2} m c^2 \dot{\beta}^2}_{\text{cinética}} + \underbrace{cmg\cos\beta}_{\text{peso (mgh)}} + \underbrace{\frac{1}{2} k\left(2c\operatorname{sen}\frac{\beta}{2} - b\right)^2}_{\text{resorte } \frac{1}{2}k\Delta x^2}$

el radio es constante

(1.5)

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b) $U = mgc\cos\beta + \frac{1}{2}k\left(2c\operatorname{sen}\frac{\beta}{2} - b\right)^2$

$\frac{\partial U}{\partial \beta} = 0$ (En el pto de equilibrio

$$\Rightarrow 0 = -mgc\operatorname{sen}\beta + k\left(2c\operatorname{sen}\frac{\beta}{2} - b\right)\cdot 2c\cos\frac{\beta}{2}\cdot\frac{1}{2}$$

$$\Rightarrow mg\operatorname{sen}\beta = k\left(c\underbrace{\left(2\operatorname{sen}\frac{\beta}{2}\cos\frac{\beta}{2}\right)}_{\operatorname{sen}\beta} - b\cos\frac{\beta}{2}\right)$$

Para $\beta = \frac{\pi}{3}$ pto de equilíbrio

$\Rightarrow \operatorname{Sen}\frac{\pi}{3} = \frac{\sqrt{3}}{2}$; $\cos\left(\frac{\pi}{6}\right) = \operatorname{Sen}\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$

$\Rightarrow \frac{\sqrt{3}}{2} mg = K\left(c\frac{\sqrt{3}}{2} - b\frac{\sqrt{3}}{2}\right)$

$\Rightarrow \boxed{m = \frac{K(c-b)}{g}}$ (2.5)

c) $\omega^2 = \frac{\partial^2 U/\partial\beta^2}{mc^2}$ ✓ , cinética $= \frac{1}{2} m c^2 \dot{\beta}^2$

$\frac{\partial^2 U}{\partial \beta^2} = -mgc\cos\beta + Kc\left(c\cos\beta + \frac{b}{2}\operatorname{Sen}\frac{\beta}{2}\right)$

$\cos\frac{\pi}{3} = \frac{1}{2} = \operatorname{Sen}\frac{\pi}{6}$

$\Rightarrow \frac{\partial^2 U}{\partial \beta^2} = -\frac{mgc}{2} + \frac{Kc}{2}\left(c + \frac{b}{2}\right) \;/\; c = 2b$

$= -mgb + \frac{Kb^2 5}{2} \;\boxed{mg = Kb}$

$\Rightarrow \omega^2 = \frac{b\left(\frac{5}{2}Kb - mg\right)}{mc^2} = \frac{\frac{3}{2}Kb}{\frac{Kb}{g}\cdot 4b^2} = \frac{3}{8}\frac{g}{b}$

$\Rightarrow \boxed{\omega^2 = \frac{3}{8}\frac{g}{b}}$ (2.0)