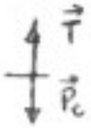
① El cilindro de masa M debe permanecer estático:



$\Rightarrow |\vec{T}| = Mg$ (1 pto)

Vista superior para el disco:

en el eje radial:

$|\vec{T}| = m|\vec{a}_c| \Rightarrow Mg = m\dfrac{|\vec{V}_t|^2}{R} \Rightarrow \boxed{|\vec{V}_t| = \sqrt{\dfrac{RMg}{m}}}$ (3 pts)

(1 pto)

② $I_{objeto} = I_{varilla} + I_1 + I_2$

$$I_{varilla} = \int r^2 dm = \int_{-\frac{L}{3}}^{\frac{2}{3}L} x^2 \lambda dx = \lambda \frac{x^3}{3}\Big|_{-\frac{L}{3}}^{\frac{2}{3}L} = \lambda\left[\frac{(\frac{2}{3}L)^3}{3} - \frac{(-\frac{L}{3})^3}{3}\right] = \lambda\left[\frac{8}{81} + \frac{1}{81}\right]L^3 = \lambda\frac{9}{81}L^3$$

$I_{varilla} = \lambda \dfrac{L^3}{9} \rightarrow$ con $\lambda = \dfrac{M}{L} \rightarrow I_{varilla} = \dfrac{1}{9}ML^2 = \dfrac{3}{27}ML^2$ (2 pts)

$I_1 = \left(-\frac{L}{3}\right)^2\left(\frac{M}{3}\right) = \left(\frac{L^2}{9}\right)\left(\frac{M}{3}\right) = \frac{L^2M}{27}$ (1 pto)

$I_2 = \left(\frac{2}{3}L\right)^2\left(\frac{M}{3}\right) = \left(\frac{4}{9}L^2\right)\left(\frac{M}{3}\right) = \frac{4}{27}L^2M$ (1 pto)

$\Rightarrow I_{objeto} = \dfrac{1}{27}L^2M + \dfrac{4}{27}L^2M + \dfrac{3}{27}ML^2 = \dfrac{8}{27}ML^2$ (1 pto)

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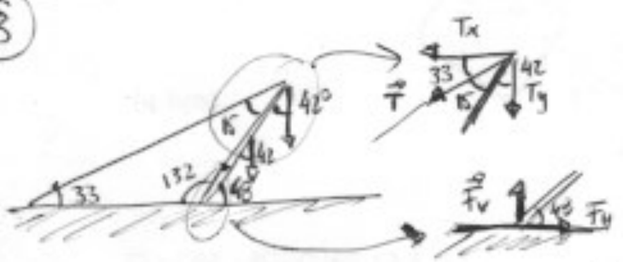
③



Eje x: $|\vec{F}_H| = |\vec{T}|\cos 33$ (1 pto)

Eje y: $|\vec{F}_V| = |\vec{T}|\operatorname{sen} 33 + |\vec{P}_S| + |\vec{P}_0|$ (1 pto)

Eje z: $|\vec{P}_0|(\cancel{L})\operatorname{sen}42 + |\vec{P}_S|\left(\frac{\cancel{L}}{2}\right)\operatorname{sen}42 = |\vec{T}|(\cancel{L})\operatorname{sen}15$

$|\vec{T}| = \dfrac{|\vec{P}_0|\operatorname{sen}42 + \frac{|\vec{P}_S|}{2}\operatorname{sen}42}{\operatorname{sen}15}$

$|\vec{F}_H| = 1228{,}2\,N$
$|\vec{F}_V| = 1417{,}6\,N$ (1 pto)

$|\vec{T}| = \dfrac{(513N)\operatorname{sen}42 + (53{,}5N)\operatorname{sen}42}{\operatorname{sen}15} = 1464{,}5N$ (2 pts)

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④ $\omega_0 = 0 \xrightarrow[\alpha_I]{8s} \omega_1 = 5\,rev/s \xrightarrow[\alpha_{II}]{12s} \omega_2 = 0$

$\omega_1 = \cancel{\omega_0} + \alpha_I t_1$

$\alpha_I = \dfrac{\omega_1}{t_1} = \dfrac{5\,rev/s}{8s} = 0{,}625\,rev/s^2$ (1 pto)

$\theta_1 = \cancel{\theta_0} + \cancel{\omega_0}t_1 + \frac{1}{2}\alpha_I t_1^2$

$\theta_1 = \frac{1}{2}(0{,}625\,rev/s^2)(8s)^2$

$\theta_1 = 20\,rev$ (1 pto)

$\cancel{\omega_2} = \omega_1 + \alpha_{II} t_2$

$\alpha_{II} = -\dfrac{\omega_1}{t_2} = -\dfrac{5\,rev/s}{12s} = -0{,}416\,rev/s^2$ (1 pto)

$\theta_2 = \theta_1 + \omega_1 t_2 + \frac{1}{2}\alpha_{II} t_2^2$

$\theta_2 = 20\,rev + (5\,rev/s)(12s) - \frac{1}{2}(0{,}416\,rev/s^2)(12s)^2$

$\theta_2 = 50{,}048\,rev$ (2 pts)