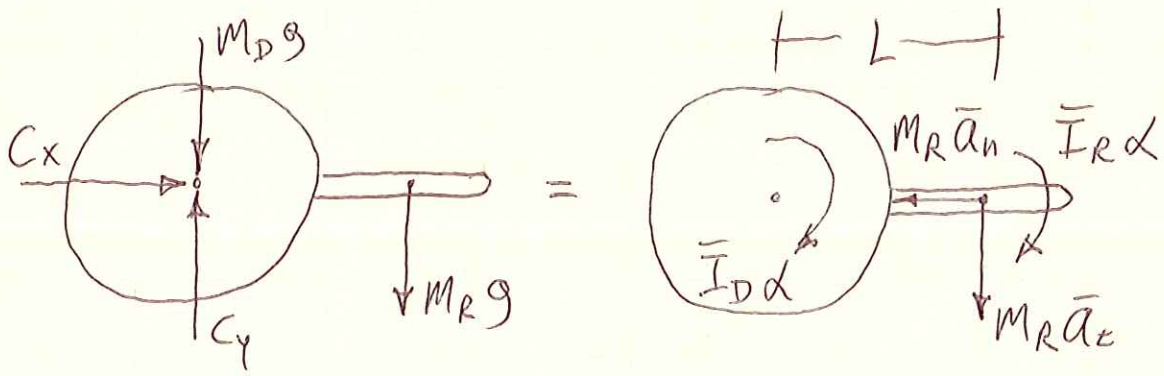
PROB. 16-90

$m_R = 1.5^{kg}$, $m_D = 5^{kg}$, $\omega = 10\ \frac{RAD}{s}$ ↻,

$r_D = 0.08^{m}$, $L_R = 0.12^{m}$, FIND α, C_x, C_y



$\Sigma F_x = m a_x$: $C_x = -m_R \bar{a}_n = -m_R (r_D + \frac{1}{2} L_R) \omega^2$

$C_x = -(1.5^{kg})\left[(0.08^{m}) + \frac{1}{2}(0.12^{m})\right]\left(10\ \frac{RAD}{s}\right)^2 = -21.0^{N}$ ←

LET $L = r_D + \frac{1}{2} L_R = (0.08^{m}) + \frac{1}{2}(0.12^{m}) = 0.14^{m}$

$\Sigma F_y = m a_y$: $C_y - m_D g - m_R g = -m_R \bar{a}_t = -m_R \cdot L \alpha$

$C_y = g(m_D + m_R) - m_R L \alpha$

$\Sigma M_C = \Sigma (M_C)_{EFF}$ +↺:

$-L m_r g = -L m_R \bar{a}_t - \bar{I}_D \alpha - \bar{I}_R \alpha$

$L m_R g = L m_R \cdot L \alpha + \alpha (\bar{I}_D + \bar{I}_R)$

$\alpha (\bar{I}_D + \bar{I}_R + m_R L^2) = L m_R g$

$$\alpha = \frac{L m_R g}{\left(\frac{1}{2} m_D r_D^2 + \frac{1}{12} m_R L_R^2 + m_R L^2\right)}$$

PROB. 16-90 CONT.

$$\alpha = \frac{(0.14^m)(1.5^{kg})(9.81\ \frac{m}{s^2})}{\left[\frac{1}{2}(5^{kg})(0.08^m)^2 + \frac{1}{12}(1.5^{kg})(0.12^m)^2 + (1.5^{kg})(0.14^m)^2\right]}$$

$$\alpha = 43.65\ \frac{RAD}{s^2}$$

$$C_y = (9.81\ \tfrac{m}{s^2})\left[(5^{kg}) + (1.5^{kg})\right] - (1.5^{kg})(0.14^m)(43.65\ \tfrac{RAD}{s^2})$$

$$C_y = 54.60\ N\ \uparrow$$