$m_A = 3\,kg$, $r_A = 0.1\,m$, $r_B = 0.125\,m$

$\omega_1 = \left(200\,\frac{REV}{MIN}\right)\left(\frac{MIN}{60\,s}\right)\left(\frac{2\pi}{REV}\right) = \frac{20\pi}{3}\,\frac{RAD}{s}$

$\omega_2 = 800\,RPM = \frac{80\pi}{3}\,\frac{RAD}{s}$, $t = 3^s$: FIND M

$m_A = \rho V_A$, $\rho = \frac{m_A}{V_A} = \frac{m_A}{\pi r_A^2 H}$

$m_B = \rho V_B = \left(\frac{m_A}{\pi r_A^2 H}\right)\left(\pi r_B^2 H\right) = \left(\frac{r_B}{r_A}\right)^2 m_A = \left(\frac{0.125\,m}{0.1\,m}\right)^2 (3\,kg)$

$m_B = 4.688\,kg$

PRINCIPLE OF IMPULSE AND MOMENTUM:

ANGULAR MOMENTUM ABOUT A +↻:

$I\omega_1 + Mt = I\omega_2$

$M = \frac{I(\omega_2 - \omega_1)}{t}$

$I = I_A + I_B = \frac{1}{2} m_A r_A^2 + \frac{1}{2} m_B r_B^2$

$$M = \frac{1}{2t} \cdot \left(m_A r_A^2 + m_B r_B^2 \right)(\omega_2 - \omega_1)$$

$$M = \frac{1}{2(3^s)} \cdot \left[(3^{kg})(0.1^m)^2 + (4.688^{kg})(0.125^m)^2 \right] \cdot \left(\frac{80\pi}{3} - \frac{20\pi}{3} \frac{RAD}{s} \right)$$

$$\boxed{M = 1.081^{N-m}}$$