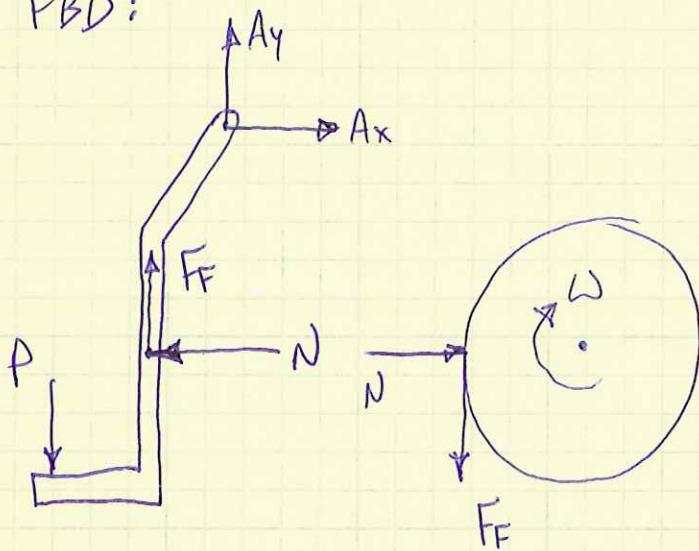


PROB. 17-13

$$\omega_0 = 360 \text{ RPM} = 12\pi \frac{\text{RAD}}{3} \text{ CW}, \text{ FIND } P \text{ FOR}$$

$$\theta = 200\pi \text{ RAD}, \omega_f = 0$$

FBD:



$$\Sigma M_A = 0 \uparrow :$$

$$9P - 2F_f - 10N = 0$$

$$F_f = \mu_k N, N = \frac{F_f}{\mu_k}$$

$$9P - 2F_f - 10\left(\frac{F_f}{\mu_k}\right) = 0$$

$$F_f\left(2 + \frac{10}{\mu_k}\right) = 9P$$

$$F_f = \frac{9P}{\left(2 + \frac{10}{\mu_k}\right)}$$

$$T_1 + U_{1-2} = T_2 \rightarrow 0$$

$$\frac{1}{2} I \omega_0^2 - M \cdot \Delta\theta = 0$$

$$M = r F_f = \frac{9Pr}{\left(2 + \frac{10}{\mu_k}\right)}$$

$$\frac{1}{2} I \omega_0^2 - \frac{9Pr \cdot \Delta\theta}{\left(2 + \frac{10}{\mu_k}\right)} = 0$$

$$P = \frac{I \omega_0^2}{18r \cdot \Delta\theta} \cdot \left(2 + \frac{10}{\mu_k}\right)$$

$$P = \frac{(14 \text{ ft} \cdot 16 \cdot \text{s}^2) \left(12\pi \frac{\text{RAD}}{3}\right)^2}{18 \left(\frac{8}{12} \text{ ft}\right) (200\pi \text{ RAD})} \cdot \left(2 + \frac{10}{0.35}\right) = 80.68 \text{ LB}$$