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Motor Specs Fun Problem

1. $K_b = \frac{V_{\text{applied}}}{\omega}$ at no-load

$$K_b = \frac{3V}{8700 \cdot \frac{2\pi}{60}} = 0.0033 \frac{V}{\text{rad/s}}$$

2. DC gain = $\frac{\omega_{\text{no-load}}}{V_{\text{applied}}} = \frac{8700 \cdot \frac{2\pi}{60}}{3} = \frac{1}{K_b} = \left(303 \frac{\text{rad/s}}{V} \right) \rightarrow 2900 \frac{\text{rpm}}{V}$

3. $\omega_{s2} = V_{\text{applied}} \cdot \text{DC gain}$
 $= 1V \cdot 2900 \frac{\text{rpm}}{V}$
 $\boxed{2900 \text{ rpm}}$

4. No. $\tau = \frac{J R}{K_m K_b}$ from Qube assignment

Output power = $0.31W = I^2 R$

$$\rightarrow R = \frac{0.31W}{(0.25A)^2} = 4.96 \Omega$$

$K_m \cong K_b$ for DC Motors. But we don't have J of motor

$8700 \cdot (1 - e^{-1}) = 5500 \text{ rpm}$ $\tau = \text{time to reach this rpm}$