

PRE-LAB (Weight: 20 %)

SHOW ALL RELEVANT CALCULATIONS ON A SEPARATE SHEET

(1) A DC motor has the following parameter specifications :

Armature resistance $R = \dots\dots\dots\Omega$ (range : 1.5 to 6 Ω)

Back-emf Constant $K_b = \dots\dots\dots$ Volt-sec/rad (range 0.002 to 0.008 V-s/rad)

“No Load” speed $\omega_{nl} = \dots\dots\dots$ RPM (range 5000 to 7000 RPM)
[convert to radians/sec!]

Input Voltage $V_{in} = \dots\dots\dots$ Volts (range 2-10 volts)
[Choose $V_{in} > E_b$ by 1-3 volts]

“Full Load” speed $\omega_{fl} = \dots\dots\dots$ RPM (range 2000 to 6000 RPM)
 ($\omega_{fl} < \omega_{nl}$)

For values of the above parameters **selected by you** (within the ranges shown) determine (under steadystate conditions, L \rightarrow SC , J \rightarrow OC) :

(a) The No-load and Full load armature currents I (no load) = $\dots\dots\dots$ A
 & I (full load) = $\dots\dots\dots$ A

(b) The corresponding torque $T = \dots\dots\dots$ Nm

(c) The effective ‘NoLoad’ Viscous Friction $B = \dots\dots\dots$ Nms/rad

(d) The speed regulation $S = \dots\dots\dots$ %

Comments re. your calculations: