



Electromechanical Devices MMME2051

Exercise Sheet 12 – Simple DC Motors

12.1 A permanent magnet DC motor has a motor constant of $0.015 \text{ V s rad}^{-1}$. At what no-load speed (in RPM) does it run when connected to a 10 V supply? Neglect frictional effects.

6366 RPM

12.2 The same motor, with a motor constant of $0.015 \text{ V s rad}^{-1}$, has an armature resistance of 0.5Ω . If the motor is connected to a 12 V supply and drives a load with a torque of 0.05 Nm, what current will it draw and what speed will it run at?

3.33 A, 6579 RPM

12.3 A motor designed to run off 12 V is stated to have a no-load speed of 6000 RPM, to develop its full mechanical power at 4500 RPM and to draw a current of 9 A under those conditions. Find its motor constant and armature resistance. Hence find the speed at which it will run and the current it will draw when driving a load of 0.06 Nm when driven from an 8 V supply. Neglect internal frictional effects.

0.0191 V s rad⁻¹, 0.333 Ω , 3476 RPM, 3.141 A

12.4 A motor is stated to have a motor constant of $0.02 \text{ V s rad}^{-1}$ and an armature resistance of 0.6Ω . When the motor is connected a 12 V supply, and is not connected to any external load, it is found to run at 5443 RPM. Estimate the current drawn under these conditions and the motor's internal friction torque.

1 A, 0.02 Nm