Rotary DC Motors part 2

(1) A 125V DC motor is rated for 32A. If Ra = 0.135Ω, determine

(a) the input power

(b) the power loss due to the resistance of the armature

(c) the power developed

(d) the back EMF

(e) the efficiency assuming no mechanical power loss

(f) Draw a power conversion diagram and fill-in the values for power in, electrical power loss, power developed, mechanical power loss and power out.

(2) We wish to design a 5 *hp*, 120*V* DC motor with an efficiency of 95%. What current can we expect to draw? Determine T_{LOAD} if the machine constant is $K_v = 0.138V\text{-}s$ and if we ignore mechanical losses. Calculate the rated speed in rpm.

(3) A DC motor rated for 120V and 2*A* has an armature resistance of $R_a = 0.175\Omega$.

(a) Find the back EMF.

(b) If the machine constant is $K_v = 0.175V\text{-}s$, find the torque developed by the motor.

(c) What is the speed of the motor in rpm?