ET 332A
Separately Excited DC Motors

A 25 hp, 1800 rpm separately excited dc motor operates with a rated terminal voltage of 240 V dc. At rated voltage, speed and power output, the motor draws 89 A. The total armature circuit resistance is found to be 0.03618 Ω.

a.) Calculate the motor emf constant, K_e, in SI units (V/rad/sec) for the motor when it operates at rated output.
b.) Compute the motor torque (N-m) developed in the armature when the motor operates at rated speed and power output.
c.) Compute the torque developed at the shaft of the motor when it operates at rated mechanical power output and speed.
d.) Assuming that the motor field excitation remains constant, determine the motor armature current and shaft speed in rpm when the torque developed in the armature is 49.47 N-m.