

HW#12

Problem 1

A d.c. shunt motor runs on a source voltage of 220 V. The armature resistance is $0.32\ \Omega$ and the field winding resistance is $110\ \Omega$. When the rotation speed is 1800 rpm, the armature current is 6 A.

- (a) Calculate the torque and power developed by the motor at 1800 rpm.
- (b) Calculate the speed, torque, and power of the motor when the armature current is 62 A.

Problem 2

A 550-V d.c. shunt motor has an armature winding resistance of $0.36\ \Omega$. When the motor rotates at 3000 rpm, the armature current is 75 A.

- (a) Calculate the torque developed by the motor at 3000 rpm.
- (b) To maintain the same torque but reduce the speed by 20%, how much extra resistance has to be added to the armature winding?

Problem 3

A 220-V d.c. shunt motor has an armature resistance of $0.2\ \Omega$. The armature current is 50 A when the rotation speed is 1200 rpm. Calculate the mechanical power and torque developed by the motor.

Problem 4

A d.c. shunt motor runs on a source voltage of 550 V. The armature winding has a resistance of $0.15\ \Omega$. When the rotation speed is 820 rpm, the armature winding draws a current of 112 A.

- (a) Calculate the torque and mechanical power developed by the motor
- (b) When the armature current drops to 84 A, calculate the rotation speed, torque, and power.