

Course Title: Electrical Machines

Course Code: EE329

Sheet #3

DC Motors

- 1- A **3.73 kW, 1725 rpm, 125 V shunt** motor has an efficiency of **82.5%** at full load. **Calculate:**
 - a) The power input
 - b) The line current
 - c) The output torque
- 2- A **series** motor has combined series field and armature of **0.85Ω**, runs at **100rpm (104.72 rad/sec)**, and draws **20A** from a **250V** supply. **Calculate:**
 - a) The rotational speed if a **3.75 Ω** resistor is connected in series with the motor and draws **20A** from the supply.
 - b) The developed power at both speeds.
 - c) The developed torque at both speeds.
- 3- A dc **series** motor has **0.1 Ω** and **0.05 Ω** armature and field resistances respectively. When the supply was **600V** and the motor current was **150A**, the speed was **300rpm**. **What** resistance should be inserted in series to reduce the speed to **200rpm** without affecting motor torque at the same supply voltage.
- 4- A **460V series** motor runs at **500rpm** taking a current of **40A**. **Calculate** the speed and percentage change in torque if the load is reduced so that the motor is taking **30A**. Total resistance of the armature and field circuits is **0.8 Ω**. Assume the flux is proportional to the field current.
- 5- A **125V shunt** motor has an armature circuit resistance **0.2 Ω** and a shunt field resistance of **45 Ω**. If the line current is **50A**. **Calculate:**
 - a) The armature induced e.m.f.
 - b) Developed power
 - c) The total electrical losses
- 6- A **250V shunt** motor runs on no load at **1750rpm (183.26 rad/sec)**. The no-load current is **10A**. The armature circuit resistance is **0.25 Ω** and the shunt field resistance is **250**. **Calculate:**
 - a) The field current
 - b) The armature induced voltage
 - c) The speed when the load current is 50A
- 7- The armature winding of a **200V dc shunt** motor has an armature and shunt field resistances of **0.1 Ω** and **400 Ω** respectively. When the motor draws supply current of **10A** the friction, windage and core losses were **100W**, and the speed is **400rpm**. **Find:**
 - a) The developed power b)The net output power
 - c) The motor efficiency d)The net output torque
 - e) If the flux is halved while the armature current is maintained constant. Find the new speed.