

**King Fahd University of Petroleum & Minerals**  
Electrical Engineering Department

**DESIGN PROJECT**  
**(EE 360-151)**

**This project is due on 01<sup>th</sup> December 2015**

It is required to design a high-current, low-voltage, shunt DC motor. The output power of the machine is expected to be between (25 to 30) hp. The copper losses including the brush losses should be between 5% and 7% of the output power. The no load power (Rotational Losses) should not exceed 6% of the output power. The motor speed full load speed range is (1000 -1200) rpm. The supply voltage is 240V. The brush voltage drop is 2V each. The magnetization curve is linear and given as  $\Phi = 0.01 \times I_f$ . The flux per pole should not exceed 30 mwb. The number of poles is up to 6 poles. The armature resistance is between  $(0.05 + 0.0 \times \text{two-digit serial number}) \Omega$ .

Explain all your design steps and give all the machine parameters and variables ( $P_{dev}$ , speed,  $T_{dev}$ , armature current, armature voltage,  $\Phi_p$ ,  $K_a$ ,  $Z$ ,  $P$ ,  $I_{path}$ ,  $R_a$ ,  $V_t$ ,  $I_t$ ,  $I_f$ ,  $R_f$ ,  $P_{rot}$ ,  $P_{input}$ ,  $T_{out}$ ,  $\eta$ )

Assume any missing data and tabulate them in your report.