

## ECE 331 - Homework #8

1 Phase and 3 Phase Induction Motors and Generators. Due March 31st 4PM  
Assume all voltages are line-to-neutral and all units are rms.

Problem 1-3: Assume the following data is obtained in lab for a 3-phase induction motor:

	VLL	IL	Ptotal
No-Load Test	100.41 V	0.29A	18.47W
Locked Rotor Test	32.13 V	0.38A	8.82W
DC Test	2R1 = 24.709 Ohms		

Using this data...

- 1) Determining the parameters for the 3-phase induction motor ( $R_1$ ,  $R_2$ ,  $jX_1$ ,  $jX_2$ ,  $R_c$ ,  $jX_c$ )
  - 2) Calculate and plot the speed vs. torque relationship when operated as a motor ( $0 < \text{slip} < 1$ )
  - 3) Calculate and plot the speed vs. torque relationship when operated as a generator ( $-1 < \text{slip} < 0$ )
- (note: you can place problem 2 and 3 on the same plot if you like...)

Problem 4-6) Assume the 3-phase induction motor for problem 1-3 has lost a phase (making it a single-phase induction motor). The lab results are:

	VLN	IL	Ptotal
No-Load Test	60 V	0.8A	18.47W
Locked Rotor Test	18.55 V	1.0A	8.82W
DC Test	R1 = 24.709 Ohms		

- 4) Determining the parameters for the 1-phase induction motor ( $R_1$ ,  $R_2$ ,  $jX_1$ ,  $jX_2$ ,  $R_c$ ,  $jX_c$ )
  - 5) Calculate and plot the speed vs. torque relationship when operated as a motor ( $0 < \text{slip} < 1$ )
  - 6) Calculate and plot the speed vs. torque relationship when operated as a generator ( $-1 < \text{slip} < 0$ )
- (note: you can place problem 5 and 6 on the same plot if you like...)