EE 340L

EXPERIMENT # 7

3-PHASE INDUCTION MOTORS

1. Equivalent Circuit Parameters

1.1 No-Load Test

Connect the three-phase induction motor to a 3-phase power supply. The stator windings **in Wye-connection** and the shaft should be disconnected from other machines.

Turn on the 3-phase 120/208V supply. Then record the supply voltage, current, active and reactive powers and rotor speed. Turn off the supply after taking all the measurements.

1.2 Locked-Rotor Test

Replace the fixed 3-Phase AC source by a **variable** 3-phase AC source. **Turn the control knob to minimum (zero) voltage**. Block the shaft manually, turn on the variable source, increase the supply voltage slowly until the current of the motor reaches 2 A. Record the voltage, current, active and reactive powers. Then decrease the supply voltage back to zero before releasing the shaft.

1.3 DC Test

Connect a variable DC source across two terminals of the induction motor. Start with 0 Volts. Increase the DC supply voltage until a current of 1 A is reached. Record the voltage and current. Then shut down the power supply. You may also use an Ohm meter to measure the stator winding resistance.

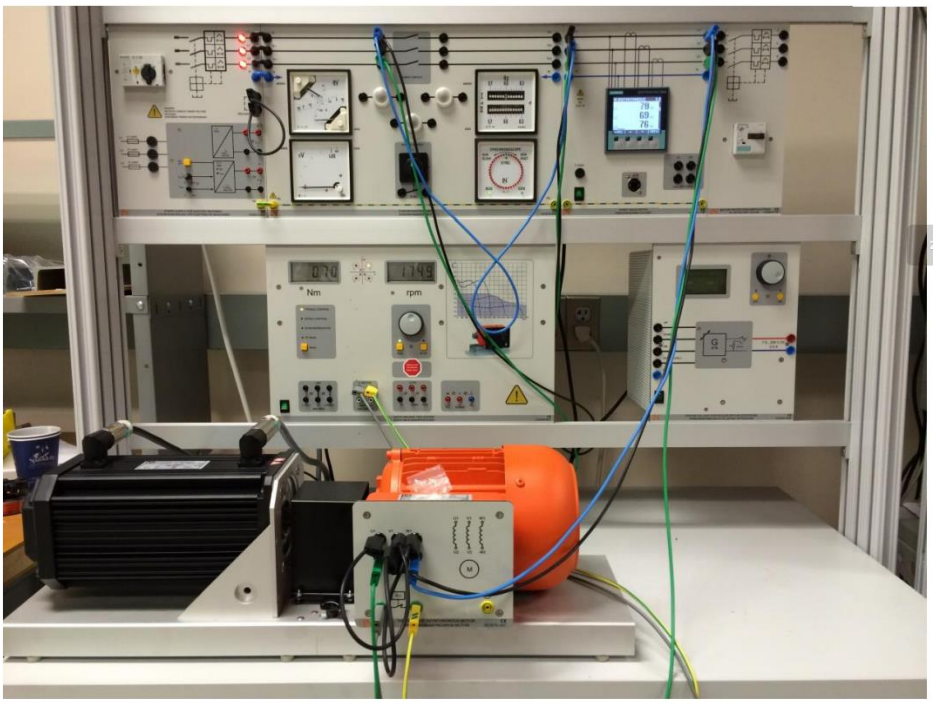
2. Torque-Speed Characteristics

1. Connect the shafts of the induction motor to that of a dynamometer. Start the motor using 120/208 V three phase supply, then record the shaft speed, current, real and reactive power drawn by the motor.

2. Increase the torque on the shaft from 0 to 1.4 Nm in increments of 0.2 Nm , and record the above measurements for each load torque.

QUESTIONS:

1. Use the measurements under no-load, locked-rotor and DC test to compute R_1, R_2, X_1, X_2, and X_m. Note that $X_1 \approx X_2$ for this particular induction machine.
2. Plot the following
    a. Torque versus speed.
    b. Motor power factor versus speed.
    c. Active and reactive power versus speed.



Experimental Data:

DC Test:
Voltage (across two phases): …….V
Current: …….. A

Locked Rotor Test:
Line current: …….A
Phase Voltage: …….V
Real Power (per phase): ……..W
Reactive Power (per phase): …….VAR

No Load Test:
Rotor Speed: …….rpm
Phase voltage: ……V
Line current: …….. A
Real Power (per phase): ……..W

Test under Load (supply volage per phase: 120 V)

Load Torque (Nm)	Rotor Speed (RPM)	Stator Current (A)	Real Power per Phase (W)	Reactive Power per Phase (VAR)
0				
.2				
.4				
.6				
.8				
1.0				
1.2				
1.4				