EET2233 - Laboratory Experiment #10 WOUND ROTOR INDUCTION MOTORS

The purpose of this experiment is:

1. To perform a load-test on a wound rotor induction motor and document the effect added rotor resistance has on a 3phase induction motor's torque, regulation, slip and efficiency.

PROCEDURE

- 1. The 3-Phase Wound Rotor Induction Motor will be used to drive a self-excited DC generator/dynamometer. The circuit connections for this configuration are shown in circuit A. When starting the wound rotor motor, the generator should be unloaded and the generator field rheostat should be in the fully clockwise (most resistance) position.
- 2. Connect the 3-Phase Induction Motor as shown in circuit B with its rotor terminals shorted. ALWAYS be sure that the 3-Phase Digital Wattmeter is shorted before starting the machine, if you fail to do this the high starting currents encountered will blow all three of the 20A fuses and possibly damage the wattmeter. The data to be recorded is speed (in RPM), power (in watts) and the dynamometer scale reading (in lbs) for different loads. Begin taking readings when you first start the induction motor, then adjust the field rheostat on the DC generator until the output voltage is 110V and make a second recording. Load the generator one resistor at a time to generate additional data points. Note, the scale on the DC dynamometer must deflect upscale (clockwise) to be read accurately. If the scale deflection is incorrect, shut down the motor and interchange any two of the phases at the reduced voltage starter. This will change the direction of rotation of the motor and the scale should now deflect in the proper direction. Also, the DC output voltage need not be held constant, however, DO NOT exceed rated current. When you have finished collecting your data, remove the load, shut down the motor and short out the digital wattmeter.
- 3. Connect the 3-Phase Induction Motor as shown in circuit C, adjust the variable rotor resistor to the 9 o'clock position and repeat procedure 2.
- 4. Adjust the variable rotor resistance shown in circuit C to the 12 o'clock position and repeat procedure 2.
- 5. Adjust the variable rotor resistance shown in circuit C to the 3 o'clock position and repeat procedure 2.

CALCULATIONS & PLOTS;

- 1. Plot speed vs torque (torque on the x-axis) for the four motor circuits on one graph. Be sure to identify the various curves.
- 2. Plot slip vs torque (torque on the x axis) for the four motor circuits on one graph. Be sure to identify the various curves.
- 3. Plot the efficiency vs horsepower (horsepower on the x-axis) for the four motor circuits on one graph. Be sure to label the various curves. Also, show one sample calculation of efficiency and horsepower.

HP = <u>2∏ x RPM x T</u>	% efficiency = <u>HP x 746 x 100%</u>
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4. Discuss the effect of added rotor resistance on motor efficiency, torque and output power.

		DATA EET2233 - Experiment #10 <u>3-PHASE INDUCTION MOTORS</u>
Lab Section	Name	
Date	Lab Partners	
Bench#	_	
		Nameplate Data:
a) DC - Generator (Dyna	imometer)	b) 3-Phase Induction Motor.

Speed	Power	Scale	

Speed	Power	Scale

Data (Procedure #2)

Data (Procedure #3)

Speed	Power	Scale	

Speed	Power	Scale	

Data (Procedure #4)

Data (Procedure #5)

CALCULATIONS

1. Load test with rotor terminals shorted.

Speed RPM	Power Watts	Slip RPM	Torque lb×ft	Horsepower	Efficiency

Speed RPM	Power Watts	Slip RPM	Torque lb*ft	Horsepower	Efficiency	
						Rotor
						Resistance 9:00
Speed RPM	Power Watts	Slip RPM	Torque lb*ft	Horsepower	Efficiency	
					,	
						Datas
						Resistance
						12:00
Speed RPM	Power Watts	Slip RPM	Torque lb*ft	Horsepower	Efficiency	
						Rotor
						Resistance 3:00
						J.UU
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