Catalogue Description:
EECE 470L is a laboratory 1-credit course designed as a supplement to the Electric Machines (EECE 370) course. The course covers practical experiment on transformers: open circuit, short circuit, and load test; unbalanced loading and parallel operation of transformers; speed control and load characteristics of shunt, series and compound DC machines; induction machines: blocked rotor, no-load, and loading tests; operation of single-phase induction motors; operation of a synchronous machine connected to a large external source.

Credit hours: 1 credits

Required or elective: Elective for ECE and CCE students

Prerequisites: By course: EECE 370, By topic: Calculus, differential equations, and electric and magnetic circuit analysis. Knowledge of KCL and KVL and ability of analyzing Electric Circuits. Basic computer simulation skills using Matlab.

Textbook(s) and/or required materials: Experiment Manuals - Provided by the instructor Electric Machinery Fundamentals, S. Chapman, 4th Edition, Mc Graw Hill, 2005

Course Objectives
The objectives of the course are to:
1. Information to supplement to the Electric Machines (EECE370) course.
2. The ability to conduct testing and experimental procedures on different types of electrical machines.
3. A chance to practice different types of wiring and devices connections.
4. The capability to analyze the operation of electric machines under different loading conditions

Course Topics
2. DC Motors Series Motor Shunt Motor Compound Motor
3. DC Generator Shunt Cumulative, and Differential Compound
4. Single and Three Phase Induction Motor Load Characteristics Starting current and starting torque Equivalent circuit
5. Synchronous Motors/Generators Open circuit, short circuit characteristics, and the regulation “V” curves
Course Learning Outcomes

1. Understand the concept of efficiency and the short circuit impedance of a three-phase transformer from no-load test, winding resistance, short circuit test, and load test.
2. Understand the effect of unbalanced loading on a three-phase transformer with different connections, and the effects and limitations of each connection.
3. Study series and parallel connections of three-phase transformers.
4. Understand the starting and connecting procedures of synchronous generators, and to obtain the ‘V’ curves of synchronous motors.
5. Experimentally obtain the load characteristics of various dc motors and generators.
6. Experimentally obtain the load characteristics, starting current and starting torque of a squirrel-cage induction motor and to derive circuit parameters from no-load and blocked-rotor tests.

Class/laboratory schedule: One 150-minute lab session per week

Resources of the course: Lab Experiments and Moodle

Evaluation methods
1- Drop quizzes (20%)
2- Experimental results and Lab Reports (30%)
3- Final (open book/notes) (50%)

Professional Components
Engineering topics: 80%
General education: 10%
Mathematics and basic sciences: 10%

Person(s) who prepared this description and date of preparation
Prepared by Dr. Karaki, April 2009

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