1. ECE 3300: Electrical Machinery

2. Credit Hours: 4; Contact Hours: 6

3. Johnson Asumadu, PhD, Professor

   1. ECE 3300 Laboratory Manual, Kelemen/Asumadu/Univ Min/Alajmi, 2013
   2. Scientific calculator

5. Course Information
   1. Three-phase analysis. Analysis and design of transformation, electromechanical devices, and machines.
   2. Prerequisites: ECE 3100 and ECE 3610
   3. Required

6. Course Goals:
   a) See item 6.b
   b) This course contributes to outcomes:
      1. ABET student outcome assigned to this course according to ECE Assessment Plan: b and g.
      2. to analyze, construct and test steady-state AC single and three-phase circuits. Compare predicted vs. measured values of voltages, currents and power and determine measurement uncertainties (a, b, e)
      3. to analyze, test and develop a steady-state AC model for magnetic hysteresis and eddy current effects (a, b, e)
      4. to use nameplate data, determine and apply necessary tests, and use test data to develop a 60 Hz circuit model for a commercial power transformer (a, b, e, k)
      5. to analyze, design and test a bank of single-phase transformers to supply an unbalanced three-phase load (a, b, c, e)
      6. to analyze, test and develop a coupled circuits model for a transformer (a, b, e)
      7. to design, test and analyze data for a single-phase transformer (a, b, c, e, k)
      8. to test, analyze data and develop non-linear models for DC machines (a, b, e)
      9. to test a three-phase squirrel cage induction motor and use data to develop a classical circuit model. Use the model and Mathcad to predict motor performance for speeds from zero to synchronous (a, b, e, k)
     10. to test a synchronous generator and use the data to develop a linear and non-linear circuit model (a, b, e, k)

7. Course Topics
   1. Steady-state AC circuit analysis (2 classes)
   2. Three-phase circuits, balanced and unbalanced wyes and deltas (5 classes)
   3. DC and AC magnetic fields, circuits and materials (6 classes)
   4. Transformers, single-phase, auto and three-phase (6 classes)
5. Principles of electromechanical energy conversion (6 classes)
6. DC machines (6 classes)
7. Induction motors (5 classes)

Synchronous machines, cylindrical rotor (4 classes)