Circuit Analysis
Outline of Instruction

Course Information
Organization  Monroe County Community College, Applied Science and Engineering Technology
Developers  Thomas Harrill
Development Date  8/26/2009
Course Number  ELEC-133
Potential Hours of Instruction  90
Total Credits  4

Description
Topics covered are: Phasor analysis of series AC circuits, both resistor-capacitor and resistor-inductor; phasor analysis of parallel AC circuits, both RC and RL; magnetism; magnetic field in a coil (inductor); inductive transient response to switched DC; impedance of complex AC circuits; oscilloscope phase measurement techniques; power factor in AC circuits; series-resonant LC circuits; parallel-resonant LC circuits; filtering using resonant LC circuits; the j-operator; voltage division in DC and AC; bridge circuit analysis in DC and AC; Thevenin's theorem in DC and AC; computer-aided circuit analysis in DC and in AC frequency domain.

Major Units:
1. Series AC and DC circuits
2. Parallel AC and DC circuits
3. Resonant Circuits
4. Wheatstone Bridges and Other Bridges
5. Complex AC Analysis
6. Network Theorems
7. Nodal Analysis of DC and AC Circuits

Types of Instruction

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<tr>
<th>Instruction Type</th>
<th>Contact Hours</th>
<th>Credits</th>
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<tr>
<td>Lecture/Lab</td>
<td>90</td>
<td>4</td>
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Textbooks
Robert L. Boylestad. Introduction to Circuit Analysis.

Learner Supplies
Proto-board.
Scientific Calculator.
Optional: Needle-Nose pliers, Diagonal Cutters and Wire Strippers.

Prerequisites
Exit Learning Outcomes

Program Outcomes
A. Acquire and apply technical expertise in the areas of Circuit analysis, Analog electronics, Digital electronics, Microprocessors, and Communication systems.
B. Develop and Demonstrate Problem Solving Skills.
C. Develop a willingness to learn independently.
D. Develop and demonstrate effective wiring and laboratory skills.
E. Demonstrate Equipment/Instrumentation Competence.
F. Develop and demonstrate Technical Documentation/Lab Report writing skills and the ability to comprehend Technical Documentation including Schematic Diagrams.
H. Demonstrate a thorough understanding of DC and AC theory and operating concepts.

General Education Outcomes
A. Apply mathematical approaches to the interpretation of numerical information
B. Apply mathematical approaches to the analysis of numerical information
C. Demonstrate an understanding of the process of scientific inquiry
D. Use computer technology to retrieve information

Course Outcomes
1. Identify/Recognize: a series resistive/reactive circuit
2. Identify/Recognize: a phasor diagram that represents the magnitude and phase relationships for the sine-wave ac voltages existing in a series, parallel, or compound resistive/reactive circuit
3. Identify/Recognize: a parallel resistive/reactive circuit
4. Identify/Recognize: a Lissajous (X-Y) scope display conveying an out-of-phase relationship between the X signal and the Y signal
5. Demonstrate/Practice: complete analysis (all voltages and currents) of complex dc circuits
6. Demonstrate/Practice: the calculation, and measurement of the magnitude and phase relationships among voltages or among current and voltages in a series resistive/reactive circuit
7. Demonstrate/Practice: the calculation, and measurement of the magnitude and phase relationships among currents or among source voltage and currents in a parallel resistive/reactive circuit
8. Demonstrate/Practice: the testing of a series or parallel-resonant LCR circuit to determine resonant frequency, bandwidth, and data points for plotting a complete frequency-response curve
9. Demonstrate/Practice: the power-factor correction technique of connecting a capacitor in parallel with an inductive ac circuit
10. Demonstrate/Practice: the use of the polar-to-rectangular (PYR) and rectangular-to-polar (RYP) functions of a scientific hand-held calculator to facilitate the analysis of ac circuits
11. Demonstrate/Practice: the use of the j-operator [j-1 operator] to calculate impedances, currents, and voltages in a complex ac circuit

12. Demonstrate/Practice: the use of the node-analysis method for analyzing a multi-source ac circuit