Eastern WV Community & Technical College
Master Course Record

Course Prefix and Number: ELM 106
Course Title: AC Electrical Circuits
Recommended Transcript Title: AC Electrical Circuits
Date Approved/Revised: November 2, 2007
Credit Hours: 4 **Contact hours per week (Based on 15 week term):** **Lecture:** 3 **Lab:** 3
Prerequisite: ELM 105 – DC Electrical Circuits **Corequisite:** **Pre/Corequisite:**
Grading Mode: Letter grade
Catalog Description: This course concentrates on alternating-current electrical circuits. Inductance, capacitance, inductive and capacitive reactance and their effect on AC circuits will be studied. The theory of resonance is introduced and the practical use and function filters and filtering circuits will be investigated. Transformer theory and applications will be studied.
Course Outcomes: 1. Determine the period, frequency and amplitude of a sine wave. 2. Discuss the relationship between the period and frequency of a sine wave. 3. Describe the production of an AC voltage. 4. Determine the instantaneous voltage. 5. Determine the peak and the peak-to-peak voltages. 6. Calculate the RMS and average voltage of a sine wave. 7. Explain the angular measurement of a sine wave. 8. Convert between radian and degree measurements. 9. Describe the phase relationship between two or more sine waves. 10. Analyze a sinusoidal waveform using the sine wave formula. 11. Apply Ohm's Law to resistive AC circuits. 12. Apply Kirchhoff's voltage and current laws to resistive AC circuits. 13. Apply Watt's Power Law to resistive AC circuits. 14. Determine total voltage in a circuit that has superimposed DC and AC voltages. 15. Identify the characteristics of non-sinusoidal waveforms. 16. Determine duty cycle of non-sinusoidal waveforms. 17. Explain the function and operation of the common oscilloscope. 18. Use an oscilloscope to determine the amplitude and frequency of a waveform. 19. Define capacitance using proper terminology and units. 20. Discuss various types of capacitors. 21. Analyze capacitors in series. 22. Analyze capacitors in parallel. 23. Explain the operation of a capacitor in a DC circuit.

24. Calculate the RC time constant.
25. Describe the operation of a capacitor in an AC circuit.
26. Explain capacitive reactance.
27. Explain the difference between apparent power, true power and reactive power.
28. Discuss the various applications of capacitors.
29. Describe the relationship between current and voltage in a series RC circuit.
30. Calculate impedance and phase shift in a series RC circuit.
31. Describe the relationship between current and voltage in a parallel RC circuit.
32. Calculate impedance and phase shift in a parallel RC circuit.
33. Discuss conductance, capacitive, susceptance and admittance.
34. Define inductance using proper terminology and units.
35. Apply Faraday's Law to inductors.
36. Apply Lenz's Law to inductors.
37. Discuss various types of inductors.
38. Analyze inductors in series.
39. Analyze inductors in parallel.
40. Explain the operation of an inductor in a DC circuit.
41. Calculate the RL time constant.
42. Describe the operation of an inductor in an AC circuit.
43. Explain inductive reactance.
44. Discuss various applications of inductors.
45. Describe the relationship between current and voltage in a series RL circuit.
46. Calculate impedance and phase shift in a parallel RL circuit.
47. Describe the relationship between current and voltage in a parallel RL circuit.
48. Calculate impedance and phase shift in a parallel RL circuit.
49. Discuss power factor.
50. Calculate the power factor of a reactive circuit.
51. Discuss power factor correction.
52. Determine if a RLC circuit is predominately capacitive or inductive.
53. Calculate resonant frequency of a series RLC circuit.
54. Describe the function and operation of common types of filters.
55. Explain decibel measurement.
56. Convert a series-parallel RLC circuit to an equivalent parallel RLC circuit.
57. Explain the operating principles of transformers.
58. Discuss the difference between isolation, step-up and step-down transformers.
59. Explain magnetic coupling.
60. Calculate the turns-ratio of a transformer.
61. Explain the effect a load on the secondary has on a transformer.
62. Discuss reflective load of a transformer.
63. Discuss transformer applications.
64. Explain tapped and multi-winding transformers.
65. Describe integrator circuits.
66. Describe differentiator circuits.

Implementation Cycle: Spring

Role in College Curriculum:
General Education Core

Technical Core: Electromechanical Technology **Restricted Elective** **General Elective** **Workforce Education** **Other**
Course Fee: Yes
Instructor's Qualifications: BS Engineering/Technology or related discipline and/or expertise and experience in the field.
Expanded Course Description: This course concentrates on alternating-current electrical circuits. Inductance, capacitance, inductive and capacitive reactance; and their effect on AC circuits will be studied. The theory of resonance is introduced and the practical use and function filters and filtering circuits will be investigated. Transformer theory and applications will be studied.

Prepared by:

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Name, Title Date

Approved Per LOT Minutes

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Dean, Academic and Student Services Date