TITLE: Electrical Fundamentals: AC-DC Circuits

ORIGINATOR: Instructor Placeholder AAA

EFF TERM: Summer 2010

FORMERLY KNOWN AS:

DATE OF OUTLINE/REVIEW: 05-01-2005

TOP NO: 0934.00

CROSS LISTED COURSE:

TOP NO:

CID:

SEMESTER UNITS: 4.0

HRS LEC: 54.0

HRS LAB: 54.0

HRS OTHER: 0.0

CONTACT HRS TOTAL: 108.0

STUDY NON-CONTACT HRS RECOMMENDED: 108.0

CATALOG DESCRIPTION:

A first course in a series of courses designed to fit the needs of an electronic engineering technician. Behavior of resistive, inductive, and capacitive devices, passive electrical networks, and a study of circuit theorems is covered. A supporting lab experience with use of basic test equipment is included.

JUSTIFICATION FOR COURSE:

PREREQUISITES:

COREQUISITES:

ADVISORIES:

ASSIGNED DISCIPLINES:

Electronic technology (radio, television, computer repair, avionics)

Electronics

MATERIAL FEE: Yes [ ] No [X] Amount: $0.00

CREDIT STATUS: Noncredit [ ] Credit - Degree Applicable [X] Credit - Not Degree Applicable [ ]

GRADING POLICY: Pass/No Pass [ ] Standard Letter [X] Not Graded [ ] Satisfactory Progress [ ]

OPEN ENTRY/OPEN EXIT: Yes [ ] No [X]

TRANSFER STATUS: CSU Transferable[X] UC/CSU Transferable[ ] Not Transferable[ ]

BASIC SKILLS STATUS: Yes [ ] No [X] LEVELS BELOW TRANSFER: Not Applicable

CALIFORNIA CLASSIFICATION CODES: Y - Not Applicable

NON CREDIT COURSE CATEGORY: Y - Not applicable, Credit Course

OCCUPATIONAL (SAM) CODE: C

REPEATABLE ACCORDING TO STATE GUIDELINES: No [X] Yes [ ] NUMBER REPEATS:

REQUIRED FOR DEGREE OR CERTIFICATE: No [ ] Yes [X]

Energy Auditor(Certificate of Achievement)

Energy Efficiency and Renewable Energy Degree(Associate in Arts)

Solar Energy(Certificate of Achievement)

GE AND TRANSFER REQUIREMENTS MET:

COURSE LEVEL STUDENT LEARNING OUTCOME(S) Supported by this course:
ET G100-Electrical Fundamentals: AC-DC Circuits

1. solve passive AC and DC electrical circuits by using basic circuit theory and related mathematics.
2. identify electronic component parts, check tolerances, and correctly connect these parts into typical AC-DC circuits.
3. identify electronic component parts, check tolerances, and correctly connect these parts into typical AC-DC circuits.
4. calibrate and operate volt-Ohm-milliammeter, digital voltmeter, laboratory power supply, dual trace oscilloscope, laboratory oscillators and signal generators, and component checking devices.

COURSE OBJECTIVES:
1. Solve passive AC and DC electrical circuits by using basic circuit theory and related mathematics.
2. Identify electronic component parts, check tolerances, and correctly connect these parts into typical AC-DC circuits.
3. Understand the function, calibration, and operation of: a.Volt-Ohm-milliammeter b.Digital voltmeter c.Laboratory power supply d.Dual trace oscilloscope e.Laboratory oscillators and signal generators f.Component checking devices

COURSE CONTENT:

LECTURE CONTENT:

A. Overview of the Electronic Industry
   1. Radio/Audio
   2. Information Processing
   3. Industrial Control
   4. Tele-communications
   5. Commercial/Industrial/Aero-Space/Medical
   6. Development/Manufacturing/Service/Sales

B. Fundamentals of Electricity
   1. Atomic theory
   2. Current flow (conventional vs. electron)
   3. Voltage/Resistance/Conduction/Power
   4. Ohms Law
   5. Resistor color code
   6. Tolerances
   7. Energy sources (Battery, Solar, etc.)

C. Direct Current Circuits
   1. Series
   2. Parallel
   3. Kirchhoff's Laws
   4. Complex
   5. Use of Voltmeter, Ammeter, and DC Power Supplies
   6. Schematic symbols (to be covered throughout the course)

D. Circuit Analysis
   1. Loop analysis
   2. Thevenin's Theorem
   3. Norton's Theorem
   4. Multi source circuits
      a. Superposition Theorem
      b. Millman's Theorem

E. Energy storage devices
   1. Capacitance and the capacitor
LABORATORY CONTENT:

A. Overview of the Electronic Industry

B. Fundamentals of Electricity
   1. Atomic theory
   2. Current flow (conventional vs. electron)
   3. Voltage/Resistance/Conduction/Power
   4. Ohms Law
   5. Resistor color code
   6. Energy sources (Battery, Solar, etc.)

C. Direct Current (DC) Circuits
   1. Series
   2. Parallel
   3. Kirchhoff’s Laws
   4. Use of Voltmeter, Ammeter, and DC Power Supplies

D. AC Alternating Voltage
   1. AC generators
   2. The sine wave
   3. RMS (peak to peak)
   4. Frequency
   5. Use of the Oscilloscope and Signal Generator

E. Fundamentals of Magnetism
   1. Alternating Current (AC) and DC
   2. Capacitor and inductive reactance
   3. Right-triangle trigonometry
   4. Impedance and phase shift (RC circuits)
   5. Inductance and inductive reactance
   6. Transformers

F. Transformer Circuits
   1. High pass, low pass, and band pass RC and RL circuits
   2. Decibels and Bode plots
   3. Semi-Log and Log-Log graphs
   4. Inductance and inductive reactance
   5. Series and parallel RLC circuits

H. Filter Circuits
   1. Combined AC and DC circuit analysis
   2. Coupling capacitors
   3. Bypass capacitors
   4. Frequency response
   5. Series and parallel RLC circuits

I. AC and DC Combined Circuits
   1. Combined AC and DC circuit analysis
   2. Coupling capacitors
   3. Bypass capacitors
   4. Frequency response
   5. Series and parallel RLC circuits

LABORATORY CONTENT:

A. Overview of the Electronic Industry

B. Fundamentals of Electricity
   1. Atomic theory
   2. Current flow (conventional vs. electron)
   3. Voltage/Resistance/Conduction/Power
   4. Ohms Law
   5. Resistor color code
   6. Energy sources (Battery, Solar, etc.)

C. Direct Current (DC) Circuits
   1. Series
   2. Parallel
   3. Kirchhoff’s Laws
   4. Use of Voltmeter, Ammeter, and DC Power Supplies

D. AC Alternating Voltage
   1. AC generators
   2. The sine wave
   3. RMS (peak to peak)
   4. Frequency
   5. Use of the Oscilloscope and Signal Generator

E. Fundamentals of Magnetism
   1. Alternating Current (AC) and DC
   2. Capacitor and inductive reactance
   3. Right-triangle trigonometry
   4. Impedance and phase shift (RC circuits)
   5. Inductance and inductive reactance
   6. Transformers

F. Transformer Circuits
   1. High pass, low pass, and band pass RC and RL circuits
   2. Decibels and Bode plots
   3. Semi-Log and Log-Log graphs
   4. Inductance and inductive reactance
   5. Series and parallel RLC circuits

H. Filter Circuits
   1. Combined AC and DC circuit analysis
   2. Coupling capacitors
   3. Bypass capacitors
   4. Frequency response
   5. Series and parallel RLC circuits

I. AC and DC Combined Circuits
   1. Combined AC and DC circuit analysis
   2. Coupling capacitors
   3. Bypass capacitors
   4. Frequency response
   5. Series and parallel RLC circuits
6. Schematic symbols (to be covered throughout the course)

D. Circuit Analysis
1. Loop analysis
2. Thevenin’s Theorem
3. Norton’s Theorem
4. Multi source circuits
   a. Superposition Theorem
   b. Millman’s Theorem

E. Energy storage devices
1. Capacitance and the capacitor
2. RC Time constant
3. Fundamentals of magnetism
4. Electromagnetism
5. Inductance
6. Relays

F. Alternating Voltage
1. AC generators
2. The sine wave
3. RMS (peak to peak)
4. Frequency
5. Use of the Oscilloscope and Signal Generator

G. AC devices and circuits
1. Capacitance and capacitive reactance
2. Right-triangle trigonometry
3. Impedance and phase shift (RC circuits)
4. Inductance and inductive reactance
5. Transformers

H. Filter Circuits
1. High pass, low pass, and band pass RC and RL
2. Decibels and Bode plots
3. Semi-Log and Log-Log graphs
4. Resonances
5. Series and parallel RLC circuits

I. AC and DC combined circuits
1. Combined AC and DC circuit analysis
2. Coupling capacitors
3. Bypass capacitors
4. Frequency response

METHODS OF INSTRUCTION:
A. Lecture:
B. Lab:
C. Tutoring – noncredit:
D. Independent Study:

INSTRUCTIONAL TECHNIQUES:

COURSE ASSIGNMENTS:
Reading Assignments
A. Required Reading such as:
   Text book assignments
Out-of-class Assignments

Writing Assignments

Writing:
Weekly lab reports of class experiments using a standard format of objective, procedure, results for analysis and technical discussion.
Author an electronics terms dictionary from lecture vocabulary and lab experiments.

Problem Solving:
Solve electronic circuit problems using applied mathematics, physics, and chemistry in classroom, laboratory and homework.

Skills Demonstration:
Two (2) exams with problem solving using applied sciences and proper technology vocabulary. Demonstrate proper use of test equipment in a lab environment.

METHODS OF STUDENT EVALUATION:
Midterm Exam
Final Exam
Short Quizzes
Written Assignments
Report
Projects (ind/group)
Problem Solving Exercises
Skills Demonstration

Demonstration of Critical Thinking:
Experiments are done from brief written or verbal instructions which simulate problems encountered in the electronic field. The student will:

1. Analyze the project

2. Determine solution criteria
Define measurable outcomes
Calculate expected results

3. Select appropriate solution procedures

4. Apply solution
Construct a working circuit
Measure critical values

5. Analyze resulting project data
Compare measured results with calculated values
Use deductive reasoning to troubleshoot the circuit

6. Report outcome
Discuss theory
Measurement techniques

Required Writing, Problem Solving, Skills Demonstration:

Writing:
Weekly lab reports of class experiments using a standard format of objective, procedure, results for analysis and technical discussion.
Author an electronics terms dictionary from lecture vocabulary and lab experiments.

Problem Solving:
Solve electronic circuit problems using applied mathematics, physics, and chemistry in classroom, laboratory and homework.

Skills Demonstration:
Two (2) exams with problem solving using applied sciences and proper technology vocabulary. Demonstrate proper use of test equipment in a lab environment.

TEXTS, READINGS, AND RESOURCES:

Other:
1. Hand-held calculator (optional)
2. Test equipment and lab materials supplied by program

LIBRARY:

Adequate library resources include:

Comments:

Attachments:

Attached Files