Virginia Western Community College
EGR 251
Basic Electric Circuits I

Prerequisites

MTH 264

Co-requisite

EGR 255

Course Description

Teaches fundamentals of electric circuits. Includes circuit quantities of charge, current, potential, power and energy. Teaches resistive circuit analysis; Ohm's and Kirchhoff's laws; nodal and mesh analysis; network theorems; RC, RL and RLC circuit transient response with constant forcing functions. Teaches AC steady-state analysis, power, and three-phase circuits. Presents frequency domain analysis, resonance, Fourier series, inductively coupled circuits, Laplace transform applications, and circuit transfer functions. Introduces problem solving using computers.

Semester Credits: 3 Credits **Lecture Hours:** 3 Hours **Lab/Recitation Hours:** 0 Hours

Required Materials

Textbook:

Electric Circuits Plus Mastering Engineering, 10th Edition, Author: James W. Nilsson, Publisher: Pearson Prentice Hall, ISBN# 9780133875904

VIRGINIA WESTERN COMMUNITY COLLEGE
School of Science, Technology, Engineering and Mathematics
(540)-857-7273

3097 Colonial Ave. SW
Roanoke, VA 24015

Other Required Materials:

Scientific Calculator (i.e. TI-89 Calculator)

The following supplementary materials are available:

1. PSpice Circuit Analysis Software
2. Matlab Software
3. Microsoft Word and Excel Software

Course Outcomes

At the completion of this course, the student should be able to:

1. Know basic circuit variables and associated units.
2. Know and apply Kirchhoff's and Ohm's laws.
3. Use parallel and series equivalents to analyze resistive circuits.
4. Analyze, design, and use voltmeters, ammeters, and ohmmeters.
5. Understand and apply node-voltage and mesh-current circuit analysis.
6. Find Thevenin and Norton equivalent circuits.
7. Analyze circuits containing dependent sources.
8. Analyze and design circuits containing operational amplifiers.
9. Understand energy storage elements: inductors and capacitors.
10. Analyze and design simple first- and second-order circuits.
11. Understand the properties of sinusoidal signals and phasors.
12. Analyze steady-state ac circuits.
13. Use PSpice to simulate electric circuits.

Topical Description

Week #	Topic	Chapter
1	Voltage, current, power and energy; SI units	1
2	Independent and dependent sources, Ohm's and Kirchhoff's laws	2
3	Series/Parallel circuits; voltage/current dividers	3.1-3.4
4	Instrumentation; Wheatstone Bridge; transformations	3.5-3.7
5	Network topology; node-voltage and mesh-current circuit analysis methods	4.1-4.7
6	Node-voltage vs. mesh-current; source transforms; max power; superposition	4.8-4.13
7	Operational amplifiers and their model	5.1-5.2
8	Operational amplifier circuits	5.3-5.7
9	Energy storage elements; capacitors and inductors	6
10	First-order RL and RC circuits; natural response and step response	7.1-7.3
11	First-order RL and RC circuits; general solution	7.4-7.7
12	Second-order RLC circuits; natural response and step response	8
13	Sinusoidal steady-state circuit analysis and phasors	9.1-9.4
14	Circuit analysis using phasors	9.5-9.12
15	Course review	
16	FINAL EXAM	

Notes to Instructors

1. Must cover dc circuit analysis and theorems.

2. Must introduce students to solutions of first- and second-order differential equations.

3. Must cover transient analysis (first- and second-order RL, RC and RLC circuits with constant forcing functions).

4. Must introduce students to ac circuit analysis

5. Final exam is worth 25% of the course grade.