EE 220
Course Content and Objectives

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Chapter 1- Circuit Terminology

Objectives

Learn to:

- Differentiate between active and passive devices; analysis and synthesis; device, circuit, and system; and dc and ac.
- Point to important milestones in the history of electrical and computer engineering.
- Relate electric charge to current; voltage to energy; power to current and voltage; and apply the passive sign convention.
- Describe the properties of dependent and independent sources.
- Describe the operation of SPST and SPDT switches.

Chapter 2 – Resistive Circuits

Objectives

Learn to:

- Apply Ohm's law and explain the basic properties of piezoresistivity and superconductivity.
- State Kirchhoff's current and voltage laws; apply them to resistive circuits.
- Define circuit equivalency, combine resistors in series and in parallel, and apply voltage and current division.
- Apply source transformation between voltage and current sources and Y–Δ circuits.
- Describe the operation of the Wheatstone-bridge circuit and how it is used to measure small deviations.
- Use Multisim and myDAQ to analyze simple circuits.

Chapter 3 – Analysis Techniques

Objectives

Learn to:

- Apply the node-voltage and mesh-current methods to analyze an electric circuit of any configuration, so long as it is linear and planar.
- Apply the by-inspection methods to circuits that satisfy certain conditions.
- Use the source-superposition method to evaluate the sensitivity of a circuit to the various sources in the circuit.
- Determine the Thévenin and Norton equivalent circuits of any input circuit and use them to evaluate the response of an external load (or an output circuit) to the input circuit.
- Establish the conditions for maximum transfer of current, voltage, and power from an input circuit to an external load.
- Learn the basic properties of the bipolar junction transistor.

Chapter 4 – Operational Amplifiers

Objectives

Learn to:

- Describe the basic properties of an op amp and state the constraints of the ideal op-amp model.
- Explain the role of negative feedback and the trade-off between circuit gain and dynamic range.
- Analyze and design inverting amplifiers, summing amplifiers, difference amplifiers, and voltage followers.
- Combine multiple op-amp circuits together to perform signal processing operations.
- Analyze and design high-gain, high-sensitivity instrumentation amplifiers.
- Design an *n*-bit digital-to-analog converter.
- Use the MOSFET in analog and digital circuits.
- Apply Multisim to analyze and simulate circuits that include op amps.

Chapter 5 – RC and RL Circuits

Objectives

Learn to:

- Use mathematical functions to describe several types of nonperiodic waveforms.
- Define the electrical properties of a capacitor, including its i-v relationship and energy equation.
- Combine multiple capacitors when connected in series or in parallel.
- Define the electrical properties of an inductor, including its i-v relationship and energy equation.
- Combine multiple inductors when connected in series or in parallel.
- Analyze the transient responses of RC and RL circuits.
- Design RC op-amp circuits to perform differentiation and integration and related operations.
- Apply Multisim to analyze RC and RL circuits.

Chapter 6 – RLC Circuits

Objectives

Learn to:

- Analyze series and parallel RLC circuits containing dc sources and switches.
- Analyze RC op-amp circuits.
- Understand RFID circuits.

Assignment

- Read pages 1- 8.