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Electronics Circuits & Systems
(Customized Course)

Chapter 1: Circuit Variable

1.1 Electrical Engineering Overview
1.2 Circuit Analysis: An overview
1.3 Voltage and current
1.4 The ideal basic circuit elements
1.5 Power and energy

Chapter 2: Circuit Elements

Practical Perspective: Electrical safety
2.1 Voltage and current sources
2.2 Electrical resistance
2.3 Construction of a Circuit model
2.4 Kirchhoff's laws
2.5 Analysis of a circuit containing a dependent source

Chapter 3: Simple Resistive Circuits

3.1 Resistors in Series
3.2 Resistors in Parallel
3.3 The Voltage-Divider and Current-Divider Circuits
3.4 Voltage Division and Current Division
3.5 Measuring Voltage and Current

Chapter 4: Techniques of Circuit Analysis

4.1 Introduction to the Node-Voltage Method
4.2 The Node-Voltage Method and Dependent Sources
4.3 Introduction to the Mesh-Current Method
4.4 The Node-Voltage Method Versus the Mesh-Current Method
4.5 Source Transformations
4.6 Thevenin and Norton Equivalents
4.7 Maximum Power Transfer

Chapter 5: The Operational Amplifier

5.1 Operational Amplifier Terminals
5.2 Terminal Voltages and Currents
5.3 The Inverting-Amplifier Circuit
5.4 The Summing-Amplifier Circuit
5.5 The Noninverting-Amplifier Circuit
5.6 The Difference-Amplifier Circuit

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Chapter 6: Inductance, Capacitance, and Mutual Inductance

- 6.1 The Inductor
- 6.2. The Capacitor
- 6.3 Series-Parallel Combinations of Inductance and Capacitance
- 6.4 Mutual Inductance

Chapter 7: Response of First-Order *RL* and *RC* Circuits

- 7.1 The Natural Response of an *RL* Circuit
- 7.2 The Natural Response of an *RC* Circuit
- 7.3 The Step Response of *RL* and *RC* Circuits
- 7.4 Sequential Switching
- 7.5 Unbounded Response
- 7.6 The Integrating Amplifier

Chapter 8: Sinusoidal Steady-State Analysis

- 8.1 The Sinusoidal Source
- 8.2 The Sinusoidal Response
- 8.3 The Phasor
- 8.4 The Passive Circuit Elements in the Frequency Domain
- 8.5 Kirchhoff s Laws in the Frequency Domain
- 8.6 Source Transformations and Thevenin-Norton Equivalent Circuits
- 8.7 The Node-Voltage Method
- 8.8 The Mesh-Current Method
- 8.9 The Transformer

Chapter 9: Sinusoidal Steady-State Power Calculations

- 9.1 Instantaneous Power
- 9.2 Average and Reactive Power
- 9.3 The rms Value and Power Calculations
- 9.4 Complex power
- 9.5 Power Calculations
- 9.6 Maximum Power Transfer

Practical Perspective: Heating Appliances

Chapter 10: Balanced Three-Phase Circuits

- *Practical Perspective: Transmission and Distribution of Electric Power*
- 10.1 Balanced Three-Phase Voltages
- 10.2 Three-Phase Voltage Sources
- 10.3 Analysis of the Wye-Wye Circuit
- 10.4 Analysis of the Wye-Delta Circuit
- 10.5 Power Calculations in Balanced Three-Phase Circuits
- 10.6 Measuring Average Power in Three-Phase Circuits

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Chapter 11: Diode circuits

- 11.1 Rectifier circuit
- 11.2 Zener Diode circuits
- 12.3 Clipper and Clamper circuits
- 12.4 Multiple diode circuits
- 12.5 Design Application: DC power supply

Chapter 12: BJT amplifiers

- 12.1 Basic Bipolar junction transistor
- 12.2 Dc analysis of transistor circuits
- 12.3 Basic transistor application
- 12.4 BJT transistor Biasing
- 12.5 Multistage circuits
- 12.6 Design application: Diode Thermometer with a bipolar transistor