- Chapter 1 Introduction and Basic Concepts
- 1 Role and Importance of Circuits in Engineering
- 2 Fields, Charge, and CurrentFieldsChargeCurrent
- 3 Voltage
- 4 Energy Conversion in an Electric Circuit
- 5 Relationships among Voltage, Current, Power, and Energy
- Power and Energy for Direct Voltages and Currents: Non-DC Power and Energy Calculations
- 6 Ideal Voltage and Current Sources
- 7 Resistance, Ohm's Law, and Power (a Reprise)
- 8 Additional Concepts
- Characteristics, Memoryless, Model, and LumpedV-I Characteristic of Constant Voltage and Current Sources
- Notion of a Memoryless Device
- Notion of Model
- Frequency, Wavelength, and the Notion of a Lumped Circuit Element
- Summary
- Terms and Concepts
- Problems
- Chapter 2 Kirchhoff's Current and Voltage Laws and Series-Parallel Resistive Circuits
- 1 Introduction
- 2 Terminology: Parallel, Series, Node, Branch, and so on
- 3 Kirchhoff"s Current Law
- 4 Kirchhoff''s Voltage Law
- 5 Equivalent Resistance, Series Resistances, and Voltage Division
- 6 Parallel Resistances and Current Division
- 7 Series-Parallel Interconnections
- 8 Dependent Sources Revisited
- 9 Model for a Nonideal Battery and Battery Capacity
- 10 Nonideal Sources
- Summary|!3
- Problems
- Chapter 3 Nodal and Loop Analysis1
- Introduction, Review, and Terminology
- 2 Concepts of Nodal and Loop Analysis
- 3 Nodal Analysis
- I Grounded Voltage Sources
- 4 Nodal Analysis
- II Floating Voltage Sources
- 5 Loop Analysis
- 6 Modified Nodal Analysis
- 7 Some Theoretical Foundations
- Planar and Nonplanar Circuit Graphs
- Meshes and Loops for Nonplanar Circuits
- Number of Independent KCL and KVL Equations
- Chapter 4 The Operational Amplifier

- 1 Introduction
- 2 The Ideal Operational Amplifier
- 3 Design of General Summing Amplifiers
- Design Choices for the General Summing Circuit
- Derivation of Op Amp Input-Output Characteristic
- 4 Saturation and the Active Region of the Op Amp
- 5 Op Amp Circuit for Digital-to-Analog Conversion
- Elements of A/D and D/A Conversion
- Binary-Weighted Summing Circuit
- Summary
- Terms and Concepts
- Problems
- Chapter 5 Linearity, Superposition, and Source Transformations
- 1 Introduction
- 2 Linearity
- 3 Superposition and Proportionality
- 4 Source Transformations
- 5 Modified Superposition Analysis
- Summary
- Terms and Concepts
- Problems
- Chapter 6 Thevenin, Norton, and Maximum Power Transfer Theorems
- 1 Introduction2. Thevenin and Norton Equivalent Circuits for Passive Networks
- 3 Thevenin and Norton Equivalent Circuits for Active Networks
- 4 Thevenin and Norton Equivalent Circuits for Op Amp Circuits
- 5 Thevenin and Norton Equivalent Circuits from Measured Data
- 6 Theoretical Considerations: Pathological Cases and a Proof
- 7 Maximum Power Transfer Theorem
- Summary
- Terms and Concepts
- Problems
- Chapter 7 Inductors, Capacitors, and Duality
- 1 Introduction
- 2 The InductorSome Physics: Definition and Basic Examples
- 3 The Capacitor
- Definitions and Properties
- Relationship of Charge to Capacitor Voltage and Current
- Principle of Conservation of Charge
- Energy Storage in a Capacitor
- Capacitance and Dielectrics
- 4 Series and Parallel Inductors and Capacitors
- Inductors in Series
- Inductors in Parallel
- Series-Parallel Inductor Combinations
- Capacitors in Series
- Capacitors in Parallel

- Series-Parallel Capacitor Combinations
- 5 Smoothing Property of a Capacitor in a Power Supply
- 6 The Duality Principle
- Basic Relationship of Dual Circuits
- Constructing the Dual N\* of a Planar Circuit N
- Summary
- Terms and Concepts
- Problems
- Chapter 8 First-Order RL and RC Circuits
- 1 Introduction
- 2 Some Mathematical Preliminaries
- 3 Source-Free or Zero-Input Response
- 4 DC or Step Response of First-Order Circuits
- 5 Superposition and Linearity
- 6 Response Classifications
- 7 Further Points of Analysis and Theory
- 8 First-Order RC Op Amp Circuits
- Summary
- Terms and Concepts
- Problems
- Chapter 9 Second-Order Linear Circuits
- 1 Introduction
- 2 Discharging a Capacitor through an Inductor
- 3 Source-Free Second-Order Linear Networks
- Development of Differential Equation Models for Series and Parallel RLC Circuits
- Solution of the Gene