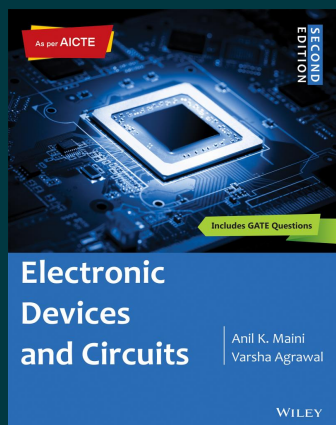




Electronic Devices and Circuits, 2ed

By Anil K. Maini, Varsha Agrawal

Paperback

9788126578085

₹1,099.00

Pages: 772

Description

Electronic devices and circuits is an important subject as it is essential to understanding the operational basics and design of linear integrated circuits, digital devices and integrated circuits, electronic circuits, and to some extent, instrumentation. It is therefore essential for students and engineers to understand electronic devices and circuits and also the building blocks of electronics configured around them. Electronic Devices and Circuits is a complete book that provides comprehensive coverage of different topics of analog electronics related to electronics devices including discrete devices as well as integrated circuits and electronic circuits.

About the Author

Anil K. Maini, Varsha Agrawal

Anil K. Maini is a Consultant, Defence Technologies, and formerly Director, Laser Science and Technology Centre, an R&D establishment under Defence Research and Development Organization (DRDO), India. He has 10 books to his credit including Digital Electronics: Principles and Applications, Satellite Technology: Principles and Applications, Microwaves and Radar, Electronics Simplified, Electronics Projects for Beginners, Handbook of Defence Electronics, Lasers and Optoelectronics, Lasers and Optoelectronics for Homeland Security

Table of Contents

1 Passive Electronic Components

1.1 Resistors

1.2 Series- and Parallel-Connected Resistors

1.3 Resistor Specifications

1.4 Standard Resistance Values

1.5 Resistor Colour Code

1.6 Classification of Resistors

1.7 Varistors

1.8 Thermistors

1.9 Variable Resistors

1.10 Resistor Noise

1.11 Capacitors

1.12 Equivalent Circuit of a Capacitor

1.13 Series- and Parallel-Connected Capacitors

- 1.14 Capacitor Specifications
- 1.15 Standard Values of Capacitors
- 1.16 Marking and Colour Coding of Capacitors
- 1.17 Capacitance Value of Different Conductor-Dielectric Configurations
- 1.18 Types of Fixed Capacitors
- 1.19 Supercapacitors
- 1.20 Variable Capacitors
- 1.21 Capacitors: Application Areas
- 1.22 Inductors
- 1.23 Electrical Equivalent Circuit of an Inductor
- 1.24 Self- and Mutual Inductance
- 1.25 Hysteresis Loop and Magnetic Properties of Materials
- 1.26 Hard and Soft Magnetic Materials
- 1.27 Diamagnetic, Paramagnetic and Ferromagnetic Materials
- 1.28 Inductor and Transformer Core Materials
- 1.29 Inductance Values of Common Geometric Configurations
- 1.30 Standard Inductor Values
- 1.31 Colour Coding of Inductors
- 1.32 Fixed, Variable and Preset Inductors
- 1.33 Series- and Parallel-Connected Inductors
- 1.34 Transformers
- 1.35 Transformer Losses
- 1.36 Classification of Transformers
- 1.37 Autotransformers and Variacs
- 1.38 Designing a Power Transformer
- 1.39 Pulse Transformers
- 2 Electromechanical Components and Batteries
- 2.1 Electrical Switches
- 2.2 Types of Switches
- 2.3 Terminology Used with Switches
- 2.4 Relays
- 2.5 Types of Relays
- 2.6 Performance Specifications of Relays
- 2.7 Connectors
- 2.8 Cables
- 2.9 Fuses
- 2.10 Batteries
- 2.11 Primary and Secondary Batteries

- 2.12 Specifications of a Battery
- 2.13 Primary Batteries
- 2.14 Types of Secondary Batteries
- 2.15 Memory Effect
- 2.16 Charging Requirements: Lead-Acid Batteries
- 2.17 Series, Parallel and Series-Parallel Connection of Batteries
- 2.18 Smart Batteries
- 2.19 Fuel Cells
- 3 Introduction to Semiconductor Physics
 - 3.1 Insulators, Conductors and Semiconductors
 - 3.2 Semiconductor Types
 - 3.3 Law of Mass Action
 - 3.4 Current Transport in a Semiconductor
 - 3.5 Mobility
 - 3.6 Resistivity
 - 3.7 Generation and Recombination of Carriers
 - 3.8 Poisson's Equation
 - 3.9 Continuity Equation
 - 3.10 Hall Effect
- 4 Semiconductor Diodes
 - 4.1 P-N Junction
 - 4.2 Band Structure of a P-N Junction
 - 4.3 Ideal Diode
 - 4.4 Practical Diode
 - 4.5 Current Components in a P-N Diode
 - 4.6 V-I Characteristics of a Diode
 - 4.7 Temperature Dependence of the V-I Characteristics
 - 4.8 Diode Specifications
 - 4.9 Diode Resistance
 - 4.10 Diode Junction Capacitance
 - 4.11 Diode Equivalent Circuits
 - 4.12 Load-Line Analysis of a Diode Circuit
 - 4.13 Breakdown Diodes
 - 4.14 Varactor Diodes
 - 4.15 Tunnel Diodes
 - 4.16 Schottky Diodes
 - 4.17 Point-Contact Diodes and Power Diodes
 - 4.18 Light-Emitting Diodes

4.19 Photodiodes

4.20 Connecting Diodes in Series and in Parallel

4.21 Diode Numbers and Lead Identification

4.22 Diode Testing

5 Bipolar Junction Transistors

5.1 Bipolar Junction Transistor versus Vacuum Triode

5.2 Transistor Construction and Types

5.3 Transistor Operation

5.4 Transistor Biased in the Active Region

5.5 Transistor Configurations

5.6 Ebers–Moll Model of Transistors

5.7 Transistor Specifications and Maximum Ratings

5.8 Lead Identification

5.9 Transistor Testing

5.10 Phototransistors

5.11 Power Transistors

5.12 Transistor Construction Techniques

6 Transistor Biasing and Thermal Stabilization

6.1 Operating Point

6.2 Common-Emitter Configuration

6.3 Common-Base Circuit

6.4 Common-Collector Circuit

6.5 Bias Stabilization

6.6 Bias Compensation

6.7 Thermal Runaway

6.8 Transistor Switch

7 Field Effect Transistors

7.1 Bipolar Junction Transistors versus Field Effect Transistors

7.2 Junction Field Effect Transistors

7.3 Metal Oxide Field Effect Transistors

7.4 FET Parameters and Specifications

7.5 Differences between JFETs and MOSFETs

7.6 Handling MOSFETs

7.7 Biasing JFETs

7.8 Biasing MOSFETs

7.9 FET Applications

7.10 Testing FETs

7.11 Dual-Gate MOSFET

7.12 VMOS Devices

7.13 CMOS Devices

7.14 Insulated Gate Bipolar Transistors (IGBTs)

8 UJTs and Thyristors

8.1 Unijunction Transistor

8.2 PNP Diode

8.3 Silicon-Controlled Rectifier

8.4 DIAC and TRIAC

8.5 Thyristor Parameters

8.6 Thyristors as Current-Controllable Devices

8.7 Thyristors in Series

8.8 Thyristors in Parallel

8.9 Applications of Thyristors

8.10 Gate Turn-OFF Thyristors

8.11 Programmable Unijunction Transistor

9 Optoelectronic Devices

9.1 Optoelectronic Devices

9.2 Photosensors

9.3 Photoconductors

9.4 Photodiodes

9.5 Phototransistors

9.6 PhotoFET, PhotosCR and PhotoTRIAC

9.7 Photoemissive Sensors

9.8 Thermal Sensors

9.9 Displays

9.10 Light-Emitting diodes

9.11 Liquid-Crystal Displays

9.12 Cathode Ray Tube Displays

9.13 Emerging Display Technologies

9.14 Optocouplers

10 Small Signal Analysis of Amplifiers

10.1 Amplifier Bandwidth: General Frequency Considerations

10.2 Hybrid h-Parameter Model for an Amplifier

10.3 Transistor Hybrid Model

10.4 r_e Transistor Model

10.5 Analysis of a Transistor Amplifier using Complete h-Parameter Model

10.6 Analysis of Transistor Amplifier Configurations using Simplified h-Parameter Model

10.7 Small Signal Analysis of FET Amplifiers

10.8 Cascading Amplifiers

10.9 Darlington Amplifiers

10.10 Cascode Amplifiers

10.11 Low-Frequency Response of Amplifiers

10.12 Low-Frequency Response of Cascaded Amplifier Stages

11 High-Frequency Response of Small Signal Amplifiers

11.1 High-Frequency Model for the Common-Emitter Transistor Amplifier

11.2 Common-Emitter Short-Circuit Current Gain

11.3 Miller's Theorem

11.4 Common-Emitter Current Gain with Resistive Load

11.5 High-Frequency Response of Common-Collector Transistor Amplifier

11.6 High-Frequency Response of an FET Amplifier

11.7 High-Frequency Response of Cascaded Amplifier Stages

11.8 Amplifier Rise Time and Sag

12 Large Signal Amplifiers

12.1 Large Signal Amplifiers

12.2 Class A Amplifiers

12.3 Class B Amplifiers

12.4 Class AB Amplifiers

12.5 Class C Amplifiers

12.6 Class D Amplifiers

12.7 Thermal Management of Power Transistors

13 Feedback Amplifiers

13.1 Classification of Amplifiers

13.2 Amplifier with Negative Feedback

13.3 Advantages of Negative Feedback

13.4 Feedback Topologies

13.5 Voltage-Series (Series-Shunt) Feedback

13.6 Voltage-Shunt (Shunt-Shunt) Feedback

13.7 Current-Series (Series-Series) Feedback

13.8 Current-Shunt (Shunt-Series) Feedback

14 Sinusoidal Oscillators

14.1 Classification of Oscillators

14.2 Conditions for Oscillations: Barkhausen Criterion

14.3 Types of Oscillators

14.4 RC Phase Shift Oscillator

14.5 Buffered RC Phase Shift Oscillator

14.6 Bubba Oscillator

- 14.7 Quadrature Oscillator
- 14.8 Twin-T Oscillator
- 14.9 Wien Bridge Oscillator
- 14.10 LC Oscillators
- 14.11 Armstrong Oscillator
- 14.12 Hartley Oscillator
- 14.13 Colpitt Oscillator
- 14.14 Clapp Oscillator
- 14.15 Crystal Oscillator
- 14.16 Voltage-Controlled Oscillators
- 14.17 Frequency Stability
- 15 Wave-Shaping Circuits
 - 15.1 Basic RC Low-Pass Circuit
 - 15.2 RC Low-Pass Circuit as Integrator
 - 15.3 Basic RC High-Pass Circuit
 - 15.4 RC High-Pass Circuit as Differentiator
 - 15.5 Basic RL Circuit as Integrator
 - 15.6 Basic RL Circuit as Differentiator
 - 15.7 Diode Clipper Circuits
 - 15.8 Diode Clamper Circuits
 - 15.9 Multivibrators
 - 15.10 Function Generators
 - 15.11 Integrated Circuit (IC) Multivibrators
- 16 Linear Power Supplies
 - 16.1 Constituents of a Linear Power Supply
 - 16.2 Designing Mains Transformer
 - 16.3 Rectifier Circuits
 - 16.4 Filters
 - 16.5 Linear Regulators
 - 16.6 Linear IC Voltage Regulators
 - 16.7 Regulated Power Supply Parameters
- 17 Switched Mode Power Supplies
 - 17.1 Switched Mode Power Supplies
 - 17.2 Flyback Converters
 - 17.3 Forward Converter
 - 17.4 Push-Pull Converter
 - 17.5 Switching Regulators
 - 17.6 Connecting Power Converters in Series

17.7 Connecting Power Converters in Parallel

18 Introduction to Operational Amplifiers

18.1 Operational Amplifier

18.2 Inside of the Opamp

18.3 Ideal Opamp versus Practical Opamp

18.4 Performance Parameters

18.5 Types of Opamps

19 Operational Amplifier Application Circuits

19.1 Inverting Amplifier

19.2 Non-Inverting Amplifier

19.3 Voltage Follower

19.4 Summing Amplifier

19.5 Difference Amplifier

19.6 Averager

19.7 Integrator

19.8 Differentiator

19.9 Rectifier Circuits

19.10 Clipper Circuits

19.11 Clamper Circuits

19.12 Peak Detector Circuit

19.13 Absolute Value Circuit

19.14 Comparator

19.15 Active Filters

19.16 Phase Shifters

19.17 Instrumentation Amplifier

19.18 Non-Linear Amplifier

19.19 Relaxation Oscillator

19.20 Current-To-Voltage Converter

19.21 Voltage-To-Current Converter

19.22 Sine Wave Oscillators

Key Terms

Objective-Type Exercises

Review Questions

Problems

Answers

Index

To purchase this product, please visit:

<https://www.wileyindia.com/electronic-devices-and-circuits-2ed.html>



Scan to buy