

Microelectronic Circuit Design Solutions

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Microelectronic Circuit Design
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Engineering Economic Analysis
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Analog Circuit Design: Discrete & Integrated

Microelectronic Circuits, Fourth Edition is an extensive revision of the classic text by Adel S. Sedra and K. C. Smith. The primary objective of this text remains the development of the student's ability to analyze and design electronic circuits, both analog and digital, discrete and integrated. Fundamental developments in modern technology, particularly the increased emphasis on integrated circuits and the profusion of advances in digital electronics, require that engineers today be aptly equipped with knowledge of these concepts and techniques. In this edition, the authors present these concepts and techniques earlier on in the text and in greater detail than in previous editions. While the previous edition presented students with analog oriented concepts followed by digital, the fourth edition promotes learning these ideas side-by-side, as they often appear in the real world. Since most professors use Part 1 or the first 5 chapters of the text for a first course on basic devices, the new edition fully integrates the fundamental concepts of digital electronics into these critical chapters. The result is a clear and complete introduction to both the analog and digital concepts essential to building a solid foundation for a modern introductory course on electronic circuits. In order to help students fully comprehend the concepts presented, the amount of material in Part 1 on the physical operation of devices has been increased. Appreciation of these devices--how they are modeled using modern computer tools like SPICE, and the fact that most circuits designed today are

integrated circuits--requires a firm grasp of device physics. To achieve this, the authors have increased the basic material on semiconductors and the PN Junction (Chapter 3), added additional material on Bipolar Junction Transistor operation (Chapter 4), and correspondingly increased coverage of MOSFET operation (Chapter 5). Instead of deliberately setting off this material into a separate chapter on device physics, the authors have integrated it into these chapters where appropriate. The result is a gradual introduction to these ideas within the context of their importance where they are needed. The material on digital electronics has been completely and thoroughly updated, expanded, and re-organized to reflect the tremendous advances in this area since the last edition. Since all electronics engineers need exposure to digital electronics early in their course work, a new section in Chapter 1 introduces the key element of digital electronics--the logic inverter--side by side with the fundamental element of analog electronics--the amplifier. This signifies the great importance of the emergence of digital electronics. More digital electronics has been added to Chapter 4 on the Bipolar Junction Transistor inverter as well as to a new section in Chapter 5 on the CMOS inverter. By including this expanded material early on in Part I, the student is exposed to the basics of analog and digital electronics in what is typically the first semester of the course (Part I, Chapters 1-5). MOS Digital Integrated Circuits (Chapter 13) has been completely rewritten and expanded to include more coverage of memory and an overview of digital circuit technologies, logic-circuit families and styles for digital system design. New topics have been added, including CMOS logic circuits and static and dynamic analysis, pseudo-NMOS logic, pass transistor logic, dynamic logic, dynamic techniques in flip-flop design, and ring oscillator. The MOSFET has become the most significant device in electronics today. The material on MOSFET (Chapter 5) has been entirely re-written to reflect the shift toward Integrated Circuit technology and the vast number of changes in MOS Integrated Circuit design. The amount of material devoted to JFET coverage has been substantially reduced. SPICE has been incorporated not only at the end of the appropriate device chapters (Chapters 3, 4, and 5), but also at the end of most chapters throughout the text, thereby increasing the flexibility to use this tool when desired. Emphasis is placed on models, when to use SPICE and what the benefits are. The placement of these SPICE SIMULATION EXAMPLES at the end of chapters allows the reader to use them optionally without interrupting the flow of the text. The authors have also included a short appendix on SPICE in the back of the book. For a complete introduction to SPICE, consult Roberts and Sedra's SPICE, Second Edition (0-19-510842-6). All examples are carefully chosen for their ability to illustrate the concepts of the chapter in a connected way. They demonstrate the power of SPICE and the potential advantages gained by using it. It should be carefully noted, however, that by-hand analysis is critical prior to employing SPICE. The Appendix on IC Fabrication has been thoroughly updated, and brief material on layout has been included. The hallmark end-of-chapter problem material has increased by offering nearly 30% more per chapter, providing well over 1300 homework problems. Many of the existing problems have been replaced or modified. See the ancillary information for additional problem material. Microelectronic Circuits, Fourth Edition, is intended for the core courses in electronic circuits taught to majors in electrical and computer engineering. All electrical and computer engineering students are required to take at least one semester of electronic circuits for which this text is intended. It should also prove useful to engineers and other professionals who wish to update their knowledge of fundamental electronic circuits. The text is supported extensively with ancillary materials.

Electronics

Microelectronics Circuit Analysis and Design

Microelectronic Circuits

Incentives provided by European governments have resulted in the rapid growth of the photovoltaic (PV) market. Many PV modules are now commercially available, and there are a number of power electronic systems for processing the electrical power produced by PV systems, especially for grid-connected applications. Filling a gap in the literature, *Power Electronics and Control Techniques for Maximum Energy Harvesting in Photovoltaic Systems* brings together research on control circuits, systems, and techniques dedicated to the maximization of the electrical power produced by a photovoltaic (PV) source. *Tools to Help You Improve the Efficiency of Photovoltaic Systems* The book supplies an overview of recent improvements in connecting PV systems to the grid and highlights various solutions that can be used as a starting point for further research and development. It begins with a review of methods for modeling a PV array working in uniform and mismatched conditions. The book then discusses several ways to achieve the best maximum power point tracking (MPPT) performance. A chapter focuses on MPPT efficiency, examining the design of the parameters that affect algorithm performance. The authors also address the maximization of the energy harvested in mismatched conditions, in terms of both power architecture and control algorithms, and discuss the distributed MPPT approach. The final chapter details the design of DC/DC converters, which usually perform the MPPT function, with special emphasis on their energy efficiency. *Get Insights from the Experts on How to Effectively Implement MPPT* Written by well-known researchers in the field of photovoltaic systems, this book tackles state-of-the-art issues related to how to extract the maximum electrical power from photovoltaic arrays under any weather condition. Featuring a wealth of examples and illustrations, it offers practical guidance for researchers and industry professionals who want to implement MPPT in photovoltaic systems.

Circuits

This book describes the design of microelectronic circuits for energy harvesting, broadband energy conversion, new methods and technologies for energy conversion. The author also discusses the design of power management circuits and the implementation of voltage regulators. Coverage includes advanced methods in low and high power electronics, as well as principles of micro-scale design based on piezoelectric, electromagnetic and thermoelectric technologies with control and conditioning circuit design.

Microelectronic Circuit Design

This invaluable second volume of a two-volume set is filled with details about the integrated circuit design for space applications. Various considerations for the selection and application of electronic components for designing spacecraft are discussed. The basic constructions of submicron transistors and schottky diodes during the technological process of production are explored. This book provides details on the energy consumption minimization methods for microelectronic devices. Specific topics include: Features and physical mechanisms of the effect of space radiation on all the main classes of microcircuits, including peculiarities of radiation impact on submicron integrated circuits; Special design, technology, and schematic methods of increasing the resistance to various types of space radiation; Recommendations for choosing research equipment and methods for irradiating various samples; Microcircuit designers on the composition of test elements for the study of the effect of radiation; Microprocessors, circuit boards, logic microcircuits, digital, analog, digital-analog microcircuits manufactured in various technologies (bipolar, CMOS, BiCMOS, SOI); Problems involved with designing high speed microelectronic devices and systems based on SOS-and SOI-structures; System-on-chip and system-in-package and methods for rejection of silicon microcircuits with hidden defects during mass production.

Laboratory Manual for Microelectronic Circuits

Electronics Cooling

This manual contains approximately 35 experiments. It follows the organization of the text and includes experiments for all major topics. To help instructor's choose and prepare for the experiments this manual identifies the core experiments all students should perform and includes manufacturers' data sheets for the most common components.

Engineering Economic Analysis

This Special Issue focuses on the state-of-the-art results from the definition and design of filters for low- and high-frequency applications and systems. Different technologies and solutions are commonly adopted for filter definition, from electrical to electromechanical and mechanical solutions, from passive to active devices, and from hybrid to integrated designs. Aspects related to both theoretical and experimental research in filter design, CAD modeling and novel technologies and applications, as well as filter fabrication, characterization and testing, are covered. The proposed research articles deal with different topics as follows: Modeling, design and simulation of filters; Processes and fabrication technologies for filters; Automated characterization and test of filters; Voltage and current mode filters; Integrated and discrete filters; Passive and

active filters; Variable filters, characterization and tunability.

Power Electronics and Control Techniques for Maximum Energy Harvesting in Photovoltaic Systems

Fundamentals of Microelectronics

The 2nd Edition of Analog Integrated Circuit Design focuses on more coverage about several types of circuits that have increased in importance in the past decade. Furthermore, the text is enhanced with material on CMOS IC device modeling, updated processing layout and expanded coverage to reflect technical innovations. CMOS devices and circuits have more influence in this edition as well as a reduced amount of text on BiCMOS and bipolar information. New chapters include topics on frequency response of analog ICs and basic theory of feedback amplifiers.

Foundations of Analog and Digital Electronic Circuits

RF and Microwave Microelectronics Packaging presents the latest developments in packaging for high-frequency electronics. It will appeal to practicing engineers in the electronic packaging and high-frequency electronics fields and to academic researchers interested in understanding leading issues in the commercial sector. It covers the latest developments in thermal management, electrical/RF/thermal-mechanical designs and simulations, packaging and processing methods as well as other RF/MW packaging-related fields.

Microelectronics

Featuring contributions from the renowned researchers and academicians in the field, this book covers key conventional and emerging cooling techniques and coolants for electronics cooling. It includes following thematic topics: - Cooling approaches and coolants - Boiling and phase change-based technologies - Heat pipes-based cooling - Microchannels cooling systems - Heat loop cooling technology - Nanofluids as coolants - Theoretical development for the junction temperature of package chips. This book is intended to be a reference source and guide to researchers, engineers, postgraduate students, and academicians in the fields of thermal management and cooling technologies as well as for people in the electronics and semiconductors industries.

Microelectronic Circuits

"Microelectronic Circuit Design" is known for being a technically excellent text. The new edition has been revised to make the material more motivating and accessible to students while retaining a student-friendly approach. Jaeger has added more pedagogy and an emphasis on design through the use of design examples and design notes. Some pedagogical elements include chapter opening vignettes, chapter objectives, "Electronics in Action" boxes, a problem solving methodology, and "design note" boxes. The number of examples, including new design examples, has been increased, giving students more opportunity to see problems worked out. Additionally, some of the less fundamental mathematical material has been moved to the ARIS website. In addition this edition comes with a Homework Management System called ARIS, which includes 450 static problems.

Microelectronic Devices and Circuits

Electronics plays a central role in our everyday lives. It is at the heart of almost all of today's essential technology, from mobile phones to computers and from cars to power stations. As such, all engineers, scientists and technologists need to have a fundamental understanding of this exciting subject, and for many this will just be the beginning. Now in its sixth edition, Electronics: A Systems Approach provides an outstanding introduction to this fast-moving and important field. Comprehensively revised and updated to cover the latest developments in the world of electronics, the text continues to use Neil Storey's established and well-respected systems approach. It introduces the basic concepts first before progressing to a more advanced analysis, enabling you to contextualise what a system is designed to achieve before tackling the intricacies of designing or analysing its various components with confidence. This book is accompanied by a website which contains over 100 video tutorials to help explain key concepts from the book and interactive quizzes to test your knowledge. Log in to www.pearsoned.co.uk/storey-elec to access these valuable resources, or use the QR codes to view the videos.

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Micro- and Nanoelectronics

This market-leading textbook continues its standard of excellence and innovation built on the solid pedagogical foundation of previous editions. This new edition has been thoroughly updated to reflect changes in technology, and includes new BJT/MOSFET coverage that combines and emphasizes the unity of the basic principles while allowing for separate treatment of the two device types where needed. Amply illustrated by a wealth of examples and complemented by an expanded number of well-designed end-of-chapter problems and practice exercises, Microelectronic Circuits is the most current resource available for teaching tomorrow's engineers how to analyze and design electronic circuits.

Computer-aided Design of Microelectronic Circuits and Systems: Digital-circuit aspects and state of the art

Unlike books currently on the market, this book attempts to satisfy two goals: combine circuits and electronics into a single, unified treatment, and establish a strong connection with the contemporary world of digital systems. It will introduce a new way of looking not only at the treatment of circuits, but also at the treatment of introductory coursework in engineering in general. Using the concept of "abstraction," the book attempts to form a bridge between the world of physics and the world of large computer systems. In particular, it attempts to unify electrical engineering and computer science as the art of creating and exploiting successive abstractions to manage the complexity of building useful electrical systems. Computer systems are simply one type of electrical systems. +Balances circuits theory with practical digital electronics applications. +Illustrates concepts with real devices. +Supports the popular circuits and electronics course on the MIT OpenCourse Ware from which professionals worldwide study this new approach. +Written by two educators well known for their innovative teaching and research and their collaboration with industry. +Focuses on contemporary MOS technology.

Analog Integrated Circuit Design

MICROELECTRONIC CIRCUITS: ANALYSIS AND DESIGN, 3E combines a breadth-first approach to learning electronics with a strong emphasis on design and simulation. This book first introduces the general characteristics of circuits (ICs) in preparation for using circuit design and analysis techniques. This edition then offers a more detailed study of devices and circuits and how they operate within ICs. More than half of the problems and examples concentrate on design and emphasize how to use computer software tools extensively. The book's proven sequence introduces electronic devices and circuits, then electronic circuits and applications, and finally, digital and analog integrated circuits. Readers learn to apply theory to real-world design problems as they master the skills to test and verify their designs. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

RF and Microwave Microelectronics Packaging

This book describes the design of microelectronic circuits for energy harvesting, broadband energy conversion, new methods and technologies for energy conversion. The author also discusses the design of power management circuits and the implementation of voltage regulators. Coverage includes advanced methods in low and high power electronics, as well as principles of micro-scale design based on piezoelectric, electromagnetic and thermoelectric technologies with control and conditioning circuit design.

CMOS

Microelectronic Circuits

This market-leading textbook continues its standard of excellence and innovation built on the solid pedagogical foundation that instructors expect from Adel S. Sedra and Kenneth C. Smith. All material in the international sixth edition of Microelectronic Circuits is thoroughly updated to reflect changes in technology-CMOS technology in particular. These technological changes have shaped the book's organization and topical coverage, making it the most current resource available for teaching tomorrow's engineers how to analyze and design electronic circuits. In addition, end-of-chapter problems unique to this version of the text help preserve the integrity of instructor assignments.

Microelectronic Circuit Design for Energy Harvesting Systems

This junior level electronics text provides a foundation for analyzing and designing analog and digital electronics throughout the book. Extensive pedagogical features including numerous design examples, problem solving technique sections, Test Your Understanding questions, and chapter checkpoints lend to this classic text. The author, Don Neamen, has many years experience as an Engineering Educator. His experience shines through each chapter of the book, rich with realistic examples and practical rules of thumb. The Third Edition continues to offer the same hallmark features that made the previous editions such a success. Extensive Pedagogy: A short introduction at the beginning of each chapter links the new chapter to the material presented in previous chapters. The objectives of the chapter are then presented in the Preview section and then are listed in bullet form for easy reference. Test Your Understanding Exercise Problems with provided answers have all been updated. Design Applications are included at the end of chapters. A specific electronic design related to that chapter is presented. The various stages in the design of an electronic thermometer are explained throughout the text. Specific Design Problems and Examples are highlighted throughout as well.

Computerized Circuit Analysis Using SPICE Programs

Microelectronic Circuits and Devices

By helping students develop an intuitive understanding of the subject, Microelectronics teaches them to think like engineers. The second edition of Razavi's Microelectronics retains its hallmark emphasis on analysis by inspection and building students' design intuition, and it incorporates a host of new pedagogical features that make it easier to teach and learn from, including: application sidebars, self-check problems with answers, simulation problems with SPICE and MULTISIM, and an expanded problem set that is organized by degree of difficulty and more clearly associated with specific chapter sections.

Filter Design Solutions for RF systems

Praise for CMOS: Circuit Design, Layout, and Simulation Revised Second Edition from the Technical Reviewers "A refreshing industrial flavor. Design concepts are presented as they are needed for 'just-in-time' learning. Simulating and designing circuits using SPICE is emphasized with literally hundreds of examples. Very few textbooks contain as much detail as this one. Highly recommended!" --Paul M. Furth, New Mexico State University "This book builds a solid knowledge of CMOS circuit design from the ground up. With coverage of process integration, layout, analog and digital models, noise mechanisms, memory circuits, references, amplifiers, PLLs/DLLs, dynamic circuits, and data converters, the text is an excellent reference for both experienced and novice designers alike." --Tyler J. Gomm, Design Engineer, Micron Technology, Inc. "The Second Edition builds upon the success of the first with new chapters that cover additional material such as oversampled converters and non-volatile memories. This is becoming the de facto standard textbook to have on every analog and mixed-signal designer's bookshelf." --Joe Walsh, Design Engineer, AMI Semiconductor CMOS circuits from design to implementation CMOS: Circuit Design, Layout, and Simulation, Revised Second Edition covers the practical design of both analog and digital integrated circuits, offering a vital, contemporary view of a wide range of analog/digital circuit blocks, the BSIM model, data converter architectures, and much more. This edition takes a two-path approach to the topics: design techniques are developed for both long- and short-channel CMOS technologies and then compared. The results are multidimensional explanations that allow readers to gain deep insight into the design process. Features include: Updated materials to reflect CMOS technology's movement into nanometer sizes Discussions on phase- and delay-locked loops, mixed-signal circuits, data converters, and circuit noise More than 1,000 figures, 200 examples, and over 500 end-of-chapter problems In-depth coverage of both analog and digital circuit-level design techniques Real-world process parameters and design rules The book's Web site, CMOSedu.com, provides: solutions to the book's problems; additional

homework problems without solutions; SPICE simulation examples using HSPICE, LTspice, and WinSpice; layout tools and examples for actually fabricating a chip; and videos to aid learning

Computer-aided Design of Microelectronic Circuits and Systems: General introduction and analog-circuit aspects

Fundamentals of Microelectronics, 2nd Edition is designed to build a strong foundation in both design and analysis of electronic circuits this text offers conceptual understanding and mastery of the material by using modern examples to motivate and prepare readers for advanced courses and their careers. The books unique problem-solving framework enables readers to deconstruct complex problems into components that they are familiar with which builds the confidence and intuitive skills needed for success.

Digital Electronic Circuits - The Comprehensive View

Microelectronic Circuit Design is known for being a technically excellent text. The new edition has been revised to make the material more motivating and accessible to students while retaining a student-friendly approach. Jaeger has added more pedagogy and an emphasis on design through the use of design examples and design notes. Some pedagogical elements include chapter opening vignettes, chapter objectives, "Electronics in Action" boxes, a problem solving methodology, and "design note" boxes. The number of examples, including new design examples, has been increased, giving students more opportunity to see problems worked out. Additionally, some of the less fundamental mathematical material has been moved to the ARIS website. In addition this edition comes with a Homework Management System called ARIS, which includes 450 static problems.

Microelectronic Circuits

Micro- and Nanoelectronics: Emerging Device Challenges and Solutions presents a comprehensive overview of the current state of the art of micro- and nanoelectronics, covering the field from fundamental science and material properties to novel ways of making nanodevices. Containing contributions from experts in both industry and academia, this cutting-edge text: Discusses emerging silicon devices for CMOS technologies, fully depleted device architectures, characteristics, and scaling Explains the specifics of silicon compound devices (SiGe, SiC) and their unique properties Explores various options for post-CMOS nanoelectronics, such as spintronic devices and nanoionic switches Describes the latest developments in carbon nanotubes, iii-v devices structures, and more Micro- and Nanoelectronics: Emerging Device Challenges and Solutions provides an excellent representation of a complex engineering field, examining emerging materials and device architecture

alternatives with the potential to shape the future of nanotechnology.

Three-dimensional Integrated Circuit Design

Microelectronic Circuits

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Microelectronic Circuit Design for Energy Harvesting Systems

Microelectronic Circuits

Analog Circuit Design: Discrete and Integrated is written by enthusiastic circuit practitioner, Sergio Franco. This text places great emphasis on developing intuition and physical insight. The numerous examples and problems have been carefully thought out to promote problem solving methodologies of the type engineers apply daily on the job. Each chapter provides a fairly comprehensive coverage of its title subject. SPICE has been integrated throughout the text both as a pedagogical aid to confer more immediately to a new concept, and as a validation tool for hand calculations. PSPICE is used to bring out nuances that would be too complex for hand calculations.

Microelectronic Circuits: Analysis and Design

Combining solid state devices with electronic circuits for an introductory-level microelectronics course, this textbook offers an integrated approach so that students can truly understand how a circuit works. A concise writing style is employed, with the right level of detail and physics to help students understand how a device works. Other features include an emphasis on

modelling of electronic devices, and analysis of non-linear circuits. Spice problems, worked examples and end-of-chapter problems are included.

Space Microelectronics Volume 2: Integrated Circuit Design for Space Applications

With vastly increased complexity and functionality in the "nanometer era" (i.e. hundreds of millions of transistors on one chip), increasing the performance of integrated circuits has become a challenging task. Connecting effectively (interconnect design) all of these chip elements has become the greatest determining factor in overall performance. 3-D integrated circuit design may offer the best solutions in the near future. This is the first book on 3-D integrated circuit design, covering all of the technological and design aspects of this emerging design paradigm, while proposing effective solutions to specific challenging problems concerning the design of 3-D integrated circuits. A handy, comprehensive reference or a practical design guide, this book provides a sound foundation for the design of 3-D integrated circuits. * Demonstrates how to overcome "interconnect bottleneck" with 3-D integrated circuit design leading edge design techniques offer solutions to problems (performance/power consumption/price) faced by all circuit designers * The FIRST book on 3-D integrated circuit design provides up-to-date information that is otherwise difficult to find * Focuses on design issues key to the product development cycle good design plays a major role in exploiting the implementation flexibilities offered in the 3-D * Provides broad coverage of 3-D integrated circuit design, including interconnect prediction models, thermal management techniques, and timing optimization offers practical view of designing 3-D circuits

Microelectronics

This market-leading textbook continues its standard of excellence and innovation built on the solid pedagogical foundation that instructors expect from Adel S. Sedra and Kenneth C. Smith. New to this Edition: A revised study of the MOSFET and the BJT and their application in amplifier design. Improved treatment of such important topics as cascode amplifiers, frequency response, and feedback Reorganized and modernized coverage of Digital IC Design. New topics, including Class D power amplifiers, IC filters and oscillators, and image sensors A new "expand-your-perspective" feature that provides relevant historical and application notes Two thirds of the end-of-chapter problems are new or revised A new Instructor's Solutions Manual authored by Adel S. Sedra

Microelectronic Circuit Design

Microelectronic Circuits

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thereby increasing the flexibility to use this tool when desired. Emphasis is placed on models, when to use SPICE and what the benefits are. The placement of these SPICE SIMULATION EXAMPLES at the end of chapters allows the reader to use them optionally without interrupting the flow of the text. The authors have also included a short appendix on SPICE in the back of the book. For a complete introduction to SPICE, consult Roberts and Sedra's SPICE, Second Edition (0-19-510842-6). All examples are carefully chosen for their ability to illustrate the concepts of the chapter in a connected way. They demonstrate the power of SPICE and the potential advantages gained by using it. It should be carefully noted, however, that by-hand analysis is critical prior to employing SPICE. The Appendix on IC Fabrication has been thoroughly updated, and brief material on layout has been included. The hallmark end-of-chapter problem material has increased by offering nearly 30% more per chapter, providing well over 1300 homework problems. Many of the existing problems have been replaced or modified. See the ancillary information for additional problem material. Microelectronic Circuits, Fourth Edition, is intended for the core courses in electronic circuits taught to majors in electrical and computer engineering. All electrical and computer engineering students are required to take at least one semester of electronic circuits for which this text is intended. It should also prove useful to engineers and other professionals who wish to update their knowledge of fundamental electronic circuits. The text is supported extensively with ancillary materials.

Microelectronic Circuit Design

This book deals with key aspects of design of digital electronic circuits for different families of elementary electronic devices. Implementation of both simple and complex logic circuits are considered in detail, with special attention paid to the design of digital systems based on complementary metal-oxide-semiconductor (CMOS) and Pass-Transistor Logic (PTL) technologies acceptable for use in planar microelectronics technology. It is written for students in electronics and microelectronics, with exercises and solutions provided.

Microelectronic Circuits

Microelectronic Circuits by Sedra and Smith has served generations of electrical and computer engineering students as the best and most widely-used text for this required course. Respected equally as a textbook and reference, "Sedra/Smith" combines a thorough presentation of fundamentals with an introduction to present-day IC technology. It remains the best text for helping students progress from circuit analysis to circuit design, developing design skills and insights that are essential to successful practice in the field. Significantly revised with the input of two new coauthors, slimmed down, and updated with the latest innovations, Microelectronic Circuits, Eighth Edition, remains the gold standard in providing the most comprehensive, flexible, accurate, and design-oriented treatment of electronic circuits available today.

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