

# Fundamentals Of Analog Circuits

## David Buchla Answers

Description: Building on Fundamentals of Electronics Circuit Design, David and Donald Comer's new text, Advanced Electronic Circuit Design, extends their highly focused, applied approach into the second and third semesters of the electronic circuit design sequence. This new text covers more advanced topics such as oscillators, power stages, digital/analog converters, and communications circuits such as mixers, and detectors. The text also includes technologies that are emerging. Advanced Electronic Circuit Design focuses exclusively on MOSFET and BJT circuits, allowing students to explore the fundamental methods of electronic circuit analysis and design in greater depth. Each type of circuit is first introduced without reference to the type of device used for implementation. This initial discussion of general principles establishes a firm foundation on which to proceed to circuits using the actual devices. Features: 1. Provides concise coverage of several important electronic circuits that are not covered in a fundamentals textbook. 2. Focuses on MOSFET and BJT circuits, rather than offering exhaustive coverage of a wide range of devices and circuits. 3. Includes an Important Concepts summary at the beginning of each section

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that direct the reader's attention to these key points.

4. Includes several Practical Considerations sections that relate developed theory to practical circuits.

Instructor Supplements: ISBN SUPPLEMENT

DESCRIPTION Online Solutions Manual Brief Table

of Contents: 1. Introduction 2. Fundamental Power

Amplifier Stages 3. Advanced Power Amplification 4.

Wideband Amplifiers 5. Narrowband Amplifiers 6.

Sinusoidal Oscillators 7. Basic Concepts in

Communications 8. Amplitude Modulation Circuits 9.

Angle Modulation Circuits 10. Mixed-Signal

Interfacing Circuits 11. Basic Concepts in Filter

Design 12. Active Synthesis 13. Future Directions

Featuring hundreds of illustrations and references,

this volume in the third edition of the Circuits and

Filters Handbook, provides the latest information on

analog and VLSI circuits, omitting extensive theory

and proofs in favor of numerous examples

throughout each chapter. The first part of the text

focuses on analog integrated circuits, presenting up-

to-date knowledge on monolithic device models,

analog circuit cells, high performance analog circuits,

RF communication circuits, and PLL circuits. In the

second half of the book, well-known contributors

offer the latest findings on VLSI circuits, including

digital systems, data converters, and systolic arrays.

"Symbolic analyzers have the potential to offer

knowledge to sophomores as well as practitioners of

analog circuit design. Actually, they are an essential

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complement to numerical simulators, since they provide insight into circuit behavior which numerical " This book is the first graduate-level textbook presenting a comprehensive treatment of Data Converters. The advancement of digital electronics urged the availability of a still missing support for teaching and self-learning analog-digital interfaces at many levels: the specification, the conversion methods and architectures, the circuit design and the testing. This book, after the necessary study of the background theoretical elements, covers aspects and provide elements for a deep and comprehensive knowledge. The breath and the level of details of topics is enhanced by introductory material in each chapter and the use of many examples, most of them in the form of computer behavioral simulations. The examples and the end-of-chapter problems help in understanding and favor self-practice using tools that are effective for training and for design activity. Data Converters is a textbook that is also essential for engineering professionals as it was written for responding to a shortage of organically organized material on the topic. The book assumes a solid background in analog and digital circuits as well as a working knowledge of simulation tools for circuit and behavioral analysis. A background on statistical analysis is also helpful, though not strictly necessary. Coverage of all the basic elements essential for a clear understanding of sampling, quantization, noise

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in sampled-data systems and mathematical tools for sampled-data linear systems Comprehensive definition of the parameters used to specify data converters and necessary for understanding product data sheets Coverage of all the architectures used in Nyquist-rate data converters and detailed study of features, limits and design techniques Detailed study of oversampled and Sigma-Delta converters with simulation examples and use of spectra and histograms for a clear understanding of features and limit if the noise shaping Coverage of digital correction and calibration techniques for enhancing performances Use of theory and intuitive views to explain circuits and systems operation and limits Coverage of testing methods and description of the data processing used for testing and characterization Extensive use of Simulink and Matlab in examples and problem sets to assist reader comprehension and favor deeper study

In the real world, most signals are analog, spanning continuously varying values. Circuits that interface with the physical environment need to be able to process these signals. Principles of Analog Electronics introduces the fascinating world of analog electronics, where fields, circuits, signals and systems, and semiconductors meet. Drawing on the author's teaching experience, this richly illustrated, full-color textbook expertly blends theory with practical examples to give a clear understanding of

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how real electronic circuits work. Build from the Essentials of Math, Physics, and Chemistry to Electronic Components, Circuits, and Applications Building a solid foundation, the book first explains the mathematics, physics, and chemistry that are essential for grasping the principles behind the operation of electronic devices. It then examines the theory of circuits through models and important theorems. The book describes and analyzes passive and active electronic devices, focusing on fundamental filters and common silicon-based components, including diodes, bipolar junction transistors, and metal–oxide–semiconductor field-effect transistors (MOSFETs). It also shows how semiconductor devices are used to design electronic circuits such as rectifiers, power suppliers, clamper and clipper circuits, and amplifiers. A chapter explores actual applications, from audio amplifiers and FM radios to battery chargers. Delve Deeper into Analog Electronics through Curiosities, Key Personalities, and Practical Examples Each chapter includes helpful summaries with key points, jargon, and terms, as well as exercises to test your knowledge. Practical tables illustrate the coding schemes to help identify commercial passive and active components. Throughout, sidebars highlight "curiosities," interesting observations, and examples that make the subject more concrete. This textbook offers a truly comprehensive introduction to the

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fundamentals of analog electronics, including essential background concepts. Taking a fresh approach, it connects electronics to its importance in daily life, from music to medicine and more.

For courses in Signals and Systems offered in departments of Electrical Engineering. This book focuses on the mathematical analysis and design of analog signal processing using a just in time approach - new ideas and topics relevant to the narrative are introduced only when needed, and no chapters are stand alone. Topics are developed throughout the narrative, and individual ideas appear frequently as needed.

Linear Circuit Transfer Functions: An introduction to Fast Analytical Techniques teaches readers how to determine transfer functions of linear passive and active circuits by applying Fast Analytical Circuits Techniques. Building on their existing knowledge of classical loop/nodal analysis, the book improves and expands their skills to unveil transfer functions in a swift and efficient manner. Starting with simple examples, the author explains step-by-step how expressing circuits time constants in different configurations leads to writing transfer functions in a compact and insightful way. By learning how to organize numerators and denominators in the fastest possible way, readers will speed-up analysis and predict the frequency response of simple to complex circuits. In some cases, they will be able to derive

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the final expression by inspection, without writing a line of algebra. Key features: Emphasizes analysis through employing time constant-based methods discussed in other text books but not widely used or explained. Develops current techniques on transfer functions, to fast analytical techniques leading to low-entropy transfer functions immediately exploitable for analysis purposes. Covers calculation techniques pertinent to different fields, electrical, electronics, signal processing etc. Describes how a technique is applied and demonstrates this through real design examples. All Mathcad® files used in examples and problems are freely available for download. An ideal reference for electronics or electrical engineering professionals as well as BSEE and MSEE students, this book will help teach them how to: become skilled in the art of determining transfer function by using less algebra and obtaining results in a more effectual way; gain insight into a circuit's operation by understanding how time constants rule dynamic responses; apply Fast Analytical Techniques to simple and complicated circuits, passive or active and be more efficient at solving problems.

This is a student supplement associated with: Analog Fundamentals: A Systems Approach, 1/e Thomas L. Floyd Toby Boydell ISBN: 0132933942

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

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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 Fundamentals: A Systems Approach provides unique coverage of analog devices and circuits with a systems emphasis. Discrete linear devices, operational amplifiers, and other linear integrated circuits, are all covered with less emphasis on the individual device, and more discussion on how these devices are incorporated into larger circuits and systems.

### Fundamentals of Analog Circuits

The Fiendishly Fun Way to Master Electronic Circuits!  
Fully updated throughout, this wickedly inventive guide introduces electronic circuits and circuit design, both



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analog and digital, through a series of projects you'll complete one simple lesson at a time. The separate lessons build on each other and add up to projects you can put to practical use. You don't need to know anything about electronics to get started. A pre-assembled kit, which includes all the components and PC boards to complete the book projects, is available separately from ABRA electronics on Amazon. Using easy-to-find components and equipment, *Electronic Circuits for the Evil Genius, Second Edition*, provides hours of rewarding--and slightly twisted--fun. You'll gain valuable experience in circuit construction and design as you test, modify, and observe your results--skills you can put to work in other exciting circuit-building projects. *Electronic Circuits for the Evil Genius*: Features step-by-step instructions and helpful illustrations Provides tips for customizing the projects Covers the underlying electronics principles behind the projects Removes the frustration factor--all required parts are listed, along with sources Build these and other devious devices: Automatic night light Light-sensitive switch Along-to-digital converter Voltage-controlled oscillator Op amp-controlled power amplifier Burglar alarm Logic gate-based toy Two-way intercom using transistors and op amps Each fun, inexpensive Genius project includes a detailed list of materials, sources for parts, schematics, and lots of clear, well-illustrated instructions for easy assembly. The larger workbook-style layout and convenient two-column format make following the step-by-step instructions a breeze. Make Great Stuff! TAB, an imprint of McGraw-Hill Professional, is a leading

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publisher of DIY technology books for makers, hackers, and electronics hobbyists.

This is a book about real-world design techniques for analog circuits: amplifiers, filters, injection-locked oscillators, phase-locked loops, transimpedance amplifiers, group delay correction circuits, notch filters, and spectrum regrowth in digital radio frequency (RF) transmitters, etc. The book offers practical solutions to analog and RF problems, helping the reader to achieve high-performance circuit and system design. A variety of issues are covered, such as: How to flatten group delay of filters How to use reciprocity to advantage How to neutralize a parasitic capacitance How to deepen a notch by adding only two components to the network How to demodulate a signal using the secant waveform and its benefit How to flatten the frequency response of a diode detector When to use a transimpedance amplifier and how to maximize its performance How to recover non-return-to-zero (NRZ) data when alternating current (AC) coupling is required Why phase noise corrupts adjacent communication channels Simple method to prevent false locking in phase-locked loops How to improve the bandwidth of amplification by using current conveyors A very simple impedance matching technique requiring only one reactive component How to use optimization Quadrature distortion and cross-rail interference This book is meant to be a handbook (or a supplemental textbook) for students and practitioners in the design of analog and RF circuitry with primary emphasis on practical albeit sometimes unorthodox circuit realizations. Equations and behavioral simulations

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result in an abundance of illustrations, following a "words and pictures" easy-to-understand approach. Teachers will find the book an important supplement to a standard analog and RF course, or it may stand alone as a textbook. Working engineers may find it useful as a handbook by bookmarking some of the step-by-step procedures, e.g., the section on simplified impedance matching or group delay flattening.

This book covers the fundamental knowledge of layout design from the ground up, addressing both physical design, as generally applied to digital circuits, and analog layout. Such knowledge provides the critical awareness and insights a layout designer must possess to convert a structural description produced during circuit design into the physical layout used for IC/PCB fabrication. The book introduces the technological know-how to transform silicon into functional devices, to understand the technology for which a layout is targeted (Chap. 2). Using this core technology knowledge as the foundation, subsequent chapters delve deeper into specific constraints and aspects of physical design, such as interfaces, design rules and libraries (Chap. 3), design flows and models (Chap. 4), design steps (Chap. 5), analog design specifics (Chap. 6), and finally reliability measures (Chap. 7). Besides serving as a textbook for engineering students, this book is a foundational reference for today's circuit designers.

This book "demystifies the art of analog circuit design and analysis, introducing the fundamentals of analog electronics through systems and applications. The book has been designed to complement popular digital

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systems modules and develop the skills needed in analog circuit design, including RF circuits. Throughout the book the learning process is encouraged by a variety of self-assessment questions and exercises including computer-based work, using spreadsheets and SPICE-like simulations. The content has been carefully designed to meet the requirements of first and second year electronic courses, communications engineering and telecommunications, as well as HND units." - back cover.

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.

Based on the popular Artech House classic, Digital Communication Systems Engineering with Software-Defined Radio, this book provides a practical approach to quickly learning the software-defined radio (SDR) concepts needed for work in the field. This up-to-date volume guides readers on how to quickly prototype wireless designs using SDR for real-world testing and experimentation. This book explores advanced wireless communication techniques such as OFDM, LTE, WLA, and hardware targeting. Readers will gain an

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understanding of the core concepts behind wireless hardware, such as the radio frequency front-end, analog-to-digital and digital-to-analog converters, as well as various processing technologies. Moreover, this volume includes chapters on timing estimation, matched filtering, frame synchronization message decoding, and source coding. The orthogonal frequency division multiplexing is explained and details about HDL code generation and deployment are provided. The book concludes with coverage of the WLAN toolbox with OFDM beacon reception and the LTE toolbox with downlink reception. Multiple case studies are provided throughout the book. Both MATLAB and Simulink source code are included to assist readers with their projects in the field.

This proven textbook guides readers to a thorough understanding of the theory and design of operational amplifiers (OpAmps). The core of the book presents systematically the design of operational amplifiers, classifying them into a periodic system of nine main overall configurations, ranging from one gain stage up to four or more stages. This division enables circuit designers to recognize quickly, understand, and choose optimal configurations. Characterization of operational amplifiers is given by macro models and error matrices, together with measurement techniques for their parameters. Definitions are given for four types of operational amplifiers depending on the grounding of their input and output ports. Many famous designs are evaluated in depth, using a carefully structured approach enhanced by numerous figures. In order to reinforce the concepts introduced and facilitate self-evaluation of

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design skills, the author includes problems with detailed solutions, as well as simulation exercises.

This text provides optional computer analysis exercises in selected examples, troubleshooting sections, & applications assignments. It uses frank explanations & limits maths to only what's needed for understanding electric circuits fundamentals.

Fundamentals of Analog Circuits offers comprehensive coverage of a wide, relevant array of topics. It integrates theory, practical circuits, and troubleshooting concepts, keeping mathematical details to a minimum. Delving more deeply into coverage of linear integrated circuits than discrete device circuits, the text guides readers through a system of pedagogical tools that both reinforces and challenges their understanding. \*Opens coverage with a five-chapter introduction to discrete devices that include diodes and transistor circuits, plus other topics often omitted in beginning devices texts- such as RF amplifiers, transmission lines, transformer coupled amplifiers, direct coupled amplifiers, and power amplifiers. \*Discusses the operational amplifier with separate chapters on active filters and oscillators.

\*Explores current topics of importance, including instrumentation amplifiers, isolation amplifiers, operational transconductance amplifiers (OTA), phase locked loops, A/D and D/A converters, transducers and more. \*Indicates current by meters-not arrows-allowing for easy integration into the curriculum of schools using either conventional current flow or electron flow.

\*Features

This comprehensive book meets the content

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requirements of most technical schools without hampering the reader with excessive detail. A strong emphasis on troubleshooting will help prepare the reader for work in the industry. This book introduces discrete device circuits and then delves more deeply into analog integrated circuits—a topic that has more importance for today's technicians. For technician-level courses in analog circuits and those who are pursuing a career in electrical technology.

### Analog Circuit Design

The essentials of analog circuit design with a unique all-region MOSFET modeling approach.

The content has been carefully designed to meet the requirements of first and second year students of electronic engineering, communications engineering and telecommunications, following full honours degree programs or two-year courses including HNC/HND. A completely new analog electronics textbook for the digital age Coverage ideal for courses with a communications / wireless focus

This book describes a consistent and direct methodology to the analysis and design of analog circuits with particular application to circuits containing feedback. The analysis and design of circuits containing feedback is generally presented by either following a series of examples where each circuit is simplified through the use of insight or experience (someone else's), or a complete nodal-matrix analysis generating lots of algebra. Neither of these approaches leads to gaining insight into the design process easily. The author develops a systematic approach to circuit analysis, the Driving Point Impedance

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and Signal Flow Graphs (DPI/SFG) method that does not require a-priori insight to the circuit being considered and results in factored analysis supporting the design function. This approach enables designers to account fully for loading and the bi-directional nature of elements both in the feedback path and in the amplifier itself, properties many times assumed negligible and ignored. Feedback circuits are shown to be directly and completely handled with little more effort than that for open loop designs. - Enables deep, functional understanding of feedback in analog circuits; - Describes a new, systematic approach to circuit analysis using Driving Point Impedance and Signal Flow Graphs (DPI/SFG); - Includes corrections to both the 'opening the loop' and Bode Return Ratio Methods.

Three chapters emphasize IC design, with SPICE simulations integrated into each one. \* Concise, streamlined presentation of topics.

This book, *Electronic Devices and Circuit Application*, is the first of four books of a larger work, *Fundamentals of Electronics*. It is comprised of four chapters describing the basic operation of each of the four fundamental building blocks of modern electronics: operational amplifiers, semiconductor diodes, bipolar junction transistors, and field effect transistors. Attention is focused on the reader obtaining a clear understanding of each of the devices when it is operated in equilibrium. Ideas fundamental to the study of electronic circuits are also developed in the book at a basic level to lessen the possibility of misunderstandings at a higher level. The difference between linear and non-linear operation is



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explored through the use of a variety of circuit examples including amplifiers constructed with operational amplifiers as the fundamental component and elementary digital logic gates constructed with various transistor types. Fundamentals of Electronics has been designed primarily for use in an upper division course in electronics for electrical engineering students. Typically such a course spans a full academic years consisting of two semesters or three quarters. As such, Electronic Devices and Circuit Applications, and the following two books, Amplifiers: Analysis and Design and Active Filters and Amplifier Frequency Response, form an appropriate body of material for such a course. Secondary applications include the use in a one-semester electronics course for engineers or as a reference for practicing engineers.

2010 First International Conference on Electrical and Electronics Engineering was held in Wuhan, China December 4-5. Advanced Electrical and Electronics Engineering book contains 72 revised and extended research articles written by prominent researchers participating in the conference. Topics covered include, Power Engineering, Telecommunication, Control engineering, Signal processing, Integrated circuit, Electronic amplifier, Nano-technologies, Circuits and networks, Microelectronics, Analog circuits, Digital circuits, Nonlinear circuits, Mixed-mode circuits, Circuits design, Sensors, CAD tools, DNA computing, Superconductivity circuits. Electrical and Electronics Engineering will offer the state of art of tremendous advances in Electrical and Electronics Engineering and

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also serve as an excellent reference work for researchers and graduate students working with/on Electrical and Electronics Engineering.

For DC/AC Circuits courses requiring a comprehensive, all inclusive text covering basic DC/AC Circuit fundamentals with additional chapters on Devices. This renowned text offers a comprehensive yet practical exploration of basic electrical and electronic concepts, hands-on applications, and troubleshooting. Written in a clear and accessible narrative, the Seventh Edition focuses on fundamental principles and their applications to solving real circuit analysis problems, and devotes six chapters to examining electronic devices.

The Industrial Electronics Handbook, Second Edition combines traditional and newer, more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high-power applications. Embracing the broad technological scope of the field, this collection explores fundamental areas, including analog and digital circuits, electronics, electromagnetic machines, signal processing, and industrial control and communications systems. It also facilitates the use of intelligent systems—such as neural networks, fuzzy systems, and evolutionary methods—in terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components.

Enhancing its value, this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal, one of the largest and most respected publications in the field.

Fundamentals of Industrial Electronics covers the essential areas that form the basis for the field. This volume presents the basic knowledge that can be applied to the other sections of the handbook. Topics covered include: Circuits and signals

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Devices Digital circuits Digital and analog signal processing  
Electromagnetics Other volumes in the set: Power Electronics  
and Motor Drives Control and Mechatronics Industrial  
Communication Systems Intelligent 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

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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

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