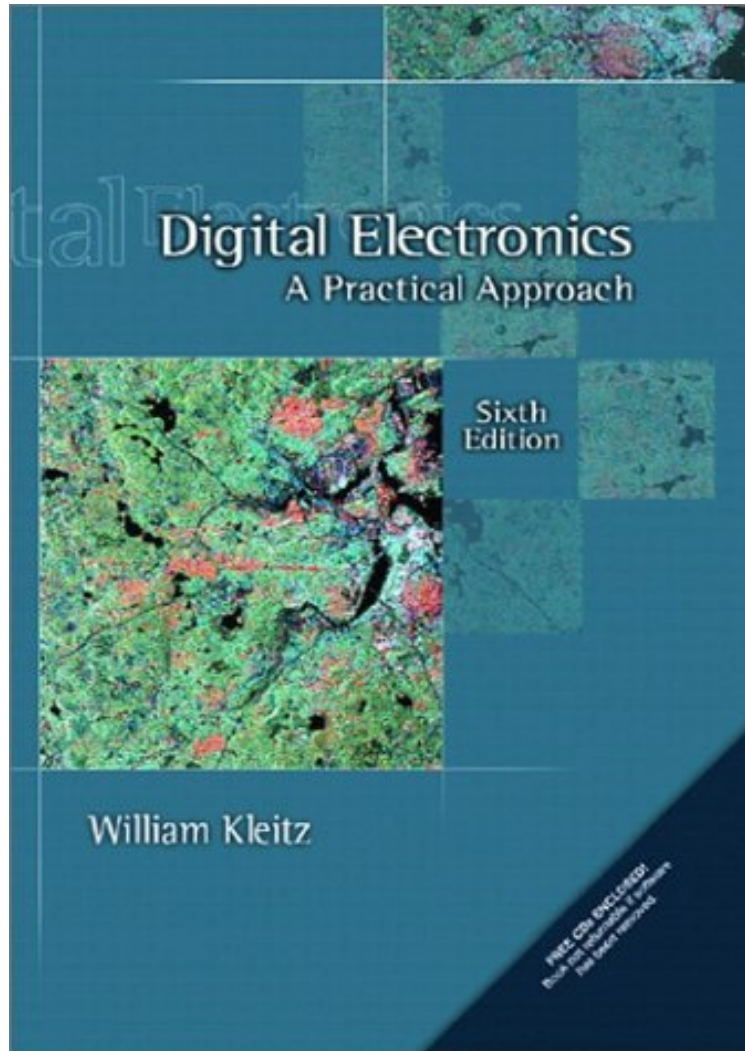


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Digital Electronics: A Practical Approach (6th Edition)

William Kleitz

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William Kleitz : Digital Electronics: A Practical Approach (6th Edition) before purchasing it in order to gage whether or not it would be worth my time, and all praised Digital Electronics: A Practical Approach (6th Edition):

0 of 0 people found the following review helpful. Overall I feel like it's a great book for introductory digital electronicsBy ryan tierneyOverall I feel like it's a great book for introductory digital electronics.Pros: the book isn't just text and equations, it has a lot of good visual and graphic illustrations on the different ideas and theories. Also, it is full of detailed examples and applications of theory for both the actual devices and the software behind designing the circuits.Cons: the only slight downfall that I could say is that it lacks some of the smaller details concerning the theories and concepts, more so in the beginning when discussing the smaller components like transistors and

diodes. That being said, I do not regret buying this text book at all 0 of 0 people found the following review helpful. Very happy with purchase By Terri Ornes Came on time and was just how described. Very happy with purchase. 4 of 4 people found the following review helpful. Great for Introduction to Digital Electronics By Cracker Jackson I purchased this book for an online class at community college. The class is actually "taught" by the writer of this textbook, which I thought was pretty cool. Although I had access to the author of the textbook, I did not need to utilize his knowledge because the text is written so well. I was able to basically teach myself and do very well in the class with this textbook and the included software. I would recommend this book to anyone who wants to know about digital electronics, whether they want to teach themselves or for a class (that is not to say you should purchase this instead of the text required for a class).

Digital electronics is the foundation of computers and microprocessor-based systems found in automobiles, industrial control systems, and home entertainment systems. Technological advances made in the past 25 years have provided us with integrated circuits and CPLDs (Complex Programmable Logic Devices) that can perform complex tasks with a minimum amount of abstract theory and complicated circuitry, bringing us to an exciting place in this important field. An understanding of digital electronics not only provides the prerequisite background (or further studies in microprocessors and microcomputer interfacing, it also (asters the job skills that are needed to open doors to a myriad of technical careers involving computers and microprocessors. This best-selling text, *Digital Electronics: A Practical Approach, Sixth Edition*, covers the fundamentals of digital electronics and is intended for students of technology, computer science, and engineering programs. As its name implies, the book approaches digital electronics from a practical perspective, enabling students who are taking a one- or two-semester course to learn the actual skills required to design and troubleshoot digital circuitry that they will see on the job. Stressing the importance of analytical reasoning skills and basic digital design using industry-standard integrated circuits and CPLDs, the book is written in a style that is both engaging and easy to read and understand, heavily supported by a multitude of review questions, problem sets, examples, illustrations, and troubleshooting applications. In addition, an extensive package of ancillary material is available to aid in the teaching and learning process, including:

- * Two CD-ROMs packaged with each copy of this text, containing:
 - Electronics Workbench(R)/MultiSIM(R) Circuit. data files
 - Solutions to in-text CPLD examples using Xilinx and Altera ,SM Texas Instruments Data Sheets
- * Instructor's Resource Manual (ISBN 0-13-092293-5) containing:
 - Solutions and answers to in-text problems
 - Solutions to Standard Logic Laboratory Manual
 - Test Item File
- * PowerPoint(R) transparencies (ISBN 0-13-092294-3)
- * Three Laboratory Manuals (Standard Logic) (ISBN 0-13-092291-9)
- A Troubleshooting Approach, by Michael Wiesner and Vance Venable (Altera ,SM CPLDs) (ISBN 0-13-084256-7)
- Digital Logic Simulation and CPLD Programming, by Steve Waterman (Xilinx CPLDs) (ISBN 0-13-088192-9)
- Digital Laboratory Experiments, by James Stewart and Chao-Ying Wang

- * PH Test Manager (ISBN 0-13-093417-8)
- * Instructor's Supplement CD (ISBN 0-13-092541-1)
- * CourseCompass (ISBN 0-13-094415-7)
- * WebCT (ISBN 0-13-062319-9)
- * Blackboard (ISBN 0-13-062318-0)
- * Companion Website: <http://www.prenhall.com/kleitz>

From the Publisher A new full-color edition of this widely-adopted best-seller...one that emphasizes analytical reasoning skills and basic digital design using industry-standard ICs. Students learn the practical skills they need to design and troubleshoot the digital circuitry they will face on the job. The author uses actual industry integrated circuits to demonstrate circuit operations, and a solid step-by-step progression is made from fundamentals through more complicated topics. Emphasis is on the basics of circuit design, so that students, knowing the foundational building blocks, can then teach themselves new technology as it appears. Numerous digital system design applications and troubleshooting exercises are provided, along with ample illustrations, examples, and review questions. Additionally, laboratory exercises can be created by having students build, test, debug, and analyze the operation of any of the text's examples.

From the Back Cover Digital electronics is the foundation of computers and microprocessor-based systems found in automobiles, industrial control systems, and home entertainment systems. Technological advances made in the past 25 years have provided us with integrated circuits and CPLDs (Complex Programmable Logic Devices) that can perform complex tasks with a minimum amount of abstract theory and complicated circuitry, bringing us to an exciting place in this important field. An understanding of digital electronics not only provides the prerequisite background (or further studies in microprocessors and microcomputer interfacing, it also (asters the job skills that are needed to open doors to a myriad of technical careers involving computers and microprocessors. This best-selling text, *Digital Electronics: A Practical Approach, Sixth Edition*, covers the fundamentals of digital electronics and is intended for students of technology, computer science, and engineering programs. As its name implies, the book approaches digital electronics from a practical perspective, enabling students who are taking a one- or two-semester course to learn the actual skills required to design and troubleshoot digital circuitry that they will see on the job. Stressing the importance of analytical reasoning skills and basic digital design using industry-standard integrated circuits and CPLDs, the book is written in a style that is both engaging and easy to read and understand, heavily supported by a multitude of review questions, problem sets, examples, illustrations, and troubleshooting

applications. In addition, an extensive package of ancillary material is available to aid in the teaching and learning process, including: Two CD-ROMs packaged with each copy of this text, containing: Electronics Workbench/MultiSIM Circuit. data files Solutions to in-text CPLD examples using Xilinx and Altera, SM Texas Instruments Data Sheets Instructor's Resource Manual (ISBN 0-13-092293-5) containing: Solutions and answers to in-text problems Solutions to Standard Logic Laboratory Manual Test Item File PowerPoint transparencies (ISBN 0-13-092294-3) Three Laboratory Manuals (Standard Logic) (ISBN 0-13-092291-9) A Troubleshooting Approach, by Michael Wiesner and Vance Venable (Altera, SM CPLDs) (ISBN 0-13-084256-7) Digital Logic Simulation and CPLD Programming, by Steve Waterman (Xilinx CPLDs) (ISBN 0-13-088192-9) Digital Laboratory Experiments, by James Stewart and Chao-Ying Wang PH Test Manager (ISBN 0-13-093417-8) Instructor's Supplement CD (ISBN 0-13-092541-1) CourseCompass (ISBN 0-13-094415-7) WebCT (ISBN 0-13-062319-9) Blackboard (ISBN 0-13-062318-0) Companion Website: <http://www.prenhall.com/kleitz> Excerpt. Reprinted by permission. All rights reserved.

To the Instructor It is time to reevaluate the way that digital electronics is taught. At first, digital electronics was a theoretical science, but now it is a down-to-earth, workable technology that can be taught using a practical approach. Digital Electronics: A Practical Approach, Sixth Edition, emphasizes analytical reasoning and basic digital design using the standard integrated circuits (ICs) that are used in industry today. Throughout the text, actual ICs are used, and reference is made to the appropriate manufacturers' data sheets. Because of this approach, students become proficient at using the terminology and timing diagrams that are the standard in manufacturers' data manuals and industrial settings. I have strived to make the text easy to read and understand, so that motivated students can teach themselves topics that require extra work without the constant attention of the instructor. Several digital system design applications and troubleshooting exercises are included. Also, there are ample illustrations, examples, and review questions to help students reach a point where they can reason out the end-of-chapter problems on their own. After all, that is the main goal of this book to help students to think and reason on their own. This book can be used for a one- or two-semester course in digital electronics and is intended for students of technology, computer science, or engineering programs. Although not mandatory, it is helpful if students using this text have an understanding of, or are concurrently enrolled in, a basic electricity course. A laboratory component to provide hands-on reinforcement of the material presented in this book can be very helpful. Laboratory exercises can be developed by building, testing, debugging, and analyzing the operation of any of the examples or system design applications that are provided within the text.

A Practical Approach to Learning Digital What is it that students really need to learn to function in the modern digital electronics field? That is the question that I ask myself every time I teach a digital course from my textbook or visit an electronics facility. The answer is that students need to learn the practical skills required to design and troubleshoot actual digital circuitry that they will see on the job. Practical means that the circuits that they study must be made up of actual ICs and the specifications that they learn about are taken from actual manufacturers' data sheets. It also means that the students must be taught how to think on their own and how to reason out new concepts as they come up on the job. They must also be able to teach themselves new material as new developments in the field arise. To address these needs, this book makes a strong effort to use actual ICs and data sheets in its examples. The text covers the basic fundamentals of any circuit design so that the students, knowing the basic building blocks, can teach themselves the newest technology when faced with it on the job. Also, material has been added to help reduce the anxiety that students feel when they first start a new job and are faced with schematics of large systems to analyze. To get students used to these large-scale circuit diagrams, I have included four "real-world" schematics that contain several of the ICs and circuits described in this text. By working the Schematic Interpretation problems at the end of each chapter and referencing the schematics in Appendix G, students are forced to dig into the complex diagrams a bit deeper in each successive chapter, so that by the end of the text, they will have covered almost all of the complete circuits.

Problem Sets A key part of learning any technical subject matter is for the student to have practice solving problems of varying difficulty. The problems at the end of each chapter are grouped together by section number. Within each section are several basic problems designed to get the student to solve a problem using the fundamental information presented in the chapter. In addition to the basic problems, there are four other problem types: D (Design) Problems designated with the letter D ask the students to modify an existing circuit or to design an original circuit to perform a specific task. This type of exercise stimulates creative thinking and instills a feeling of accomplishment on successful completion of a circuit design. T (Troubleshooting) Problems designated with the letter T present the student with a malfunctioning circuit to be diagnosed or ask for a procedure to follow to test for proper circuit operation. This develops the student's analytical skills and prepares him or her for troubleshooting tasks that would typically be faced on the job. C (Challenging) Problems designated with the letter C are the most challenging to solve. They require a thorough understanding of the material covered and go a step beyond by requiring the student to develop some of his or her own strategies to solve a problem that is different from the examples presented in the chapter. This also expands the student's analytical skills and develops critical thinking techniques. S (Schematic interpretation) Problems designated with the letter S are designed to give the student experience interpreting circuits and ICs in complete system schematic diagrams. The student is asked to identify certain components in the diagram, describe their operation, modify circuit elements, and design new circuit interfaces. This gives the student experience

working with real-world, large-scale schematics like the ones that he or she will see on the job. Electronics Workbench/MultiSIM Exercises Electronics Workbench (EWB) is a software simulation tool that is used to reinforce the theory presented in each chapter. It provides an accurate simulation of digital and analog circuit operations along with a simulation of instruments used by technicians to measure IC, component, and circuit characteristics. With this software, you have the ability to build and test most of the circuits presented in this text. Several EWB exercises are included at the end of each chapter. One of the CDs included in the back of this textbook contains all of the circuit files and instructions needed to solve each problem. There are three types of problems: (1) circuit interaction problems require the student to change input values and take measurements at the outputs to verify circuit operation, (2) design problems require the student to design, or modify, a circuit to perform a particular task, and (3) troubleshooting problems require the student to find and fix the fault that exists in the circuit that is given. Complex Programmable Logic Device Problems Complex Programmable Logic Device (CPLD) problems are included at the end of several chapters. Designing digital logic with CPLDs is becoming very popular in situations where high complexity and programmability are important. The CPLD problems use manufacturers' software to solve designs that were previously implemented using 7400-series ICs. Examples of circuit design are provided within the chapters, and Appendix E contains tutorials for using the software. The examples and problems used in the text are based on both Altera,SM and Xilinx products. The CPLD design software for their products can be downloaded from their websites (listed in Appendix A). Margin Annotation Icons Several annotations are given in the page margins throughout the text. These are intended to highlight particular points that were made on the page. They can be used as the catalyst to develop a rapport between the instructor and the students and to initiate team discussions among the students. Four different icons are used to distinguish between the annotations. Common Misconception: These annotations point out areas of digital electronics that have typically been stumbling blocks for students and need careful attention. Pointing out these potential problem areas helps students avoid making that mistake. Team Discussion: These annotations are questions that tend to initiate a discussion about a particular topic. The instructor can use them as means to develop cooperative learning by encouraging student interaction. Helpful Hint: These annotations offer suggestions for circuit analysis and highlight critical topics presented in that area of the text. Students use these tips to gain insights regarding important concepts. Inside Your PC: These annotations are used to illustrate practical applications of the theory in that section as it is applied inside of a modern PC. This will help the student to understand many of the terms used to describe the features that define the capability of a PC. Teaching and Learning Digital Electronics I would like to share with you some teaching strategies that I've developed from using this text for the past 14 years. Needless to say, students have become very excited about learning digital electronics because of the increasing popularity of the digital computer and the expanding job opportunities for digital technicians and engineers. Students are also attracted to the subject area because of the availability of inexpensive digital ICs, which have enabled them to construct useful digital circuits in the lab or at home at a minimal cost. Student Projects: I always encourage the students to build some of the fundamental building-block circuits that are presented in this text. The circuits that I recommend are the S-V power supply in Figure 11-39, the 60-Hz pulse generator in Figure 11-40, the cross-NAND switch debouncer in Figure 11-37, and the seven-segment LED display in Figure 12-42. Having these circuits provides a starting point for the student to test many of the other circuits in the text at his or her own pace, at home. Team Discussions: As early as possible in the course, I take advantage of the Team Discussion margin annotations. These are cooperative learning exercises where the students are allowed to form teams, discuss the problem, and present their conclusion to the class. These activities give them a sense of team cooperation and create a student network connection that will carry on throughout the rest of their studies. Laboratory Component: Giving the students the opportunity for hands-on laboratory experience is a very useful component of any digital course. An important feature of this text is that there is enough information given for any of the circuits so that they can be built and tested in the lab and that you can be certain they will give the same response as shown in the text. Circuit Illustrations: Almost every topic in the text has an illustration associated with it. Because of the extensive art program, I normally lecture directly from illustration to illustration. To do this, I have an overhead transparency made of every figure in the text. All figures and tables in the text are available in PowerPoint format for instructors adopting the text. Testing: Rather than let a long period of time elapse between tests, I try to give a half-hour quiz each week. Besides the daily homework, this forces the students to study at least once per week. I also believe that it is appropriate to allow them to have a formula sheet for the quiz or test (along with a TTL or CMOS databook). This sheet can have anything they want to write on it. Making up the formula sheet is a good way for them to study and eliminates a lot of routine memorization that they would not normally have to do on the job. The Learning Process: The student's knowledge is generally developed by learning the theory and the tools required to understand a particular topic, working through the examples provided, answering the review questions at the end of each section, and finally, solving the problems at the end of the chapter. I always encourage the students to rework the solutions given in the examples without looking at the solutions in the book until they are done. This gives them extra practice and a secure feeling of knowing the detailed solution is right there at their disposal. Chapter Organization Basically, the text can be divided into two halves: Chapters 1 to 8 cover basic digital logic and combinational logic, and Chapters 9 to 17 cover sequential logic and digital systems. Chapters 1 and 2 provide the

procedures for converting between the various number systems and introduce the student to the electronic signals and switches used in digital circuitry. Chapter 3 covers the basic logic gates and introduces the student to timing analysis and troubleshooting techniques. Chapter 4 explains how to implement designs using CPLDs. Chapter 5 shows how several of the basic gates can be connected together to form combinational logic. Boolean algebra, De Morgan's theorem, and Karnaugh mapping are used to reduce the logic to its simplest form. Chapters 6, 7, and 8 discuss combinational logic used to provide more advanced functions like parity checking, arithmetic operations, and code converting. The second half of this book begins with a discussion of the operating characteristics and specifications of the TTL and CMOS logic families (Chapter 9). Chapter 10 introduces flip-flops and the concept of sequential timing analysis. Chapter 11 makes the reader aware of the practical limitations of digital ICs and some common circuits that are used in later chapters to facilitate the use of medium-scale ICs. Chapters 12 and 13 expose the student to the operation and use of several common medium-scale ICs used to implement counter and shift register systems. Chapter 14 deals with oscillator and timing circuits built with digital ICs and with the 555 timer IC. Chapter 15 teaches the theory behind analog and digital conversion schemes and the practical implementation of ADC and DAC IC converters. Chapter 16 covers semiconductor, magnetic, and optical memory as it applies to PCs and microprocessor systems. Chapter 17 introduces microprocessor hardware and software to form a bridge between digital electronics and a follow-up course in microprocessors. The book concludes with several appendices used to supplement the chapter material. If time constraints only allow for a single-semester course, then the following sections should be covered to provide a coherent overview of digital electronics: Sections 1.1-1.5, 1.8-1.13 Sections 2.1-2.2 Sections 3.1-3.3, 3.5-3.9 Sections 4.1-4.2 Sections 5.1-5.4 Sections 6.1-6.2 Sections 9.1-9.2 Sections 10.1-10.8 Sections 12.1-12.6 Sections 13.1-13.6 Sections 15.1, 15.5, 15.6, 15.10 Sections 16.1, 16.2, 16.4 Also, if the course is intended for nonelectrical technology students, then the following sections could be omitted to eliminate any basic electricity requirements: Sections 2.6-2.8 Sections 9.1-9.3, 9.8 Sections 11.3-11.6 Sections 14.2-14.4 Sections 15.2-15.4, 15.12

Unique Learning Tools Special features included in this textbook to enhance the learning and comprehension process are: Two CD-ROMs packaged with each copy of this text containing: Electronics Workbench Version 5 circuit data files Electronics Workbench/MultiSIM Version 6 circuit data files Solutions to in-text Altera,SM CPLD examples Solutions to in-text Xilinx CPLD examples Texas Instruments' data sheets Over 100 Electronics Workbench/MultiSIM exercises are aimed at enhancing student understanding of fundamental concepts, troubleshooting strategies, and circuit design procedures. Performance-based objectives at the beginning of each chapter outline the goals to be achieved. A summary at the end of each chapter provides a review of the topics covered. Over 200 examples are worked out step by step to clarify problems that are normally stumbling blocks. A four-color format provides a visual organization to the various parts of each section. Troubleshooting applications and problems are used throughout the text to teach testing and debugging procedures. questions summarize each section and are answered to see that each learning objective is met. More than 1000 problems and questions are provided to enhance problem-solving skills. A complete range of problems, from straightforward to very challenging, is included. A glossary at the end of each chapter serves as a summary of the terminology just presented. Over 1000 detailed illustrations give visual explanations and serve as the basis for all discussions. Color operational notes are included on several of the illustrations to describe the operation of a particular part of the figure. Reference to manufacturers' data sheets throughout the book provides a valuable experience with real-world problem solving. A supplementary index of ICs provides a quick way to locate a particular IC by number. Timing waveforms are used throughout the text to illustrate the timing analysis techniques used in industry and to give a graphical picture of the sequential operations of digital ICs. Several tables of commercially used ICs provide a source for state-of-the-art circuit design. Several photographs are included to illustrate specific devices and circuits discussed in the text. Extensive Supplements Package An extensive package of supplementary material is available to aid in the teaching and learning process. Two CD-ROMs packaged with each copy of this text, containing: Electronics Workbench Version 5 circuit data files Electronics Workbench/MultiSIM Version 6 circuit data files Solutions to in-text Altera,SM CPLD examples Solutions to in-text Xilinx CPLD examples Texas Instruments' data sheets Instructor's Resource Manual (ISBN 0-13-092293-5) containing: Solutions and answers to in-text problems Solutions to the Standard Logic Laboratory Manual Test Item File, by Les Taylor (DeVry Institute of Technology) and Mike Durren (Lake Michigan College), with over 1000 test questions that can be used to develop weekly quizzes, tests, or final exams PowerPoint Transparencies on CD-ROM (ISBN 0-13-092294-3) containing: All figures and tables from the text Lecture notes for all chapters by Mike Durren (Lake Michigan College) Three Laboratory Manuals, to provide hands-on laboratory experience and reinforce the material presented in the textbook Standard Logic A Troubleshooting Approach for Digital Electronics, by Michael Wiesner and Vance Venable (both of Heald College) (ISBN 0-13-092291-9) Altera CPLDs Digital Logic Simulation and CPLD Programming, by Steve Waterman (DeVry Institute of Technology) (ISBN 0-13-084256-7) Xilinx CPLDs Digital Laboratory Experiments, by James Stewart and Chao-Ying Wang (DeVry Institute of Technology) (ISBN 0-13-088192-9) PH Test Manager, in Windows format, for producing customized tests and quizzes (ISBN 0-13-093417-8) Companion Website, a student resource containing additional multiple-choice questions by Kenneth Lawell (Brown Institute) and other textbook-related links, found at <http://www.prenhall.com/kleitzi> Instructor's Supplement CD-ROM,

a software compilation of the instructors' ancillaries (ISBN 0-13-092541-1) CourseCompass (ISBN 0-13-094415-7) WebCT (ISBN 0-13-062319-9) Blackboard (ISBN 0-13-062318-0) Changes in the Sixth Edition The first five editions were developed from an accumulation of 18 years of class notes. Teaching from the fifth edition for the past 3 years has given me the opportunity to review several suggestions from my students and other faculty regarding such things as ways to improve a circuit diagram, clarifying an explanation, and redesigning an application to make it easier to duplicate in lab. More than 120 schools have adopted the fifth edition. To write the sixth edition, I have taken advantage of the comments from these schools as well as my own experience and market research to develop an even more practical and easier-to-learn-from textbook. Besides rewriting several of the examples and applications based on my classroom experience, I have added the following material: A new chapter covering CPLD architecture, design, and circuit implementation. Examples throughout the book of circuit implementation using a CPLD in place of conventional digital ICs. Several chapter-end CPLD problems. Altera,SM and Xilinx CPLD software tutorials in Appendix E. Expanded coverage of modern semiconductor, flash, magnetic, and optical memory. Expanded coverage of basic electricity principles in Appendix F. Hundreds of new circuit descriptive and operational notes in the figures. Inside Your PC margin annotations. Important Web sites listed in Appendix A. Coverage of the Advanced Very-Low-Voltage CMOS logic family. Comparison tables of modern SRAM, DRAM, EEPROM, and Flash memories. Coverage of modern serial and parallel data formats. To the Student Digital electronics is the foundation of computers and microprocessor-based systems found in automobiles, industrial control systems, and home entertainment systems. You are beginning your study of digital electronics at a good time. Technological advances made during the past 25 years have provided us with ICs that can perform complex tasks with a minimum amount of abstract theory and complicated circuitry. Before you are through this book, you'll be developing exciting designs that you've always wondered about but can now experience firsthand. The study of digital electronics also provides the prerequisite background for your future studies in microprocessors and microcomputer interfacing. It also provides the job skills to become a computer service technician, production test technician, or digital design technician, or to fill a multitude of other positions related to computer and microprocessor-based systems. This book is written as a learning tool, not just as a reference. The concept and theory of each topic is presented first. Then, an explanation of its operation is given. This is followed by several worked-out examples and, in some cases, a system design application. The review questions at the end of each chapter will force you to dig back into the reading to see that you have met the learning objectives given at the beginning of the chapter. The problems at the end of each chapter will require more analytical reasoning, but the procedures for their solutions were already given to you in the examples. One good way to prepare for homework problems and tests is to cover up the solutions to the examples and try to work them out yourself. If you get stuck, you've got the answer and an explanation for the answer right there. I also suggest that you take advantage of your Electronics Workbench problems. The more practice you get, the easier the course will be. I wish you the best of luck in your studies and future employment. Bill Kleitz <http://www.prenhall.com/kleitz>