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with PLD Integration Handbook of Digital Logic ... with Practical Applications DIGITAL LOGIC AND COMPUTER ORGANIZATION

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Manual can be taken as well as picked to act.

This textbook is intended to serve as a practical guide for the design of complex digital logic circuits such as digital control circuits, network interface circuits, pipelined arithmetic units, and RISC microprocessors. It is an advanced digital logic design textbook that emphasizes the use of synthesizable Verilog code and provides numerous fully worked-out practical design examples including a Universal Serial Bus interface, a pipelined multiply-accumulate unit, and a pipelined microprocessor for the ARM THUMB architecture.

Description: The book is an attempt to make Digital Logic Design easy and simple to understand. The book covers various features of Logic Design using lots of examples and relevant diagrams. The complete text is reviewed for its correctness. This book is an outcome of sincere effort and hard work to bring concepts of Digital Logic Design close to the audience of this book. The salient features of the book:--Easy explanation of Digital System and Binary Numbers with lots of solved examples--Detailed covering of Boolean Algebra and Gate-Level Minimization with proper examples and diagrammatic representation.--Detailed analysis of different Combinational Logic Circuits--Complete Synchronous sequential Logic understanding--Deep understanding of Memory and Programmable Logic--Detailed analysis of different Asynchronous Sequential Logic

Table Of Contents: Unit 1 : Digital System and Binary Numbers; Part 1: Digital System and Binary Numbers Part 2 : Boolean Algebra and Gate Level Minimization Unit 2 : Combinational Logic Unit 3: Sequential Circuits Unit 4 : Memory, Programmable Logic and Design Unit 5 : Asynchronous Sequential Logic

New, updated and expanded topics in the fourth edition include: EBCDIC, Grey code, practical applications of flip-flops, linear and shaft encoders, memory elements and FPGAs. The section on fault-finding has been expanded. A new chapter is dedicated to the interface between digital components and analog voltages. \*A highly accessible, comprehensive and fully up to date digital systems text \*A well known and respected text now revamped for current courses \*Part of the Newnes suite of texts for HND/1st

year modules This textbook is intended to introduce the student of electronics to the fundamentals of digital circuits, both combinational and sequential, in a reasonable and systematic manner. It proceeds from basic logic concepts to circuits and designs. Fundamentals of Digital Logic and Microcomputer Design, has long been hailed for its clear and simple presentation of the principles and basic tools required to design typical digital systems such as microcomputers. In this Fifth Edition, the author focuses on computer design at three levels: the device level, the logic level, and the system level. Basic topics are covered, such as number systems and Boolean algebra, combinational and sequential logic design, as well as more advanced subjects such as assembly language programming and microprocessor-based system design. Numerous examples are provided throughout the text. Coverage includes: Digital circuits at the gate and flip-flop levels Analysis and design of combinational and sequential circuits Microcomputer organization, architecture, and programming concepts Design of computer instruction sets, CPU, memory, and I/O System design features associated with popular microprocessors from Intel and Motorola Future plans in microprocessor development An instructor's manual, available upon request Additionally, the accompanying CD-ROM, contains step-by-step procedures for installing and using Altera Quartus II software, MASM 6.11 (8086), and 68asm (68000), provides valuable simulation results via screen shots. Fundamentals of Digital Logic and Microcomputer Design is an essential reference that will provide you with the fundamental tools you need to design typical digital systems. **PRINCIPLES OF MODERN DIGITAL DESIGN FROM UNDERLYING PRINCIPLES TO IMPLEMENTATION—A THOROUGH INTRODUCTION TO DIGITAL LOGIC DESIGN** With this book, readers discover the connection between logic design principles and theory and the logic design and optimization techniques used in practice. Therefore, they not only learn how to implement current design techniques, but also how these techniques were developed and why they work. With a deeper understanding of the underlying principles, readers become better problem-solvers when faced with new and difficult digital design challenges. Principles of Modern Digital Design begins with an examination of number systems and

binary code followed by the fundamental concepts of digital logic. Next, readers advance to combinational logic design. Armed with this foundation, they are then introduced to VHDL, a powerful language used to describe the function of digital circuits and systems. All the major topics needed for a thorough understanding of modern digital design are presented, including: Fundamentals of synchronous sequential circuits and synchronous sequential circuit design Combinational logic design using VHDL Counter design Sequential circuit design using VHDL Asynchronous sequential circuits VHDL-based logic design examples are provided throughout the book to illustrate both the underlying principles and practical design applications. Each chapter is followed by exercises that enable readers to put their skills into practice by solving realistic digital design problems. An accompanying website with Quartus II software enables readers to replicate the book's examples and perform the exercises. This book can be used for either a two- or one-semester course for undergraduate students in electrical and computer engineering and computer science. Its thorough explanation of theory, coupled with examples and exercises, enables both students and practitioners to master and implement modern digital design techniques with confidence. This practical introduction explains exactly how digital circuits are designed, from the basic circuit to the advanced system. It covers combinational logic circuits, which collect logic signals, to sequential logic circuits, which embody time and memory to progress through sequences of states. The primer also highlights digital arithmetic and the integrated circuits that implement the logic functions. Based on the author's extensive experience in teaching digital electronics to undergraduates, the book translates theory directly into practice and presents the essential information in a compact, digestible style. Worked problems and examples are accompanied by abbreviated solutions, with demonstrations to ensure that the design material and the circuits' operation are fully understood. This is essential reading for any electronic or electrical engineering student new to digital electronics and requiring a succinct yet comprehensive introduction. Fundamentals of Digital Logic with VHDL Design teaches the basic design techniques for logic circuits. The text provides a clear and easily

understandable discussion of logic circuit design without the use of unnecessary formalism. It emphasizes the synthesis of circuits and explains how circuits are implemented in real chips. Fundamental concepts are illustrated by using small examples, which are easy to understand. Then, a modular approach is used to show how larger circuits are designed. VHDL is a complex language so it is introduced gradually in the book. Each VHDL feature is presented as it becomes pertinent for the circuits being discussed. While it includes a discussion of VHDL, the book provides thorough coverage of the fundamental concepts of logic circuit design, independent of the use of VHDL and CAD tools. A CD-ROM containing all of the VHDL design examples used in the book, as well Altera's Quartus II CAD software, is included free with every text. This textbook, based on the author's fifteen years of teaching, is a complete teaching tool for turning students into logic designers in one semester. Each chapter describes new concepts, giving extensive applications and examples. Assuming no prior knowledge of discrete mathematics, the authors introduce all background in propositional logic, asymptotics, graphs, hardware and electronics. Important features of the presentation are:

- All material is presented in full detail. Every designed circuit is formally specified and implemented, the correctness of the implementation is proved, and the cost and delay are analyzed
- Algorithmic solutions are offered for logical simulation, computation of propagation delay and minimum clock period
- Connections are drawn from the physical analog world to the digital abstraction
- The language of graphs is used to describe formulas and circuits
- Hundreds of figures, examples and exercises enhance understanding.

The extensive website (<http://www.eng.tau.ac.il/~guy/Even-Medina/>) includes teaching slides, links to Logisim and a DLX assembly simulator. Practical Design of Digital Circuits: Basic Logic to Microprocessors demonstrates the practical aspects of digital circuit design. The intention is to give the reader sufficient confidence to embark upon his own design projects utilizing digital integrated circuits as soon as possible. The book is organized into three parts. Part 1 teaches the basic principles of practical design, and introduces the designer to his "tools" — or rather, the range of devices that can be called upon. Part 2 shows the

designer how to put these together into viable designs. It includes two detailed descriptions of actual design exercises. The first of these is a fairly simple exercise in CMOS design; the second is a much more complex design for an electronic game, using TTL devices. Part 3 focuses on microprocessors. It illustrates how a particular design problem changes emphasis when a microprocessor is introduced. This book is aimed at a fairly broad market: it is intended to aid the linear design engineer to cross the barrier into digital electronics; it should provide interesting supporting reading for students studying digital electronics from the more academic viewpoint; and it should enable the enthusiast to design much more ambitious and sophisticated projects than he could otherwise attempt if restricted to linear devices. From one of the best-known and successful authors in the field comes this new edition of Digital Logic and State Machine Design. The text is concise and practical, and covers the important area of digital system design specifically for undergraduates. Comer's primary goal is to illustrate that sequential circuits can be designed using state machine techniques. These methods apply to sequential circuit design as efficiently as Boolean algebra and Karnaugh mapping methods apply to combinatorial design. After presenting the techniques, Comer proceeds directly into designing digital systems. This task consists of producing the schematic or block diagram of the system based on nothing more than a given set of specifications. The design serves as the basis for the construction of the actual hardware system. In the new Third Edition, Comer introduces state machines earlier than in previous editions, and adds entire chapters on programmable logic devices and computer organization. This introductory text on 'digital logic and computer organization' presents a logical treatment of all the fundamental concepts necessary to understand the organization and design of a computer. It is designed to cover the requirements of a first-course in computer organization for undergraduate Computer Science, Electronics, or MCA students. Beginning from first principles, the text guides students through to a stage where they are able to design and build a small computer with available IC chips. Starting with the foundation material on data representation, computer arithmetic and combinatorial and sequential circuit



design, the text explains ALU design and includes a discussion on an ALU IC chip. It also discusses Algorithmic State Machine and its representation using a Hardware Description Language before shifting to computer organization. The evolutionary development of a small hypothetical computer is described illustrating hardware-software trade-off in computer organization. Its instruction set is designed giving reasons why each new instruction is introduced. This is followed by a description of the general features of a CPU, organization of main memory and I/O systems. The book concludes with a chapter describing the features of a real computer, namely the Intel Pentium. An appendix describes a number of laboratory experiments which can be put together by students, culminating in the design of a toy computer.

**Key Features**

- Self-contained presentation of digital logic and computer organization with minimal pre-requisites
- Large number of examples provided throughout the book
- Each chapter begins with learning goals and ends with a summary to aid self-study by students.

The fundamentals and implementation of digital electronics are essential to understanding the design and working of consumer/industrial electronics, communications, embedded systems, computers, security and military equipment. Devices used in applications such as these are constantly decreasing in size and employing more complex technology. It is therefore essential for engineers and students to understand the fundamentals, implementation and application principles of digital electronics, devices and integrated circuits. This is so that they can use the most appropriate and effective technique to suit their technical need. This book provides practical and comprehensive coverage of digital electronics, bringing together information on fundamental theory, operational aspects and potential applications. With worked problems, examples, and review questions for each chapter, Digital Electronics includes: information on number systems, binary codes, digital arithmetic, logic gates and families, and Boolean algebra; an in-depth look at multiplexers, de-multiplexers, devices for arithmetic operations, flip-flops and related devices, counters and registers, and data conversion circuits; up-to-date coverage of recent application fields, such as programmable logic devices, microprocessors,

microcontrollers, digital troubleshooting and digital instrumentation. A comprehensive, must-read book on digital electronics for senior undergraduate and graduate students of electrical, electronics and computer engineering, and a valuable reference book for professionals and researchers. The book is written for an undergraduate course on digital electronics. The book provides basic concepts, procedures and several relevant examples to help the readers to understand the analysis and design of various digital circuits. It also introduces hardware description language, VHDL. The book teaches you the logic gates, logic families, Boolean algebra, simplification of logic functions, analysis and design of combinational circuits using SSI and MSI circuits and analysis and design of the sequential circuits. This book provides in-depth information about multiplexers, de-multiplexers, decoders, encoders, circuits for arithmetic operations, various types of flip-flops, counters and registers. It also covers asynchronous sequential circuits, memories and programmable logic devices. This book focuses on the basic principles of digital electronics and logic design. It is designed as a textbook for undergraduate students of electronics, electrical engineering, computer science, physics, and information technology. The text covers the syllabi of several Indian and foreign universities. It depicts the comprehensive resources on the recent ideas in the area of digital electronics explored by leading experts from both industry and academia. A good number of diagrams are provided to illustrate the concepts related to digital electronics so that students can easily comprehend the subject. Solved examples within the text explain the concepts discussed and exercises are provided at the end of each chapter. Fundamentals of Digital Logic with Verilog Design is intended for an introductory course in digital logic design, which is a basic course in most Electrical and Computer Engineering programs. The authors provide a desirable balance between classical and modern design approaches. Basic concepts are introduced using simple logic circuits, which are designed by using both manual techniques and modern CAD-tool-based methods. Having established the fundamental concepts, more complex, realistic circuits are then designed with the CAD tools. The Verilog language is an integral part of design techniques used throughout the book.

Altera's advanced Max plus II CAD system (on CD-ROM) and a series of step-by-step tutorials are included. Updated to reflect the latest advances in the field, the Sixth Edition of Fundamentals of Digital Logic and Microcontrollers further enhances its reputation as the most accessible introduction to the basic principles and tools required in the design of digital systems. Features updates and revision to more than half of the material from the previous edition Offers an all-encompassing focus on the areas of computer design, digital logic, and digital systems, unlike other texts in the marketplace Written with clear and concise explanations of fundamental topics such as number system and Boolean algebra, and simplified examples and tutorials utilizing the PIC18F4321 microcontroller Covers an enhanced version of both combinational and sequential logic design, basics of computer organization, and microcontrollers Number systems; Base-R arithmetic; Boolean algebra; Special boolean functions and basic logic conventions; Minimization procedures for boolean function; Binary arithmetic units; Decimal arithmetic; Introduction to sequential circuit design; Practical flip-flop circuits; Binary counters; Register design techniques; Advanced arithmetic units. This book presents the fundamentals of digital electronics in a focused and comprehensive manner with many illustrations for understanding of the subject with high clarity. Digital Signal Processing (DSP) application information is provided for many topics of the subject to appreciate the practical significance of learning. To summarize, this book lays a foundation for students to become DSP engineers. This text is intended for a first course in digital logic design, at the sophomore or junior level, for electrical engineering, computer engineering and computer science programs, as well as for a number of other disciplines such as physics and mathematics. The book can also be used for self-study or for review by practicing engineers and computer scientists not intimately familiar with the subject. After completing this text, the student should be prepared for a second (advanced) course in digital design, switching and automata theory, microprocessors or computer organization. This book introduces readers to both the fundamentals of digital logic and the advanced, modern method of utilizing the fundamentals with PLD Technology. An application first

approach—and over 80 PLD alternative circuit applications for both Altera and Xilinx integrated and referenced throughout the book—shows learners how to immediately begin using PLD software and allow them to experiment. The book emphasizes strong testing, test equipment, and troubleshooting, to help prepare the technician student for the working world. Other key topics include number systems and codes, standard logic versus programmable logic, digital IC types, troubleshooting logic gates, logic circuit simplification, decoders and encoders, other combinational logic circuits, set-reset and data-type flip-flops, JK flip-flop and timer circuits, registers, counters, semiconductor memories, digital systems, and an introduction to microprocessors. For technicians specializing in digital electronics. The omnipresence of electronic devices in our everyday lives has been accompanied by the downscaling of chip feature sizes and the ever increasing complexity of digital circuits. This book is devoted to the analysis and design of digital circuits, where the signal can assume only two possible logic levels. It deals with the basic principles and concepts of digital electronics. It addresses all aspects of combinational logic and provides a detailed understanding of logic gates that are the basic components in the implementation of circuits used to perform functions and operations of Boolean algebra. Combinational logic circuits are characterized by outputs that depend only on the actual input values. Efficient techniques to derive logic equations are proposed together with methods of analysis and synthesis of combinational logic circuits. Each chapter is well structured and is supplemented by a selection of solved exercises covering logic design practices. The third edition of Digital Logic Techniques provides a clear and comprehensive treatment of the representation of data, operations on data, combinational logic design, sequential logic, computer architecture, and practical digital circuits. A wealth of exercises and worked examples in each chapter give students valuable experience in applying the concepts and techniques discussed. Beginning with an objective comparison between analogue and digital representation of data, the author presents the Boolean algebra framework for digital electronics, develops combinational logic design from first principles, and presents cellular logic as an alternative structure more relevant than canonical forms

to VLSI implementation. He then addresses sequential logic design and develops a strategy for designing finite state machines, giving students a solid foundation for more advanced studies in automata theory. The second half of the book focuses on the digital system as an entity. Here the author examines the implementation of logic systems in programmable hardware, outlines the specification of a system, explores arithmetic processors, and elucidates fault diagnosis. The final chapter examines the electrical properties of logic components, compares the different logic families, and highlights the problems that can arise in constructing practical hardware systems.

**DIGITAL LOGIC** This book teaches the basic principles of digital circuits. It is appropriate for an introductory course in digital electronics for the students of: • B.Sc. (Computer Science) • B.Sc. (Electronics) • B.Sc. (Information Technology) • B.Sc. (Physics) • Bachelor of Computer Applications (BCA) • Postgraduate Diploma in Computer Applications • Master of Computer Applications (MCA) The book emphasizes the must know concepts that should be covered in an introductory course and provides an abundance of clearly explained examples, so essential for a thorough understanding of the principles involved in the analysis and design of digital computers. The book takes students step-by-step through digital theory, focusing on: » Number representation systems and codes for representing information in digital systems » Use of logic gates in building digital circuits » Basic postulates and theorems of Boolean algebra » Karnaugh map method for simplifying Boolean functions » Arithmetic circuits such as adders and subtractors » Combinational circuit building blocks such as multiplexers, decoders and encoders » Sequential circuit building blocks such as flip-flops, counters and registers » Operation of memory elements such as RAM, DRAM, magnetic disk, magnetic bubble, optical disk, etc.

1. Number Systems and Codes
2. Logic Gates and Circuits
3. Boolean Algebra
4. Combinational Logic Circuits
5. Sequential Logic Circuits
6. Counters and Shift Registers
7. MEMORY ELEMENTS

The omnipresence of electronic devices in our everyday lives has been accompanied by the downscaling of chip feature sizes and the ever increasing complexity of digital circuits. This book is devoted to the analysis and design of digital circuits, where the

signal can assume only two possible logic levels. It deals with the basic principles and concepts of digital electronics. It addresses all aspects of combinational logic and provides a detailed understanding of logic gates that are the basic components in the implementation of circuits used to perform functions and operations of Boolean algebra. Combinational logic circuits are characterized by outputs that depend only on the actual input values. Efficient techniques to derive logic equations are proposed together with methods of analysis and synthesis of combinational logic circuits. Each chapter is well structured and is supplemented by a selection of solved exercises covering logic design practices. An essential companion to John C Morris's 'Analogue Electronics', this clear and accessible text is designed for electronics students, teachers and enthusiasts who already have a basic understanding of electronics, and who wish to develop their knowledge of digital techniques and applications. Employing a discovery-based approach, the author covers fundamental theory before going on to develop an appreciation of logic networks, integrated circuit applications and analogue-digital conversion. A section on digital fault finding and useful ic data sheets completes the book. FPGAs have almost entirely replaced the traditional Application Specific Standard Parts (ASSP) such as the 74xx logic chip families because of their superior size, versatility, and speed. For example, FPGAs provide over a million fold increase in gates compared to ASSP parts. The traditional approach for hands-on exercises has relied on ASSP parts, primarily because of their simplicity and ease of use for the novice. Not only is this approach technically outdated, but it also severely limits the complexity of the designs that can be implemented. By introducing the readers to FPGAs, they are being familiarized with current digital technology and the skills to implement complex, sophisticated designs. However, working with FPGAs comes at a cost of increased complexity, notably the mastering of an HDL language, such as Verilog. Therefore, this book accomplishes the following: first, it teaches basic digital design concepts and then applies them through exercises; second, it implements these digital designs by teaching the user the syntax of the Verilog language while implementing the exercises. Finally, it employs contemporary digital hardware,

such as the FPGA, to build a simple calculator, a basic music player, a frequency and period counter and it ends with a microprocessor being embedded in the fabric of the FGPA to communicate with the PC. In the process, readers learn about digital mathematics and digital-to-analog converter concepts through pulse width modulation. Digital Logic Design is a comprehensive textbook, which aims to provide entrylevelreaders a quick start to the field of digital logic design so as to facilitate themwith the capability suitable for the versatility of social change and interdisciplinarylearning. This textbook can be used as a textbook for classroom use in the fields ofelectronics, electrical, computer science, information engineering, mechanical, and soon. The salient features of this textbook are as follows:

1. Introduce incrementally the principles of digital logic design and exemplify eachbasic theme and concept with abundant illustrations.
2. Detail design principles of various combinational modules, including decoders, encoders, multiplexers, demultiplexers, arithmetic circuits, and so on.
3. Introduce design principles of various sequential modules, including counters, registers, shift registers, sequence generators, etc.
4. Address the structures, features, and applications of PLD/FPGA devices.
5. Exemplify applications of CPLD/FPGA devices with Verilog HDL modules.
6. Provide 20 basic and application experiments of digital logic to help readers verifythe consistence of digital logic between principles and practice.
7. Include an abundance of review questions in each section to help readers evaluatetheir understandings about the section.
8. Deal with Verilog HDL concisely in relevant sections so as to make the readerunderstand how to describe a logic circuit in Verilog HDL precisely.

Digital Logic Design is an ideal textbook for the digital logic design course in thefields of electronics, electrical, computer science, information engineering, mechanical, etc, or serves as a valuable reference book for self-study. As electronic devices become increasingly prevalent in everyday life, digital circuits are becoming even more complex and smaller in size. This book presents the basic principles of digital electronics in an accessible manner, allowing the reader to grasp the principles of combinational and sequential logic and the underlying techniques for the analysis and design of digital circuits. Providing a hands-on approach, this

work introduces techniques and methods for establishing logic equations and designing and analyzing digital circuits. Each chapter is supplemented with practical examples and well-designed exercises with worked solutions. This second of three volumes focuses on sequential and arithmetic logic circuits. It covers various aspects related to the following topics: latch and flip-flop; binary counters; shift registers; arithmetic and logic circuits; digital integrated circuit technology; semiconductor memory; programmable logic circuits. Along with the two accompanying volumes, this book is an indispensable tool for students at a bachelors or masters level seeking to improve their understanding of digital electronics, and is detailed enough to serve as a reference for electronic, automation and computer engineers. Fundamentals of Digital Logic with VHDL Design teaches the basic design techniques for logic circuits. The text provides a clear and easily understandable discussion of logic circuit design without the use of unnecessary formalism. It emphasizes the synthesis of circuits and explains how circuits are implemented in real chips. Fundamental concepts are illustrated by using small examples, which are easy to understand. Then, a modular approach is used to show how larger circuits are designed. VHDL is a complex language so it is introduced gradually in the book. Each VHDL feature is presented as it becomes pertinent for the circuits being discussed. While it includes a discussion of VHDL, the book provides thorough coverage of the fundamental concepts of logic circuit design, independent of the use of VHDL and CAD tools. A CD-ROM containing all of the VHDL design examples used in the book, as well as Altera's Quartus II CAD software, is included free with every text. The third edition of Digital Logic Techniques provides a clear and comprehensive treatment of the representation of data, operations on data, combinational logic design, sequential logic, computer architecture, and practical digital circuits. A wealth of exercises and worked examples in each chapter give students valuable experience in applying the concepts and techniques discussed. Beginning with an objective comparison between analogue and digital representation of data, the author presents the Boolean algebra framework for digital electronics, develops combinational logic design from first principles, and presents cellular logic as an



alternative structure more relevant than canonical forms to VLSI implementation. He then addresses sequential logic design and develops a strategy for designing finite state machines, giving students a solid foundation for more advanced studies in automata theory. The second half of the book focuses on the digital system as an entity. Here the author examines the implementation of logic systems in programmable hardware, outlines the specification of a system, explores arithmetic processors, and elucidates fault diagnosis. The final chapter examines the electrical properties of logic components, compares the different logic families, and highlights the problems that can arise in constructing practical hardware systems.

Market\_Desc: · Electrical engineers· Logic Designers in Computer Industry Special Features: · Provides extensive exercises for readers to work out while studying a topic· Presents up-to-date approaches in logic design in later chapters· Discusses the relationship between digital system design and computer architecture

About The Book: This is an introductory-level book on the principles of digital logic design. While providing coverage to the usual topics in combinational and sequential circuit principles, it also includes a chapter on the use of the hardware description language ABEL in the design of circuits using PLDs and a chapter on computer organization.

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