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KEY=FUNDAMENTALS - MARIELA MATHEWS

FUNDAMENTALS OF MODERN VLSI DEVICES

Cambridge University Press *Learn the basic properties and designs of modern VLSI devices, as well as the factors affecting performance, with this thoroughly updated second edition. The first edition has been widely adopted as a standard textbook in microelectronics in many major US universities and worldwide. The internationally renowned authors highlight the intricate interdependencies and subtle trade-offs between various practically important device parameters, and provide an in-depth discussion of device scaling and scaling limits of CMOS and bipolar devices. Equations and parameters provided are checked continuously against the reality of silicon data, making the book equally useful in practical transistor design and in the classroom. Every chapter has been updated to include the latest developments, such as MOSFET scale length theory, high-field transport model and SiGe-base bipolar devices.*

FUNDAMENTALS OF NANOTRANSISTORS

World Scientific Publishing Company *The transistor is the key enabler of modern electronics. Progress in transistor scaling has pushed channel lengths to the nanometer regime where traditional approaches to device physics are less and less suitable. These lectures describe a way of understanding MOSFETs and other transistors that is much more suitable than traditional approaches when the critical dimensions are measured in nanometers. It uses a novel, "bottom-up approach" that*

agrees with traditional methods when devices are large, but that also works for nano-devices. Surprisingly, the final result looks much like the traditional, textbook, transistor models, but the parameters in the equations have simple, clear interpretations at the nanoscale. The objective is to provide readers with an understanding of the essential physics of nanoscale transistors as well as some of the practical technological considerations and fundamental limits. This book is written in a way that is broadly accessible to students with only a very basic knowledge of semiconductor physics and electronic circuits. Complemented with online lecture by Prof Lundstrom: nanoHUB-U Nanoscale Transistor Contents: MOSFET Fundamentals: Overview The Transistor as a Black Box The MOSFET: A Barrier-Controlled Device MOSFET IV: Traditional Approach MOSFET IV: The Virtual Source Model MOS Electrostatics: Poisson Equation and the Depletion Approximation Gate Voltage and Surface Potential Mobile Charge: Bulk MOS Mobile Charge: Extremely Thin SOI 2D MOS Electrostatics The VS Model Revisited The Ballistic MOSFET: The Landauer Approach to Transport The Ballistic MOSFET The Ballistic Injection Velocity Connecting the Ballistic and VS Models Transmission Theory of the MOSFET: Carrier Scattering and Transmission Transmission Theory of the MOSFET Connecting the Transmission and VS Models VS Characterization of Transport in Nanotransistors Limits and Limitations Readership: Any student and professional with an undergraduate degree in the physical sciences or engineering.

NANO AND GIGA CHALLENGES IN MICROELECTRONICS

Elsevier The book is designed as an introduction for engineers and researchers wishing to obtain a fundamental knowledge and a snapshot in time of the cutting edge in technology research. As a natural consequence, Nano and Giga Challenges is also an essential reference for the "gurus" wishing to keep abreast of the latest directions and challenges in microelectronic technology development and future trends. The combination of viewpoints presented within the book can help to foster further research and cross-disciplinary interaction needed to surmount the barriers facing future generations of technology design. Key Features: • Quickly becoming the hottest topic of the new millennium (2.4 billion dollars funding in US alone) • Current status and future trends of micro and nanoelectronics research • Written by leading experts in the corresponding research areas • Excellent tutorial for graduate students and reference for "gurus"

SINGLE-CHIP BLUETOOTH SOLUTIONS

A PERSPECTIVE ON CURRENT TRENDS IN MICROELECTRONICS

ELECTRONIC DESIGN AUTOMATION FOR IC IMPLEMENTATION, CIRCUIT DESIGN, AND PROCESS TECHNOLOGY

CIRCUIT DESIGN, AND PROCESS TECHNOLOGY, SECOND EDITION

CRC Press The second of two volumes in the Electronic Design Automation for Integrated Circuits Handbook, Second Edition, Electronic Design Automation for IC Implementation, Circuit Design, and Process Technology thoroughly examines real-

time logic (RTL) to GDSII (a file format used to transfer data of semiconductor physical layout) design flow, analog/mixed signal design, physical verification, and technology computer-aided design (TCAD). Chapters contributed by leading experts authoritatively discuss design for manufacturability (DFM) at the nanoscale, power supply network design and analysis, design modeling, and much more. New to This Edition: Major updates appearing in the initial phases of the design flow, where the level of abstraction keeps rising to support more functionality with lower non-recurring engineering (NRE) costs Significant revisions reflected in the final phases of the design flow, where the complexity due to smaller and smaller geometries is compounded by the slow progress of shorter wavelength lithography New coverage of cutting-edge applications and approaches realized in the decade since publication of the previous edition—these are illustrated by new chapters on 3D circuit integration and clock design Offering improved depth and modernity, *Electronic Design Automation for IC Implementation, Circuit Design, and Process Technology* provides a valuable, state-of-the-art reference for electronic design automation (EDA) students, researchers, and professionals.

EDA FOR IC IMPLEMENTATION, CIRCUIT DESIGN, AND PROCESS TECHNOLOGY

CRC Press Presenting a comprehensive overview of the design automation algorithms, tools, and methodologies used to design integrated circuits, the *Electronic Design Automation for Integrated Circuits Handbook* is available in two volumes. The second volume, *EDA for IC Implementation, Circuit Design, and Process Technology*, thoroughly examines real-time logic to GDSII (a file format used to transfer data of semiconductor physical layout), analog/mixed signal design, physical verification, and technology CAD (TCAD). Chapters contributed by leading experts authoritatively discuss design for manufacturability at the nanoscale, power supply network design and analysis, design modeling, and much more. Save on the complete set.

NANOMETER CMOS

CRC Press This book presents the material necessary for understanding the physics, operation, design, and performance of modern MOSFETs with nanometer dimensions. It offers a brief introduction to the field and a thorough overview of MOSFET physics, detailing the relevant basics. The authors apply presented models to calculate and demonstrate transistor characteristics, and they include required input data (e.g., dimensions, doping) enabling readers to repeat the calculations and compare their results. The book introduces conventional and novel advanced MOSFET concepts, such as multiple-gate structures or alternative channel materials. Other topics covered include high-k dielectrics and mobility enhancement techniques, MOSFETs for RF (radio frequency) applications, MOSFET fabrication technology.

ADVANCES IN ELECTRICAL AND COMPUTER TECHNOLOGIES

SELECT PROCEEDINGS OF ICAECT 2019

Springer Nature *The book comprises select proceedings of the first International Conference on Advances in Electrical and Computer Technologies 2019 (ICAECT 2019). The papers presented in this book are peer reviewed and cover wide range of topics in Electrical and Computer Engineering fields. This book contains the papers presenting the latest developments in the areas of Electrical, Electronics, Communication systems and Computer Science such as smart grids, soft computing techniques in power systems, smart energy management systems, power electronics, feedback control systems, biomedical engineering, geo informative systems, grid computing, data mining, image and signal processing, video processing, computer vision, pattern recognition, cloud computing, pervasive computing, intelligent systems, artificial intelligence, neural network and fuzzy logic, broad band communication, mobile and optical communication, network security, VLSI, embedded systems, optical networks and wireless communication. This book will be of great use to the researchers and students in the areas of Electrical and Electronics Engineering, Communication systems and Computer Science.*

LOW-FREQUENCY NOISE IN ADVANCED MOS DEVICES

Springer Science & Business Media *This is an introduction to noise, describing fundamental noise sources and basic circuit analysis, discussing characterization of low-frequency noise and offering practical advice that bridges concepts of noise theory and modelling, characterization, CMOS technology and circuits. The text offers the latest research, reviewing the most recent publications and conference presentations. The book concludes with an introduction to noise in analog/RF circuits and describes how low-frequency noise can affect these circuits.*

WAFER LEVEL 3-D ICS PROCESS TECHNOLOGY

Springer Science & Business Media *This book focuses on foundry-based process technology that enables the fabrication of 3-D ICs. The core of the book discusses the technology platform for pre-packaging wafer level 3-D ICs. However, this book does not include a detailed discussion of 3-D ICs design and 3-D packaging. This is an edited book based on chapters contributed by various experts in the field of wafer-level 3-D ICs process technology. They are from academia, research labs and industry.*

THE FOURTH TERMINAL

BENEFITS OF BODY-BIASING TECHNIQUES FOR FDSOI CIRCUITS AND SYSTEMS

Springer Nature *This book discusses the advantages and challenges of Body-Biasing for integrated circuits and systems, together with the deployment of the design infrastructure needed to generate this Body-Bias voltage. These new design solutions enable state of the art energy efficiency and system flexibility for the latest applications, such as Internet of Things and 5G communications.*

SIMULATION AND OPTIMIZATION OF DIGITAL CIRCUITS

CONSIDERING AND MITIGATING DESTABILIZING FACTORS

Springer *This book describes new, fuzzy logic-based mathematical apparatus, which enable readers to work with continuous variables, while implementing whole circuit simulations with speed, similar to gate-level simulators and accuracy, similar to circuit-level simulators. The author demonstrates newly developed principles of digital integrated circuit simulation and optimization that take into consideration various external and internal destabilizing factors, influencing the operation of digital ICs. The discussion includes factors including radiation, ambient temperature, electromagnetic fields, and climatic conditions, as well as non-ideality of interconnects and power rails.*

MOS DEVICES FOR LOW-VOLTAGE AND LOW-ENERGY APPLICATIONS

John Wiley & Sons *Helps readers understand the physics behind MOS devices for low-voltage and low-energy applications • Based on timely published and unpublished work written by expert authors • Discusses various promising MOS devices applicable to low-energy environmental and biomedical uses • Describes the physical effects (quantum, tunneling) of MOS devices • Demonstrates the performance of devices, helping readers to choose right devices applicable to an industrial or consumer environment • Addresses some Ge-based devices and other compound-material-based devices for high-frequency applications and future development of high performance devices. 'Seemingly innocuous everyday devices such as smartphones, tablets and services such as on-line gaming or internet keyword searches consume vast amounts of energy. Even when in standby mode, all these devices consume energy. The upcoming "Internet of Things" (IoT) is expected to deploy 60 billion electronic devices spread out in our homes, cars and cities. Britain is already consuming up to 16 per cent of all its power through internet use and this rate is doubling every four years. According to The UK's Daily Mail May (2015), if usage rates continue, all of Britain's power supply could be consumed by internet use in just 20 years. In 2013, U.S. data centers consumed an estimated 91 billion kilowatt-hours of electricity, corresponding to the power generated by seventeen 1000-megawatt nuclear power plants. Data center electricity consumption is projected to increase to roughly 140 billion kilowatt-hours annually by 2020, the equivalent annual output of 50 nuclear power plants. (Natural Resources Defense Council, USA, Feb. 2015) All these examples stress the urgent need for developing electronic devices that consume as little energy as possible. The book "MOS Devices for Low-Voltage and Low-Energy Applications" explores the different transistor options that can be utilized to achieve that goal. It describes in detail the physics and performance of transistors that can be operated at low voltage and consume little power, such as subthreshold operation in bulk transistors, fully depleted SOI devices, tunnel FETs, multigate and gate-all-around MOSFETs. Examples of low-energy circuits making use of these devices are given as well. The book "MOS Devices for Low-Voltage and Low-Energy Applications" is a good reference for graduate students, researchers, semiconductor and electrical*

engineers who will design the electronic systems of tomorrow.' --- Dr. Jean-Pierre Colinge, Taiwan Semiconductor Manufacturing Company (TSMC) "The authors present a creative way to show how different MOS devices can be used for low-voltage and low-power applications. They start with Bulk MOSFET, following with SOI MOSFET, FinFET, gate-all-around MOSFET, Tunnel-FET and others. It is presented the physics behind the devices, models, simulations, experimental results and applications. This book is interesting for researchers, graduate and undergraduate students. The low-energy field is an important topic for integrated circuits in the future and none can stay out of this." --- Prof. Joao A. Martino, University of Sao Paulo, Brazil

FULLY DEPLETED SILICON-ON-INSULATOR

NANODEVICES, MECHANISMS AND CHARACTERIZATION

Elsevier *Fully Depleted Silicon-On-Insulator* provides an in-depth presentation of the fundamental and pragmatic concepts of this increasingly important technology. There are two main technologies in the marketplace of advanced CMOS circuits: FinFETs and fully depleted silicon-on-insulators (FD-SOI). The latter is unchallenged in the field of low-power, high-frequency, and Internet-of-Things (IOT) circuits. The topic is very timely at research and development levels. Compared to existing books on SOI materials and devices, this book covers exhaustively the FD-SOI domain. *Fully Depleted Silicon-On-Insulator* is based on the expertise of one of the most eminent individuals in the community, Dr. Sorin Cristoloveanu, an IEEE Andrew Grove 2017 award recipient "For contributions to silicon-on-insulator technology and thin body devices." In the book, he shares key insights on the technological aspects, operation mechanisms, characterization techniques, and most promising emerging applications. Early praise for *Fully Depleted Silicon-On-Insulator* "It is an excellent written guide for everyone who would like to study SOI deeply, specially focusing on FD-SOI." --Dr. Katsu Izumi, Formerly at NTT Laboratories and then at Osaka Prefecture University, Japan "FDSOI technology is poised to catch an increasingly large portion of the semiconductor market. This book fits perfectly in this new paradigm [...] It covers many SOI topics which have never been described in a book before." --Professor Jean-Pierre Colinge, Formerly at TSMC and then at CEA-LETI, Grenoble, France "This book, written by one of the true experts and pioneers in the silicon-on-insulator field, is extremely timely because of the growing footprint of FD-SOI in modern silicon technology, especially in IoT applications. Written in a delightfully informal style yet comprehensive in its coverage, the book describes both the device physics underpinning FD-SOI technology and the cutting-edge, perhaps even futuristic devices enabled by it." --Professor Alexander Zaslavsky, Brown University, USA "A superbly written book on SOI technology by a master in the field." --Professor Yuan Taur, University of California, San Diego, USA "The author is a world-top researcher of SOI device/process technology. This book is his masterpiece and important for the FD-SOI archive. The reader will learn much from the book." -- Professor Hiroshi Iwai, National Yang Ming Chiao Tung University, Taiwan From the author "It is during our global war against the terrifying coalition of corona and insidious computer viruses that this book has been put together. Continuous

enlightenment from FD-SOI helped me cross this black and gray period. I shared a lot of myself in this book. The rule of the game was to keep the text light despite the heavy technical content. There are even tentative FD-SOI hieroglyphs on the front cover, composed of curves discussed in the book." Written by a top expert in the silicon-on-insulator community and IEEE Andrew Grove 2017 award recipient
Comprehensively addresses the technology aspects, operation mechanisms and electrical characterization techniques for FD-SOI devices Discusses FD-SOI's most promising device structures for memory, sensing and emerging applications

PROCEEDINGS OF THE EIGHTH INTERNATIONAL CONFERENCE ON SOFT COMPUTING AND PATTERN RECOGNITION (SOCPAR 2016)

Springer *This volume presents 70 carefully selected papers from a major joint event: the 8th International Conference on Soft Computing and Pattern Recognition (SoCPaR 2016) and the 8th International Conference on Computational Aspects of Social Networks (CASoN 2016). SoCPaR-CASoN 2016, which was organized by the Machine Intelligence Research Labs (MIR Labs), USA and Vellore Institute of Technology (VIT), India and held at the VIT on December 19–21, 2016. It brings together researchers and practitioners from academia and industry to share their experiences and exchange new ideas on all interdisciplinary areas of soft computing and pattern recognition, as well as intelligent methods applied to social networks. This book is a valuable resource for practicing engineers/scientists and researchers working in the field of soft computing, pattern recognition and social networks.*

DESIGN FOR MANUFACTURABILITY

FROM 1D TO 4D FOR 90–22 NM TECHNOLOGY NODES

Springer Science & Business Media *This book explains integrated circuit design for manufacturability (DfM) at the product level (packaging, applications) and applies engineering DfM principles to the latest standards of product development at 22 nm technology nodes. It is a valuable guide for layout designers, packaging engineers and quality engineers, covering DfM development from 1D to 4D, involving IC design flow setup, best practices, links to manufacturing and product definition, for process technologies down to 22 nm node, and product families including memories, logic, system-on-chip and system-in-package.*

INTEGRATED CIRCUIT AND SYSTEM DESIGN

POWER AND TIMING MODELING, OPTIMIZATION AND SIMULATION; 14TH INTERNATIONAL WORKSHOP, PATMOS 2004, SANTORINI, GREECE, SEPTEMBER 15-17, 2004, PROCEEDINGS

Springer Science & Business Media *This book constitutes the refereed proceedings of the 14th International Workshop on Power and Timing Optimization and Simulation, PATMOS 2004, held in Santorini, Greece in September 2004. The 85 revised papers presented together with abstracts of 6 invited presentations were carefully reviewed and selected from 152 papers submitted. The papers are*

organized in topical sections on buses and communication, circuits and devices, low power issues, architectures, asynchronous circuits, systems design, interconnect and physical design, security and safety, low-power processing, digital design, and modeling and simulation.

FINFET DEVICES FOR VLSI CIRCUITS AND SYSTEMS

CRC Press To surmount the continuous scaling challenges of MOSFET devices, FinFETs have emerged as the real alternative for use as the next generation device for IC fabrication technology. The objective of this book is to provide the basic theory and operating principles of FinFET devices and technology, an overview of FinFET device architecture and manufacturing processes, and detailed formulation of FinFET electrostatic and dynamic device characteristics for IC design and manufacturing. Thus, this book caters to practicing engineers transitioning to FinFET technology and prepares the next generation of device engineers and academic experts on mainstream device technology at the nanometer-nodes.

CMOS IC LAYOUT

CONCEPTS, METHODOLOGIES, AND TOOLS

Elsevier This book includes basic methodologies, review of basic electrical rules and how they apply, design rules, IC planning, detailed checklists for design review, specific layout design flows, specialized block design, interconnect design, and also additional information on design limitations due to production requirements.
 *Practical, hands-on approach to CMOS layout theory and design *Offers engineers and technicians the training materials they need to stay current in circuit design technology. *Covers manufacturing processes and their effect on layout and design decisions

ALGORITHMS & ARCHITECTURES

PROCEEDINGS OF THE SECOND NEC RESEARCH SYMPOSIUM

SIAM

FUNDAMENTALS OF MODERN MANUFACTURING

PROCESSES AND SYSTEMS

Wiley This book takes a modern, all-inclusive look at manufacturing processes. Its coverage is strategically divided—65% concerned with manufacturing process technologies, 35% dealing with engineering materials and production systems.

CMOS

CIRCUIT DESIGN, LAYOUT, AND SIMULATION

John Wiley & Sons This edition provides an important contemporary view of a wide range of analog/digital circuit blocks, the BSIM model, data converter architectures, and more. The authors develop design techniques for both long- and short-channel

CMOS technologies and then compare the two.

CMOS VLSI DESIGN: A CIRCUITS AND SYSTEMS PERSPECTIVE

Pearson Education India

MICROLITHOGRAPHY

SCIENCE AND TECHNOLOGY

CRC Press *The completely revised Third Edition to the bestselling Microlithography: Science and Technology provides a balanced treatment of theoretical and operational considerations, from fundamental principles to advanced topics of nanoscale lithography. The book is divided into chapters covering all important aspects related to the imaging, materials, and processes that have been necessary to drive semiconductor lithography toward nanometer-scale generations. Renowned experts from the world's leading academic and industrial organizations have provided in-depth coverage of the technologies involved in optical, deep-ultraviolet (DUV), immersion, multiple patterning, extreme ultraviolet (EUV), maskless, nanoimprint, and directed self-assembly lithography, together with comprehensive descriptions of the advanced materials and processes involved. New in the Third Edition In addition to the full revision of existing chapters, this new Third Edition features coverage of the technologies that have emerged over the past several years, including multiple patterning lithography, design for manufacturing, design process technology co-optimization, maskless lithography, and directed self-assembly. New advances in lithography modeling are covered as well as fully updated information detailing the new technologies, systems, materials, and processes for optical UV, DUV, immersion, and EUV lithography. The Third Edition of Microlithography: Science and Technology authoritatively covers the science and engineering involved in the latest generations of microlithography and looks ahead to the future systems and technologies that will bring the next generations to fruition. Loaded with illustrations, equations, tables, and time-saving references to the most current technology, this book is the most comprehensive and reliable source for anyone, from student to seasoned professional, looking to better understand the complex world of microlithography science and technology.*

IEEE CIRCUITS & DEVICES

THE PHYSICS OF SOLAR CELLS

World Scientific Publishing Company *This book provides a comprehensive introduction to the physics of the photovoltaic cell. It is suitable for undergraduates, graduate students, and researchers new to the field. It covers: basic physics of semiconductors in photovoltaic devices; physical models of solar cell operation; characteristics and design of common types of solar cell; and approaches to increasing solar cell efficiency. The text explains the terms and concepts of solar cell device physics and shows the reader how to formulate and solve relevant physical problems. Exercises and worked solutions are included.*

LOW-POWER VARIATION-TOLERANT DESIGN IN NANOMETER SILICON

Springer Science & Business Media *Design considerations for low-power operations and robustness with respect to variations typically impose contradictory requirements. Low-power design techniques such as voltage scaling, dual-threshold assignment and gate sizing can have large negative impact on parametric yield under process variations. This book focuses on circuit/architectural design techniques for achieving low power operation under parameter variations. We consider both logic and memory design aspects and cover modeling and analysis, as well as design methodology to achieve simultaneously low power and variation tolerance, while minimizing design overhead. This book will discuss current industrial practices and emerging challenges at future technology nodes.*

CAPITALIST NIGGER

THE ROAD TO SUCCESS - A SPIDER WEB DOCTRINE

Jonathan Ball Publishers *Capitalist Nigger is an explosive and jarring indictment of the black race. The book asserts that the Negroid race, as naturally endowed as any other, is culpably a non-productive race, a consumer race that depends on other communities for its culture, its language, its feeding and its clothing. Despite enormous natural resources, blacks are economic slaves because they lack the 'devil-may-care' attitude and the 'killer instinct' of the Caucasian, as well as the spider web mentality of the Asian. A Capitalist Nigger must embody ruthlessness in pursuit of excellence in his drive towards achieving the goal of becoming an economic warrior. In putting forward the idea of the Capitalist Nigger, Chika Onyeani charts a road to success whereby black economic warriors employ the 'Spider Web Doctrine' - discipline, self-reliance, ruthlessness - to escape from their victim mentality. Born in Nigeria, Chika Onyeani is a journalist, editor and former diplomat.*

PHYSICS OF SEMICONDUCTOR DEVICES

John Wiley & Sons *The new edition of the most detailed and comprehensive single-volume reference on major semiconductor devices The Fourth Edition of Physics of Semiconductor Devices remains the standard reference work on the fundamental physics and operational characteristics of all major bipolar, unipolar, special microwave, and optoelectronic devices. This fully updated and expanded edition includes approximately 1,000 references to original research papers and review articles, more than 650 high-quality technical illustrations, and over two dozen tables of material parameters. Divided into five parts, the text first provides a summary of semiconductor properties, covering energy band, carrier concentration, and transport properties. The second part surveys the basic building blocks of semiconductor devices, including p-n junctions, metal-semiconductor contacts, and metal-insulator-semiconductor (MIS) capacitors. Part III examines bipolar transistors, MOSFETs (MOS field-effect transistors), and other field-effect transistors such as JFETs (junction field-effect-transistors) and MESFETs (metal-semiconductor field-effect transistors). Part IV focuses on negative-resistance and power devices. The book concludes with coverage of photonic devices and sensors, including light-*

emitting diodes (LEDs), solar cells, and various photodetectors and semiconductor sensors. This classic volume, the standard textbook and reference in the field of semiconductor devices: Provides the practical foundation necessary for understanding the devices currently in use and evaluating the performance and limitations of future devices Offers completely updated and revised information that reflects advances in device concepts, performance, and application Features discussions of topics of contemporary interest, such as applications of photonic devices that convert optical energy to electric energy Includes numerous problem sets, real-world examples, tables, figures, and illustrations; several useful appendices; and a detailed solutions manual for Instructor's only Explores new work on leading-edge technologies such as MODFETs, resonant-tunneling diodes, quantum-cascade lasers, single-electron transistors, real-space-transfer devices, and MOS-controlled thyristors *Physics of Semiconductor Devices, Fourth Edition* is an indispensable resource for design engineers, research scientists, industrial and electronics engineering managers, and graduate students in the field.

DIGITAL ELECTRONICS

PRINCIPLES, DEVICES AND APPLICATIONS

John Wiley & Sons 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.

SEMICONDUCTOR MATERIAL AND DEVICE CHARACTERIZATION

John Wiley & Sons Resistivity -- Carrier and doping density -- Contact resistance and Schottky barriers -- Series resistance, channel length and width, and threshold voltage -- Defects -- Oxide and interface trapped charges, oxide thickness -- Carrier lifetimes -- Mobility -- Charge-based and probe characterization -- Optical

characterization -- Chemical and physical characterization -- Reliability and failure analysis.

MODERN SEMICONDUCTOR DEVICES FOR INTEGRATED CIRCUITS

Prentice Hall *Modern Semiconductor Devices for Integrated Circuits, First Edition* introduces readers to the world of modern semiconductor devices with an emphasis on integrated circuit applications. **KEY TOPICS:** *Electrons and Holes in Semiconductors; Motion and Recombination of Electrons and Holes; Device Fabrication Technology; PN and Metal-Semiconductor Junctions; MOS Capacitor; MOS Transistor; MOSFETs in ICs—Scaling, Leakage, and Other Topics; Bipolar Transistor.* **MARKET:** *Written by an experienced teacher, researcher, and expert in industry practices, this succinct and forward-looking text is appropriate for anyone interested in semiconductor devices for integrated circuits, and serves as a suitable reference text for practicing engineers.*

COMPACT MODELS FOR INTEGRATED CIRCUIT DESIGN

CONVENTIONAL TRANSISTORS AND BEYOND

CRC Press *Compact Models for Integrated Circuit Design: Conventional Transistors and Beyond* provides a modern treatise on compact models for circuit computer-aided design (CAD). Written by an author with more than 25 years of industry experience in semiconductor processes, devices, and circuit CAD, and more than 10 years of academic experience in teaching compact modeling courses, this first-of-its-kind book on compact SPICE models for very-large-scale-integrated (VLSI) chip design offers a balanced presentation of compact modeling crucial for addressing current modeling challenges and understanding new models for emerging devices. Starting from basic semiconductor physics and covering state-of-the-art device regimes from conventional micron to nanometer, this text: Presents industry standard models for bipolar-junction transistors (BJTs), metal-oxide-semiconductor (MOS) field-effect-transistors (FETs), FinFETs, and tunnel field-effect transistors (TFETs), along with statistical MOS models Discusses the major issue of process variability, which severely impacts device and circuit performance in advanced technologies and requires statistical compact models Promotes further research of the evolution and development of compact models for VLSI circuit design and analysis Supplies fundamental and practical knowledge necessary for efficient integrated circuit (IC) design using nanoscale devices Includes exercise problems at the end of each chapter and extensive references at the end of the book *Compact Models for Integrated Circuit Design: Conventional Transistors and Beyond* is intended for senior undergraduate and graduate courses in electrical and electronics engineering as well as for researchers and practitioners working in the area of electron devices. However, even those unfamiliar with semiconductor physics gain a solid grasp of compact modeling concepts from this book.

COMPACT MODELING OF DGMOSFETS

MODERN PROCESSOR DESIGN

FUNDAMENTALS OF SUPERSCALAR PROCESSORS

Waveland Press Conceptual and precise, *Modern Processor Design* brings together numerous microarchitectural techniques in a clear, understandable framework that is easily accessible to both graduate and undergraduate students. Complex practices are distilled into foundational principles to reveal the authors insights and hands-on experience in the effective design of contemporary high-performance micro-processors for mobile, desktop, and server markets. Key theoretical and foundational principles are presented in a systematic way to ensure comprehension of important implementation issues. The text presents fundamental concepts and foundational techniques such as processor design, pipelined processors, memory and I/O systems, and especially superscalar organization and implementations. Two case studies and an extensive survey of actual commercial superscalar processors reveal real-world developments in processor design and performance. A thorough overview of advanced instruction flow techniques, including developments in advanced branch predictors, is incorporated. Each chapter concludes with homework problems that will institute the groundwork for emerging techniques in the field and an introduction to multiprocessor systems.

SOUTH ASIAN JOURNAL OF SOCIO-POLITICAL STUDIES

SAJOSPS : A MULTI DISCIPLINARY JOURNAL DEVOTED TO THE STUDY OF SOCIAL SCIENCES

ELECTRONIC CIRCUITS

FUNDAMENTALS AND APPLICATIONS

Routledge Electronics explained in one volume, using both theoretical and practical applications. Mike Tooley provides all the information required to get to grips with the fundamentals of electronics, detailing the underpinning knowledge necessary to appreciate the operation of a wide range of electronic circuits, including amplifiers, logic circuits, power supplies and oscillators. The 5th edition includes an additional chapter showing how a wide range of useful electronic applications can be developed in conjunction with the increasingly popular Arduino microcontroller, as well as a new section on batteries for use in electronic equipment and some additional/updated student assignments. The book's content is matched to the latest pre-degree level courses (from Level 2 up to, and including, Foundation Degree and HND), making this an invaluable reference text for all study levels, and its broad coverage is combined with practical case studies based in real-world engineering contexts. In addition, each chapter includes a practical investigation designed to reinforce learning and provide a basis for further practical work. A companion website at <http://www.key2electronics.com> offers the reader a set of spreadsheet design tools that can be used to simplify circuit calculations, as well as circuit models and templates that will enable virtual simulation of circuits in the book. These are

accompanied by online self-test multiple choice questions for each chapter with automatic marking, to enable students to continually monitor their own progress and understanding. A bank of online questions for lecturers to set as assignments is also available.

DATA MINING: CONCEPTS AND TECHNIQUES

Elsevier *Data Mining: Concepts and Techniques* provides the concepts and techniques in processing gathered data or information, which will be used in various applications. Specifically, it explains data mining and the tools used in discovering knowledge from the collected data. This book is referred as the knowledge discovery from data (KDD). It focuses on the feasibility, usefulness, effectiveness, and scalability of techniques of large data sets. After describing data mining, this edition explains the methods of knowing, preprocessing, processing, and warehousing data. It then presents information about data warehouses, online analytical processing (OLAP), and data cube technology. Then, the methods involved in mining frequent patterns, associations, and correlations for large data sets are described. The book details the methods for data classification and introduces the concepts and methods for data clustering. The remaining chapters discuss the outlier detection and the trends, applications, and research frontiers in data mining. This book is intended for Computer Science students, application developers, business professionals, and researchers who seek information on data mining. Presents dozens of algorithms and implementation examples, all in pseudo-code and suitable for use in real-world, large-scale data mining projects Addresses advanced topics such as mining object-relational databases, spatial databases, multimedia databases, time-series databases, text databases, the World Wide Web, and applications in several fields Provides a comprehensive, practical look at the concepts and techniques you need to get the most out of your data

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MODERN VLSI DESIGN SAFRI
