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AFCIAW - PORTER PATRICK

This is a non-calculus based circuit analysis text that can be offered in the first term. It could also be used by students as supplementary material for self study and as an additional source of information. Problem solutions are provided for all the problems in the book in order to provide the student with an extensive source of worked examples. Both DC and AC steady state circuit analysis are covered by introducing circuit analysis concepts with DC circuits containing sources and resistors using simpler math and then expanding the analysis to AC circuits containing sinusoidal sources, resistors, capacitors, and inductors using more complex math. Topics such as series, parallel, and series/parallel circuits, Ohm’s law, Kirchhoff’s voltage and current laws, voltage and current divider rules, superposition, Thevenin and Norton equivalent circuits, Pi-T circuit transformations, nodal voltage analysis method, frequency analysis, and Bode plots are covered.

This book is concerned with circuit simulation using National Instruments Multisim. It focuses on the use and comprehension of the working techniques for electrical and electronic circuit simulation. The first chapters are devoted to basic circuit analysis. It starts by describing in detail how to perform a DC analysis using only resistors and independent and controlled sources. Then, it introduces capacitors and inductors to make a transient analysis. In the case of transient analysis, it is possible to have an initial condition either in the capacitor voltage or in the inductor current, or both. Fourier analysis is discussed in the context of transient analysis. Next, we make a treatment of AC analysis to simulate the frequency response of a circuit. Then, we introduce diodes, transistors, and circuits composed by them and perform DC, transient, and AC analyses. The book ends with simulation of digital circuits. A practical approach is followed through the chapters, using step-by-step examples to introduce new Multisim circuit elements, tools, analyses, and virtual instruments for measurement. The examples are clearly commented and illustrated. The different tools available on Multisim are used when appropriate so readers learn which analyses are available to them. This is part of the learning outcomes that should result after each set of end-of-chapter exercises is worked out. Table of Contents: Introduction to Circuit Simulation / Resistive Circuits / Time Domain Analysis -- Transient Analysis / Frequency Domain Analysis -- AC Analysis / Semiconductor Devices / Digital Circuits

An Introduction to Electric Circuits is essential reading for first year students of electronics and electrical engineering who need to get to grips quickly with the basic theory. This text is a comprehensive introduction to the topic and, assuming virtually no knowledge, it keeps the mathematical content to a minimum. As with other textbooks in the series, the format of this book enables the student to work at their own pace. It includes numerous worked examples throughout the text and graded exercises, with answers, at the end of each section.

This comprehensive volume covers both elementary and advanced analog and digital circuit simulation using PSpice. The text includes many worked examples, circuit diagrams, tables, and code listings. It also compares practical results with those obtained from simulation.

Front Cover; Electronic Methods; Copyright Page; Contributors to Volume 2; Foreword; Contents, Volume 2; Chapter 1. Evaluation of Measurement; Chapter 2. Passive Circuit Elements and Networks; Chapter 3. Vacuum Tubes; Chapter 4. Gas Tubes; Chapter 5. Semiconductor Circuit Elements; Chapter 6. Rectifiers, Amplifiers, and Oscillators; Chapter 7. Nonlinear Circuits; Chapter 8. Servomechanisms, Regulation and Feedback; Chapter 9. Measurements; Chapter 10. Microwaves; Chapter 11. Miscellaneous Electronic Devices; Chapter 12. Noise In Electronic Devices; Author Index; Subject Index.

Until recently, three principal classes had been known in the electrical cir cuitry. They were as follows: 1) The lumped-constant circuit, which should be called a zero-dimensional circuit, in the sense that the circuit elements are much smaller in size as compared with the wavelength in all three spatial directions. 2) The distributed-constant circuit, which should be called a one-dimensional circuit, in the sense that the circuit elements are much smaller than the wavelength in two directions but comparable to the wavelength in one di rection. 3) The waveguide circuit, which should be called a three-dimensional circuit, in the sense that the circuit elements are comparable to the wavelength in all three directions. The principal subject of this book is the analysis and design (synthesis) theories for another circuit class which appeared in the late 1960s and became common in the 1970s. This new circuit class is 4) the planar circuit, which should be called a two-dimensional circuit, in the sense that the circuit elements are much smaller in size as compared with the wavelength in one direction, but comparable to the wavelength in the other two directions.

This book examines single-electron circuits as an introduction to the rapidly expanding field of nanoelectronics. It discusses both the analysis and synthesis of circuits with the nanoelectronic metallic single-electron tunneling (SET) junction device. The basic physical phenomena under consideration are the quantum mechanical tunneling of electrons through a small insulating gap between two metal leads, the Coulomb blockade and Coulomb oscillations — the last two resulting from the quantization of charge. The author employs an unconventional approach in explaining the operation and design of single-electron circuits.

Pragmatic Circuits: Frequency Domain goes through the Laplace transform to get from the time do-

main to topics that include the s-plane, Bode diagrams, and the sinusoidal steady state. This second of three volumes ends with a-c power, which, although it is just a special case of the sinusoidal steady state, is an important topic with unique techniques and terminology. Pragmatic Circuits: Frequency Domain is focused on the frequency domain. In other words, time will no longer be the independent variable in our analysis. The two other volumes in the Pragmatic Circuits series include titles on DC and Time Domain and Signals and Filters. These short lecture books will be of use to students at any level of electrical engineering and for practicing engineers, or scientists, in any field looking for a practical and applied introduction to circuits and signals. The author's “pragmatic” and applied style gives a unique and helpful “non-idealistic, practical, opinionated” introduction to circuits.

This volume is intended as a textbook for a first course in electrical engineering. It is divided into two parts, for a two-semester coverage. The first part deals with circuit elements, resistive circuits, circuit theorems, circuit topology, and the state-variable method. The presentation of the state-variable method is a special feature. The authors believe that the natural way to analyze RLC circuits is to use the state-variable method rather than second- or high-order ordinary differential equations. By choosing capacitor voltages and inductor currents in an RLC circuit as state variables, the so--called state equations can be systematically obtained through network topology. Of particular interest is the approach employing Thevenin's theorem and Norton's theorem to find state equations without using circuit topology. The second part of the book covers sinusoidal steady-state analysis, two-port networks, the Fourier series, the Fourier transform, and the Laplace transform. Great effort has been devoted to presenting the subjects of the Fourier series, the Fourier transform, and the Laplace transform with many practical circuits. Thus, we hope that the reader will be better motivated to learn rather abstract concepts such as complex frequency and frequency response.

Electric Circuits and Networks is designed to serve as a textbook for a two-semester undergraduate course on basic electric circuits and networks. The book builds on the subject from its basic principles. Spread over seventeen chapters, the book can be taught with varying degree of emphasis on its six subsections based on the course requirement. Written in a student-friendly manner, its narrative style places adequate stress on the principles that govern the behaviour of electric circuits and networks.

Digital Design: An Embedded Systems Approach Using VHDL provides a foundation in digital design for students in computer engineering, electrical engineering and computer science courses. It takes an up-to-date and modern approach of presenting digital logic design as an activity in a larger systems design context. Rather than focus on aspects of digital design that have little relevance in a realistic design context, this book concentrates on modern and evolving knowledge and design skills. Hardware description language (HDL)-based design and verification is emphasized--VHDL examples are used extensively throughout. By treating digital logic as part of embedded systems design, this book provides an understanding of the hardware needed in the analysis and design of systems comprising both hardware and software components. Includes a Web site with links to vendor tools, labs and tutorials. Presents digital logic design as an activity in a larger systems design context Features extensive use of VHDL examples to demonstrate HDL (hardware description language) usage at the abstract behavioural level and register transfer level, as well as for low-level verification and verification environments Includes worked examples throughout to enhance the reader's understanding and retention of the material Companion Web site includes links to tools for FPGA design from Synplicity, Mentor Graphics, and Xilinx, VHDL source code for all the examples in the book, lecture slides, laboratory projects, and solutions to exercises

Circuit theory is a core course in every Electrical Engineering curriculum, with a wide range of applications to a variety of problems related to electrical systems and subsystems, such as power transmission systems, communication systems, control systems and electronics systems in general.This e book is the third volume of my e book series on Electric Circuits.In Volume 1, Introduction to Electric Circuits Theory, we present all fundamental concepts, definitions, principles and techniques on Electric Circuits, while In Volume 2, Direct Currents Circuit Analysis, we present a systematic analysis of DC circuits, i.e. circuits driven by DC sources.In the current volume we study Alternating Currents, i.e. the analysis of Electric Circuits driven by sinusoidal voltage and/or current sources. The content of this book is divided in 17 chapters.In Chapter 1 we introduce the periodic signals (wave forms), and define their average and RMS (effective) values, give a systematic and comprehensive introduction of the Algebra of Complex Numbers, (which greatly simplifies the analysis of AC circuits), introduce the extremely important Phasor Concept and show how to express sinusoidal functions of time by their Phasors representations.In Chapter 2 we develop the two fundamental Kirchhoff

Providing an introductory, yet comprehensive, treatment of the analysis and design of electric circuits, this book emphasizes good engineering practice. It covers electric circuit elements, principles of circuit analysis, and the necessary theorems and formulas. Most topics are well motivated with historical material, and each chapter includes a short essay on electrical engineering history and current practice, a preview of topics covered, a summary, a summary design problem, and a glossary. The text contains over 150 illustrative examples, and 150 exercises and 400 homework problems, many with answers at the back of the book.

A Comprehensive and Up-to-Date Treatment of RF and Microwave Transistor Amplifiers This book provides state-of-the-art coverage of RF and microwave transistor amplifiers, including low-noise, narrowband, broadband, linear, high-power, high-efficiency, and high-voltage. Topics covered include modeling, analysis, design, packaging, and thermal and fabrication considerations. Through a unique integration of theory and practice, readers will learn to solve amplifier-related design problems ranging from matching networks to biasing and stability. More than 240 problems are included to help readers test their basic amplifier and circuit design skills-and more than half of the problems feature fully worked-out solutions. With an emphasis on theory, design, and everyday applications, this book is geared toward students, teachers, scientists, and practicing engineers who are interested in broadening their knowledge of RF and microwave transistor amplifier circuit design.

This book is a compilation and a collection of tutorials and recent advances in the use of nullors (combinations of nullators and norators) and pathological mirrors in analog circuit and system design. It highlights the basic theory, trends and challenges in the field, making it an excellent reference resource for researchers and designers working in the synthesis, analysis, and design of analog integrated circuits. With its tutorial character, it can also be used for teaching. Singular elements such as nullors and pathological mirrors can arguably be considered as universal blocks since they can represent all existing analog building blocks, and they allow complex integrated circuits to be de-

signed simply and effectively. These pathological elements are now used in a wide range of applications in modern circuit/system theory, and also in design practice.
This book deals with the bifurcation and chaotic aspects of damped and driven nonlinear oscillators. The analytical and numerical aspects of the chaotic dynamics of these oscillators are covered, together with appropriate experimental studies using nonlinear electronic circuits. Recent exciting developments in chaos research are also discussed, such as the control and synchronization of chaos and possible technological applications. Contents:IntroductionLinear and Nonlinear OscillatorsElectronic Circuits as Oscillators and Analog Simulation of Dynamical SystemsDuffing Oscillator: Bifurcation and ChaosDuffing Oscillator: Analytic ApproachesBifurcation, Chaos and Phase-Looking in BVP and DVP OscillatorsChaotic Oscillators with Chua's DiodeControlling of ChaosSynchronized Chaotic Systems and Secure Communications Readership: Nonlinear scientists, physicists, chaos researchers and nonlinear circuits theorists. keywords:Nonlinear Dynamics;Bifurcation and Chaos;Controlling of Chaos;Synchronization of Chaos;Secure Communications;Nonlinear Oscillators “... the book offers a well-written, concise and serious introduction to a number of subjects which are areas of current research, enabling the reader to grasp the basic ideas and at the same time guiding her/him through the vast literature.” Mathematical Reviews

This book includes recent research that focuses on analog integrated circuits and covers three main topics, namely: fundamentals, synthesis and performance. Eleven chapters are divided among these three topics as follows: Chapters One to Four are a part of fundamentals. The first chapter (The Next Generation of Nanomaterials for Designing Analog Integrated Circuits) describes new directions for applying nanomaterials for the design of modern analog circuits. Chapter Two (Application of Nullors in Designing Analog Circuits for Frequency Bandwidth) uses the pathological circuit element known as a nullor to design analog integrated circuits with frequency specifications to accomplish a desired bandwidth. Chapter Three (RC and RL to LC Circuit Conversion, and its Application in Poles and Zeros Identification) details an important property from circuit theory to estimate roots by performing conversions of passive elements. Chapter Four (Enhanced and Improved Symbolic Circuit Analysis Using MATLAB) relays the development of symbolic circuit analysis and focuses on enhancing an already developed symbolic tool to allow the symbolic analysis of large circuits. The synthesis of analog integrated circuits has been a challenge because there is no way to establish general rules to cover the gap between the behavioral and transistor circuit levels of abstraction. In this book, the second topic includes four chapters, from Five to Eight. Chapter Five (On the Synthesis of Sinusoidal Oscillators Using Nullors), just as in Chapter Two, uses the pathological circuit element known as a nullor to perform the synthesis of sinusoidal oscillators, which are quite useful in many electronic systems. Other kinds of oscillators are described in Chapter Six (Synthesis of SRCOs and Multi-Phase Oscillators from State Variables to their Implementation Using CMOS IC Technology) where the synthesis process identifies the resistor that controls the oscillating frequency and applies a state variable approach. Chapter Seven (Evolutionary Optimisation in the Design of CMOS Analog Integrated Circuits) shows the application of heuristics for circuit optimisation, and how it can be extended to bigger analog integrated circuits. Chapter Eight provides details on the synthesis and design of a CMOS harmonic mixer with output power management for narrowband and wideband wireless communications: the Bluetooth and UWB cases. The third part of this book is devoted to analog circuit performances and includes three chapters. Chapter Nine details the FPGA realisation of radio frequency (RF) power amplifier models. In this case, the system is modeled in the analog domain and implemented in the digital one. Chapter Ten White-Box Models of Optimal-Sized Solutions of Analog Integrated Circuits) generates analytical expressions for modeling the dominant behavior of CMOS analog circuits. Finally, Chapter Eleven (Radial Basis Function Surrogate Modeling for the Accurate Design of Analog Circuits) applies modern modeling approaches to accomplish real target specifications and to improve the design of reliable circuits.
Electronic Circuits Analysis Study Guide with Answer Key: Trivia Questions Bank, Worksheets to Review Textbook Notes PDF (Electronics Quick Study Guide with Answers for Self-Teaching/Learning) includes worksheets to solve problems with hundreds of trivia questions. "Electronic Circuits Analysis Study Guide" with answer key PDF covers basic concepts and analytical assessment tests. "Electronic Circuits Analysis Question Bank" PDF book helps to practice workbook questions from exam prep notes. Electronic Circuits Analysis study guide with answers includes self-learning guide with verbal, quantitative, and analytical past papers quiz questions. Electronic Circuits Analysis trivia questions and answers PDF download, a book to review questions and answers on chapters: Applications of Laplace transform, ac power, ac power analysis, amplifier and operational amplifier circuits, analysis method, applications of Laplace transform, basic concepts, basic laws, capacitors and inductors, circuit concepts, circuit laws, circuit theorems, filters and resonance, first order circuits, Fourier series, Fourier transform, frequency response, higher order circuits and complex frequency, introduction to electric circuits, introduction to Laplace transform, magnetically coupled circuits, methods of analysis, mutual inductance and transformers, operational amplifiers, polyphase circuits, second order circuits, sinusoidal steady state analysis, sinusoids and phasors, three phase circuits, two port networks, waveform and signals worksheets for college and university revision notes. Electronic circuits analysis question bank PDF download with free sample book covers beginner's questions, textbook's study notes to practice worksheets. Electronics study guide PDF includes high school workbook questions to practice worksheets for exam. "Electronic Circuits Analysis Trivia Questions" and answers PDF, a quick study guide with chapters' notes for competitive exam. "Electronic Circuits Analysis Worksheets" book PDF to review problem solving exam tests from electronics engineering practical and textbook's chapters as: Chapter 1: AC Power Worksheet Chapter 2: AC Power Analysis Worksheet Chapter 3: Amplifier and Operational Amplifier Circuits Worksheet Chapter 4: Analysis Method Worksheet Chapter 5: Applications of Laplace Transform Worksheet Chapter 6: Basic Concepts Worksheet Chapter 7: Basic laws Worksheet Chapter 8: Capacitors and Inductors Worksheet Chapter 9: Circuit Concepts Worksheet Chapter 10: Circuit Laws Worksheet Chapter 11: Circuit Theorems Worksheet Chapter 12: Filters and Resonance Worksheet Chapter 13: First Order Circuits Worksheet Chapter 14: Fourier Series Worksheet Chapter 15: Fourier Transform Worksheet Chapter 16: Frequency Response Worksheet Chapter 17: Higher Order Circuits and Complex Frequency Worksheet Chapter 18: Introduction to Electric Circuits Worksheet Chapter 19: Introduction to Laplace Transform Worksheet Chapter 20: Magnetically Coupled Circuits Worksheet Chapter 21: Methods of Analysis Worksheet Chapter 22: Mutual Inductance and Transformers Worksheet Chapter 23: Operational Amplifiers Worksheet Chapter 24: Polyphase Circuits Worksheet Chapter 25: Second Order Circuits Worksheet Chapter 26: Sinusoidal Steady State Analysis Worksheet Chapter 27: Sinusoids and Pha-

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Methods of Experimental Physics, Volume 2 – Part A: Electronic Methods, Second Edition focuses on techniques and experimental methods involving vacuum-tube and solid-state electronic devices and vacuum-tube circuitry. This volume consists of eight main topics—passive linear circuit elements

and networks, semiconductor circuit elements, vacuum tubes, gas tubes, rectifier circuits and power supplies, amplifiers, oscillators, and nonlinear circuits. In these topics, this book specifically discusses the relations between time and frequency response; devices employing bulk semiconductor properties; Richardson-Dushman equation; and gas tube phenomena. The full-wave rectifiers with capacitive load; vacuum tube and field-effect transistor bias circuits; and harmonic oscillators are also elaborated. This text likewise covers the oscillators that use negative resistance devices; field-effect transistors; and analog-to-digital (A/D) converters. This publication is a good source for physicists and students interested in techniques and methods involving electronic equipment.
Advanced Electric Circuits focuses on circuit analysis, including amplification, oscillations, capacitance, and circuit elements. The publication first offers information on the symbolic method of analysis, network theorems, bridge networks, and tuned circuits and filters. The text then takes a look at polyphase circuits, non-sinusoidal and transient excitation, and valves as circuit elements. Discussions focus on amplification, resistance-capacitance amplifiers, feedback, negative feedback amplifiers, cathode follower, low-power oscillations, and practical design of feedback circuits. The manuscript elaborates on transistors as circuit elements and elementary transmission-line analysis. Topics include ideal small-signal current amplifiers, small signal performance of the common emitter amplifier, comparative table of symbols, and typical examination questions. The publication is a dependable reference for students and readers interested in electric circuits.

Up-to-date coverage of the analysis and applications of coplanarwaveguides to microwave circuits and antennas The unique feature of coplanar waveguides, as opposed to moreconventional waveguides, is their uniplanar construction, in whichall of the conductors are aligned on the same side of thesubstrate. This feature simplifies manufacturing and allows fasterand less expensive characterization using on-wafer techniques. Coplanar Waveguide Circuits, Components, and Systems isan engineer's complete resource, collecting all of the availabledata on the subject. Rainee Simons thoroughly discusses propagationparameters for conventional coplanar waveguides and includesvaluable details such as the derivation of the fundamentalequations, physical explanations, and numerical examples. Coverage also includes: Discontinuities and circuit elements Transitions to other transmission media Directional couplers, hybrids, and magic T Microelectromechanical systems based switches and phaseshifters Tunable devices using ferroelectric materials Photonic bandgap structures Printed circuit antennas
The second edition of this text provides an introduction to the analysis and design of digital circuits at a logic, instead of electronics, level. It covers a range of topics, from number system theory to asynchronous logic design. A solution manual is available to instructors only. Requests must be made on official school stationery.
The fourth edition of this work continues to provide a thorough perspctive of the subject, communicated through a clear explanation of the concepts and techniques of electric circuits. This edition was developed with keen attention to the learning needs of students. It includes illustrations that have been redesigned for clarity, new problems and new worked examples. Margin notes in the text point out the option of integrating PSpice with the provided Introduction to PSpice; and an instructor's roadmap (for instructors only) serves to classify homework problems by approach. The author has also given greater attention to the importance of circuit memory in electrical engineering, and to the role of electronics in the electrical engineering curriculum.
Spicey Circuits: Elements of Computer-Aided Circuit Analysis presents a fresh, new approach to exploring basic circuit theory. The book is primarily a textbook designed for undergraduate students in electrical engineering and SPICE users who need an introduction to elementary circuit analysis. The book stresses the process of deriving expressions and demonstrates that computer simulation can be useful in understanding the behavior of complex expressions. Computer simulation using SPICE is woven into the material with emphasis on using the program as a tool for understanding circuits rather than a mere number cruncher. Topics discussed include circuit elements, resistors, files, interfaces, sources, and circuit types.

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This book examines the new and important technology of asymmetric passive components for minia-

turized microwave passive circuits. The asymmetric design methods and ideas set forth by the author are groundbreaking and have not been treated in previous works. Readers discover how these design methods reduce the circuit size of microwave integrated circuits and are also critical to reducing the cost of equipment such as cellular phones, radars, antennas, automobiles, and robots. An introductory chapter on the history of asymmetric passive components, which began with asymmetric ring hybrids first described by the author, sets the background for the book. It lays a solid foundation with a chapter examining microwave circuit parameters such as scattering, ABCD, impedance, admittance, and image. A valuable feature of this chapter is a conversion table between the various circuit matrices characterizing two-port networks terminated in arbitrary impedances. The correct conversion has also never been treated in previous works. Next, the author sets forth a thorough treatment of asymmetric passive component design, which covers the basic and indispensable elements for integration with other active or passive devices, including: * Asymmetric ring hybrids * Asymmetric branch-line hybrids * Asymmetric three-port power dividers and N-way power dividers * Asymmetric ring hybrid phase shifters and attenuators * Asymmetric ring filters and asymmetric impedance transformers With its focus on the principles of circuit element design, this is a must-have graduate-level textbook for students in microwave engineering, as well as a reference for design engineers who want to learn the new and powerful design method for asymmetric passive components.

"Real Analog" is a comprehensive collection of free educational materials that seamlessly blend hands-on design projects with theoretical concepts and circuit analysis techniques. Real Analog has the equivalent content of a university level introductory circuits course. Developed for university circuits classes by practicing engineers and experienced educators, Real Analog is centered on a newly-updated 12-chapter textbook and features: Exercises designed to reinforce textbook and lecture topics Homework assignments for every chapter Multiple design projects that reinforce and extend theoretical concepts Worksheets to help students complete design projects outside of the lab This book contains the textbook material for the Real Analog Course. The Lab Manual will be published separately and is currently coming soon to Amazon. For now, it can be downloaded from Digilent.-com/real-analog. The Table of Contents can be seen below: Chapter 1: Circuit Analysis Fundamentals 1.1 Basic Circuit Parameters and Sign Conventions 1.2 Power Sources 1.3 Resistors and Ohm's Law 1.4 Kirchhoff's Laws Chapter 2: Circuit Reduction 2.1 Series Circuit Elements and Voltage Division 2.2 Parallel Circuit Elements and Current Division 2.3 Circuit Reduction and Analysis 2.4 Non-ideal Power Supplies 2.5 Practical Voltage and Current Measurement Chapter 3: Nodal and Mesh Analysis 3.1 Introduction and Terminology 3.2 Nodal Analysis 3.3 Mesh Analysis Chapter 4: Systems and Network Theorems 4.1 Signals and Systems 4.2 Linear Systems 4.3 Superposition 4.4 Two-terminal Networks 4.5 Thévenin's and Norton's Theorems 4.6 Maximum Power Transfer Chapter 5: Operational Amplifiers 5.1 Ideal Operational Amplifier Model 5.2 Operational Amplifier Model Background 5.3 Commercially Available Operational Amplifiers 5.4 Analysis of Op-amp Circuits 5.5 Comparators 5.6 A Few Non-ideal Effects Chapter 6: Energy Storage Elements 6.1 Fundamental Concepts 6.2 Basic Time-varying Signals 6.3 Capacitors 6.4 Inductors 6.5 Practical Inductors Chapter 7: First Order Circuits 7.1 Introduction to First Order Systems 7.2 Natural Response of RC Circuits 7.3 Natural Response of RL Circuits 7.4 Forced Response of First Order Circuits 7.5 Step Response of First Order Circuits Chapter 8: Second Order Circuits 8.1 Introduction to Second Order Systems 8.2 Second Order System Natural Response, Part 1 8.3 Sinusoidal Signals and Complex Exponentials 8.4 Second Order System Natural Response, Part 2 8.5 Second Order System Step Response Chapter 9: State Variable Methods 9.1 Introduction to State Variable Models 9.2 Numerical Simulation of System Responses Using MATLAB 9.3 Numerical Simulation of System Responses Using Octave Chapter 10: Steady-State Sinusoidal Analysis 10.1 Introduction to Steady-state Sinusoidal Analysis 10.2 Sinusoidal Signals, Complex Exponentials, and Phasors 10.3 Sinusoidal Steady-state System Response 10.4 Phasor Representations of Circuit Elements 10.5 Direct Frequency Domain Circuit Analysis 10.6 Frequency Domain System Characterization Chapter 11: Frequency Response and Filtering 11.1 Introduction to Steady-state Sinusoidal Analysis 11.2 Signal Spectra and Frequency Response Plots 11.3 Frequency Selective Circuits and Filters 11.4 Introduction to Bode Plots Chapter 12: Steady-State Sinusoidal Power 12.1 Instantaneous Power 12.2 Average and Reactive Power 12.3 RMS Values 12.4 Apparent Power and Power Factor 12.5 Complex Power12.6 Power Factor Correction

Radiation-induced soft errors are a major concern for modern digital circuits, especially memory elements. Unlike large Random Access Memories that can be protected using error-correcting codes and bit interleaving, soft error protection of sequential elements, i.e. latches and flip-flops, is challenging. Traditional techniques for designing soft-error-resilient sequential elements generally address single node errors, or Single Event Upsets (SEUs). However, with technology scaling, the charge deposited by a single particle strike can be simultaneously collected and shared by multiple circuit nodes, resulting in Single Event Multiple Upsets (SEMUs). In this work, we target SEMUs by presenting a design framework for soft-error-resilient sequential cell design with an overview of existing circuit and layout techniques for soft error mitigation, and introducing a new soft error resilience layout design principle called LEAP, or Layout Design through Error-Aware Transistor Positioning. We then discuss our application of LEAP to the SEU-immune Dual Interlocked Storage Cell (DICE) by implementing a new sequential element layout called LEAP-DICE, retaining the original DICE circuit topology. We compare the soft error performance of SEU-immune flip-flops with the LEAP-DICE flip-flop using a test chip in 180nm CMOS under 200-MeV proton radiation and conclude that 1) our LEAP-DICE flip-flop encounters on average 2,000X and 5X fewer errors compared to a conventional D flip-flop and our reference DICE flip-flop, respectively; 2) our LEAP-DICE flip-flop has the best soft error performance among all existing SEU-immune flip-flops; 3) In the evaluation of our design framework, we also discovered new soft error effects related to operating conditions such as voltage scaling, clock frequency setting and radiation dose.

The central theme of Introduction to Electric Circuits is the concept that electric circuits are a part of the basic fabric of modern technology. Given this theme, this book endeavors to show how the analysis and design of electric circuits are inseparably intertwined with the ability of the engineer to design complex electronic, communication, computer and control systems as well as consumer products.This book is designed for a one-to three-term course in electric circuits or linear circuit analysis, and is structured for maximum flexibility.

Key Message:This book aims to explain physics in a readable and interesting manner that is accessible and clear, and to teach readers by anticipating their needs and difficulties without oversimplifying. Physics is a description of reality, and thus each topic begins with concrete observations and experiences that readers can directly relate to. We then move on to the generalizations and more for-

mal treatment of the topic. Not only does this make the material more interesting and easier to understand, but it is closer to the way physics is actually practiced. Key Topics: INTRODUCTION, MEASUREMENT, ESTIMATING, DESCRIBING MOTION: KINEMATICS IN ONE DIMENSION, KINEMATICS IN TWO OR THREE DIMENSIONS; VECTORS, DYNAMICS: NEWTON'S LAWS OF MOTION , USING NEWTON'S LAWS: FRICTION, CIRCULAR MOTION, DRAG FORCES, GRAVITATION AND NEWTON'S6 SYNTHESIS , WORK AND ENERGY , CONSERVATION OF ENERGY , LINEAR MOMENTUM , ROTATIONAL MOTION , ANGULAR MOMENTUM; GENERAL ROTATION , STATIC EQUILIBRIUM; ELASTICITY AND FRACTURE , FLUIDS , OSCILLATIONS , WAVE MOTION, SOUND , TEMPERATURE, THERMAL EXPANSION, AND THE IDEAL GAS LAW KINETIC THEORY OF GASES, HEAT AND THE FIRST LAW OF THERMODYNAMICS , SECOND LAW OF THERMODYNAMICS , ELECTRIC CHARGE AND ELECTRIC FIELD , GAUSS'S LAW , ELECTRIC POTENTIAL , CAPACITANCE, DIELECTRICS, ELECTRIC ENERGY STORAGE ELECTRIC CURRENTS AND RESISTANCE, DC CIRCUITS, MAGNETISM, SOURCES OF MAGNETIC FIELD, ELECTROMAGNETIC INDUCTION AND FARADAY'S LAW, INDUCTANCE, ELECTROMAGNETIC OSCILLATIONS, AND AC CIRCUITS, MAXWELL'S EQUATIONS AND ELECTROMAGNETIC WAVES, LIGHT: REFLECTION AND REFRACTION, LENSES AND OPTICAL INSTRUMENTS, THE WAVE NATURE OF LIGHT; INTERFERENCE, DIFFRACTION AND POLARIZATION, SPECIAL THEORY OF RELATIVITY, EARLY QUANTUM THEORY AND MODELS OF THE ATOM, QUANTUM MECHANICS, QUANTUM MECHANICS OF ATOMS, MOLECULES AND SOLIDS, NUCLEAR PHYSICS AND RADIOACTIVITY, NUCLEAR ENERGY: EFECTS AND USES OF RADIATION, ELEMENTARY PARTICLES,ASTROPHYSICS AND COSMOLOGY Market Description:This book is written for readers interested in learning the basics of physics.

Whereas power systems have traditionally been designed with a focus on protecting them from routine component failures and atypical user demand, we now also confront the fact that deliberate attack intended to cause maximum disruption is a real possibility. In response to this changing environment, new concepts and tools have emerged that address many of the issues facing power system operation today. This book is aimed at introducing these ideas to practicing power systems engineers, control systems engineers interested in power systems, and graduate students in these areas. The ideas are examined with an emphasis on how they can be applied to improve our understanding of power system behavior and help design better control systems. The book is supplemented by a Mathematica package enabling readers to work out nontrivial examples and problems. Also included is a set of Mathematica tutorial notebooks providing detailed solutions of the worked examples in the text. In addition to Mathematica, simulations are carried out using Simulink with Stateflow.

The objective of FUNDAMENTALS OF MECHATRONICS is to cover both hardware and software aspects of mechatronics systems in a single text, giving a complete treatment to the subject matter. The text focuses on application considerations and relevant practical issues that arise in the selection and design of mechatronics components and systems. The text uses several programming languages to illustrate the key topics. Different programming platforms are presented to give instructors the choice to select the programming language most suited to their course objectives. A separate laboratory book, with additional exercises is provided to give guided hands-on experience with many of the topics covered in the text. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.