

## Network Analysis By Ua Bakshi

This fully updated textbook provides complete coverage of electrical circuits and introduces students to the field of energy conversion technologies, analysis and design. Chapters are designed to equip students with necessary background material in such topics as devices, switching circuit analysis techniques, converter types, and methods of conversion. The book contains a large number of examples, exercises, and problems to help enforce the material presented in each chapter. A detailed discussion of resonant and softswitching dc-to-dc converters is included along with the addition of new chapters covering digital control, non-linear control, and micro-inverters for power electronics applications. Designed for senior undergraduate and graduate electrical engineering students, this book provides students with the ability to analyze and design power electronic circuits used in various industrial applications.

This book presents a comprehensive and in-depth analysis of electrical circuit theory in biomedical engineering, ideally suited as textbook for a graduate course. It contains methods and theory, but the topical focus is placed on practical applications of circuit theory, including problems, solutions and case studies. The target audience comprises graduate students and researchers and experts in electrical engineering who intend to embark on biomedical applications.

The book covers all the aspects of Network Analysis for undergraduate course. The book provides comprehensive coverage of circuit analysis and simplification techniques, coupled circuits, network theorems, transient analysis, Laplace transform, network functions, two port network parameters, network topology and network synthesis with the help of large number of solved problems. The book starts with explaining the various circuit variables, elements and sources. Then it explains different network simplification techniques including mesh analysis, node analysis and source shifting. The basics of coupled circuits and dot conventions are also explained in support. The book covers the application of various network theorems to d.c. and a.c. circuits. The importance of initial conditions and transient analysis of various networks is also explained in the book. The Laplace transform plays an important role in the network analysis. The chapter on Laplace transform includes properties of Laplace transform and its application in the network analysis. The book includes the discussion of network functions of one and two port networks. The book covers the various aspects of two port network parameters along with the conditions of symmetry and reciprocity. It also derives the interrelationships between the two port network parameters. The book incorporates the discussion of network topology. Finally the book covers the fundamentals of network synthesis and synthesis of LC, RC and RL networks. The book uses plain and lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. The variety of solved examples is the feature of this book. The book explains the philosophy of the subject which makes the understanding of the subject very clear and makes the subject more interesting. The students have to omit nothing and possibly have to cover nothing more.

Inspired by a new revival of worldwide interest in extra-high-voltage (EHV) and ultra-high-voltage (UHV) transmission, High Voltage Engineering merges the latest research with the extensive experience of the best in the field to deliver a comprehensive treatment of electrical insulation systems for the next generation of utility engineers and electric power professionals. The book offers extensive coverage of the physical basis of high-voltage engineering, from insulation stress and strength to lightning attachment and protection and beyond. Presenting information critical to the design, selection, testing, maintenance, and operation of a myriad of high-voltage power equipment, this must-have text: Discusses power system overvoltages, electric field calculation, and statistical analysis of ionization and breakdown phenomena essential for proper planning and interpretation of high-voltage tests Considers the breakdown of gases (SF<sub>6</sub>), liquids (insulating oil), solids, and composite materials, as well as the breakdown characteristics of long air gaps Describes insulation systems currently used in high-voltage engineering, including air insulation and insulators in overhead power transmission lines, gas-insulated substation (GIS) and cables, oil-paper insulation in power transformers, paper-oil insulation in high-voltage cables, and polymer insulation in cables Examines contemporary practices in insulation coordination in association with the International Electrotechnical Commission (IEC) definition and the latest standards Explores high-voltage testing and measuring techniques, from generation of test voltages to digital measuring methods With an emphasis on handling practical situations encountered in the operation of high-voltage power equipment, High Voltage Engineering provides readers with a detailed, real-world understanding of electrical insulation systems, including the various factors affecting—and the actual means of evaluating—insulation performance and their application in the establishment of technical specifications.

The book covers all the aspects of Transmission and Distribution for undergraduate course. The various aspects of transmission and distribution systems, FACTS, sag calculations, parameters and performance of transmission lines, insulators, cables, substations and grounding systems are explained in the book with the help of comprehensive approach. The book starts with the discussion of basics of power system. It includes comparison of material required for overhead and underground systems. Various types of d.c. and a.c. distribution systems, EHVAC, HVDC and FACTS devices is also included in the book. The book explains the sag calculation under different conditions and sag template. In depth analysis of transmission line parameters is also included in the book. The book also covers the performance analysis of short, medium and long transmission lines along with circle diagram and methods of voltage control. The details of corona effect are explained in support. The book incorporates the discussion of types of insulators, string efficiency, methods of improving string efficiency, single and three core cables, grading of cables, heating and testing of cables. The chapter on substations includes the explanation of various types of substations, substation equipment's and key diagrams. The book also covers the various types of grounding systems, grounding grids and

resistance of grounding systems. The book uses plain and lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. Each chapter is well supported with necessary illustrations, self-explanatory diagrams and large number of solved problems. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

Electronics – From Theory Into Practice deals with design procedures in electronics and bridges the gap between theoretical knowledge and practice. It provides design examples and discusses the use of the Laplace Transform for solving engineering problems. The book introduces bipolar and field effect transistor, the unijunction transistor and the silicon-controlled rectifier, and shows how data sheets are used in design calculations. It then examines the development of integrated circuits and their characteristics. Following this discussion are chapters that contain a brief treatment of theory limited to the extraction of necessary design relationships. The book concludes by considering the general aspects of electronic engineering practice. This book will be of use to practising engineers, particularly those trained in other disciplines, who are taking on a certain amount of electronic design.

The importance of various electrical machines is well known in the various engineering fields. The book provides comprehensive coverage of the magnetic circuits, magnetic materials, single and three phase transformers and d.c. machines. The book is structured to cover the key aspects of the course Electrical Machines - I. The book starts with the explanation of basics of magnetic circuits, concepts of self and mutual inductances and important magnetic materials. Then it explains the fundamentals of single phase transformers including the construction, phasor diagram, equivalent circuit, losses, efficiency, methods of cooling, parallel operation and autotransformer. The chapter on three phase transformer provides the detailed discussion of construction, connections, phasor groups, parallel operation, tap changing transformer and three winding transformer. The various testing methods of transformers are also incorporated in the book. The book further explains the concept of electromechanical energy conversion including the discussion of singly and multiple excited systems. Then the book covers all the details of d.c. generators including construction, armature reaction, commutation, characteristics, parallel operation and applications. The book also includes the details of d.c. motors such as characteristics, types of starters, speed control methods, electric braking and permanent magnet d.c. motors. Finally, the book covers the various testing methods of d.c. machines including Swinburne's test, brake test, retardation test and Hopkinson's test. The book uses plain, lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. Each chapter is well supported with necessary illustrations, self-explanatory diagrams and variety of solved problems. All the chapters are arranged in a proper sequence that permits each topic to build upon earlier studies. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The book covers all the aspects of theory, analysis, and design of Electronic Circuits for the undergraduate course. It provides all the essential information required to understand the operation and perform the analysis and design of a wide range of electronic circuits, including MOSFET as a switching and amplifier circuits, feedback amplifiers, oscillators, voltage regulators, operational amplifiers and its applications, DAC, ADC, and Phase-Locked Loop. The book is divided into four parts. The first part focuses on the fundamental concepts of MOSFET, MOSFET construction, characteristics, and circuits - as a switch, as a resistor/diode, as an amplifier, and current sink and source circuits. The second part focuses on the analysis of voltage-series and current-series feedback amplifiers. It also explains the Barkhausen criterion for oscillation and incorporates the detailed analysis of Wien bridge and phase-shift oscillators. The third part is dedicated to the basics of op-amp and a discussion of a variety of its applications. The fourth part focuses on the V to I and I to V Converters, DAC and ADC, and Phase-Locked Loop. The book uses straightforward and lucid language to explain each topic. The book provides the logical method of describing the various complicated issues and stepwise methods to make understanding easy. The variety of solved examples is the feature of this book. The book explains the subject's philosophy, which makes understanding the concepts evident and makes the subject more interesting.

The importance of electronic measuring instruments and transducers is well known in the various engineering fields. The book provides comprehensive coverage of various electronic measuring instruments, transducers, data acquisition system, oscilloscopes and measurement of physical parameters. The book starts with explaining the theory of measurement including characteristics of instruments, classification, statistical analysis and limiting errors. Then the book explains the various analog and digital instruments such as average and true rms responding voltmeters, chopper and sampling voltmeter, types of digital voltmeters, multimeter and ohmmeter. It also includes the discussion of high frequency impedance measurement. The book further explains types of signal generators and various signal analyzers such as wave analyzer, logic analyzer, distortion analyzer and power analyzer. The book teaches various d.c. and a.c. bridges along with necessary derivations and phasor diagrams. The book incorporates the discussion of various types of conventional and special purpose oscilloscopes. The book includes the discussion of time and frequency measurement and types of recorders. The chapter on transducers is dedicated to the detailed discussion of various types of transducers. The book also includes the measurement of various physical parameters such as flow, displacement, velocity, force, pressure and torque. Finally, it incorporates the discussion of data acquisition system. Each chapter gives the conceptual knowledge about the topic dividing it in various sections and subsections. Each chapter provides the detailed explanation of the topic, practical examples and variety of solved problems. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The importance of network analysis and synthesis is well known in the various engineering fields. The book provides comprehensive coverage of the signals and network analysis, network functions and two port networks, network synthesis and active filter design. The book is structured to cover the key aspects of the course Network Analysis & Synthesis. The book starts with explaining the various types of signals, basic concepts of network analysis and transient analysis using classical approach. The Laplace transform plays an important role in the network analysis. The chapter on Laplace transform includes properties of Laplace transform and its application in the network analysis. The book includes the discussion of network functions of one and two port networks. The book covers the various aspects of two port network parameters along with the conditions of symmetry and reciprocity. It also derives the interrelationships between the two port network parameters. The network synthesis starts with the realizability theory including Hurwitz polynomial, properties of positive real functions, Sturm's theorem and maximum modulus theorem. The book covers the various aspects of one port network synthesis explaining the

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network synthesis of LC, RC, RL and RLC networks using Foster and Cauer forms. Then it explains the elements of transfer function synthesis. Finally, the book illustrates the active filter design. Each chapter provides the detailed explanation of the topic, practical examples and variety of solved problems. The explanations are given using very simple and lucid language. All the chapters are arranged in a specific sequence which helps to build the understanding of the subject in a logical fashion. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The book is written as primer hand book for addressing the fundamentals of smart grid. It provides the working definition the functions, the design criteria and the tools and techniques and technology needed for building smart grid. The book is needed to provide a working guideline in the design, analysis and development of Smart Grid. It incorporates all the essential factors of Smart Grid appropriate for enabling the performance and capability of the power system. There are no comparable books which provide information on the "how to" of the design and analysis. The book provides a fundamental discussion on the motivation for the smart grid development, the working definition and the tools for analysis and development of the Smart Grid. Standards and requirements needed for designing new devices, systems and products are discussed; the automation and computational techniques need to ensure that the Smart Grid guarantees adaptability, foresight alongside capability of handling new systems and components are discussed. The interoperability of different renewable energy sources are included to ensure that there will be minimum changes in the existing legacy system. Overall the book evaluates different options of computational intelligence, communication technology and decision support system to design various aspects of Smart Grid. Strategies for demonstration of Smart Grid schemes on selected problems are presented.

The importance of various electrical machines is well known in the various engineering fields. The book provides comprehensive coverage of the synchronous generators (alternators), synchronous motors, three phase and single phase induction motors and various special machines. The book is structured to cover the key aspects of the course Electrical Machines - II. The book starts with the explanation of basics of synchronous generators including construction, winding details and e.m.f. equation. The book then explains the concept of armature reaction, phasor diagrams, regulation and various methods of finding the regulation of alternator. Stepwise explanation and simple techniques used to elaborate these methods is the feature of this book. The book further explains the concept of synchronization of alternators, two reaction theory and parallel operation of alternators. The chapter on synchronous motor provides the detailed discussion of construction, working principle, behavior on load, analysis of phasor diagram, Vee and Inverted Vee curves, hunting and applications. The book further explains the three phase induction motors in detail. It includes the construction, working, effect of slip, torque equation, torque ratios, torque-slip characteristics, losses, power flow, equivalent circuit, effect of harmonics on the performance and applications. This chapter includes the discussion of induction generator and synchronous induction motor. The detailed discussion of circle diagram is also included in the book. The book teaches the various starting methods, speed control methods and electrical braking methods of three phase induction motors. Finally, the book gives the explanation of various single phase induction motors and special machines such as reluctance motor, hysteresis motor, repulsion motor, servomotors and stepper motors. The discussion of magnetic levitation is also incorporated in the book. The book uses plain, lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. Each chapter is well supported with necessary illustrations, self explanatory diagrams and variety of solved problems. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The knowledge of switchgear and apparatus protection plays an important role in the power system. The book is structured to cover the key aspects of the course Switchgear & Protection for undergraduate students. The book starts with the discussion of basics of protective relaying. The book includes comprehensive coverage of faults and analysis of symmetrical and unsymmetrical faults. The book explains the protection against overvoltage, lightning arresters and power system earthing. The book covers the characteristics of various types of relays such as electromagnetic relays, induction type relays, directional relays, differential relays, thermal relays, frequency relays and negative sequence relays. The detailed discussion of distance relays and static relays is also included in the book. The book also covers the various possible faults and methods of protection of transformers, generators, motors, busbars and transmission lines. The book further explains the theory of circuit interruption and various arc interruption methods. Finally, the book incorporates various types of circuit breakers, circuit breaker ratings and testing of circuit breakers. The book uses plain and lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. Each chapter is well supported with necessary illustrations and self-explanatory diagrams. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

Single Stage Amplifiers Review, Small signal analysis of junction transistor, Frequency response of common emitter amplifier, Common base amplifier, Common collector amplifier, JFET amplifiers, Common drain (CD) amplifier, Common gate amplifier, gain band-width product. Multistage Amplifiers Multi stage amplifiers, Methods of inter stage coupling, n-stage cascaded amplifier, Equivalent circuits, Miller's theorem, Frequency effects, Amplifier analysis, High input resistance transistor circuits, Cascode - transistor configuration, CE-CC amplifiers, Two stage RC coupled JFET amplifier (in common source (CS) configuration), Difference amplifier. High Frequency Transistor Circuits Transistor at high frequencies, Hybrid- common emitter, Transconductance model, Determination of hybrid- conductances, Variation of Hybrid parameters with  $|i_C|$ ,  $|V_{CE}|$  and temperature. The parameters  $f_T$ , expression for  $f$ , Current gain with resistance load, CE short circuit current gain, Hybrid - ( $\pi$ ) parameters, Measurement of  $f_T$  variation of Hybrid- parameters with Voltage, Current and temperature, Design of high frequency amplifier. Power Amplifiers Class A power amplifier, Maximum value of efficiency of class a amplifier, Transformer coupled amplifier, Transformer coupled audio amplifier, Push pull amplifier, Complimentary symmetry circuits (Transformer less class B power amplifier), Phase inverters, Class D operation, Class S operation, Heat sinks. Tuned Amplifiers - I Single tuned capacitive coupled amplifier, Tapped single tuned capacitance coupled amplifier, Single tuned transformer coupled or inductively coupled amplifier, CE double tuned amplifier, Application of tuned amplifiers. Tuned Amplifiers - II Stagger tuning, Stability considerations, Tuned Class B and Class C amplifiers, Wideband amplifiers, Tuned amplifiers. Voltage Regulators Terminology, Basic regulator circuit, Short circuit protection, Current limiting, Specifications of voltage regulator circuits, Voltage multipliers. Switching and IC Voltage Regulators IC 723 voltage regulators and three terminal IC regulators, DC to DC converter, Switching regulators, Voltage Multipliers, UPS, SMPS.

The importance of measuring instruments is well known in the various engineering fields. The book provides comprehensive coverage of various electrical and digital measuring instruments. The book starts with explaining the classification and requirements of a measuring instrument. Then the book explains the PMMC and moving iron instruments. Extension of range of instruments using shunts and multipliers is also included in the book. The book includes detailed discussion of instrument transformers and power factor meters. The book covers the types of wattmeters, errors and compensations and two wattmeter method. The chapter on energy measurement includes discussion of energy meters, errors and compensations, calibration, phantom loading, trivector meter and Merz price maximum demand indicator. The book teaches the details of d.c. and a.c. potentiometers along with their applications. The book further explains various d.c. and a.c. bridges along with necessary derivations and phasor diagrams. It also includes the discussion of various magnetic measurements. Finally, the book includes the discussion of various digital meters such as digital voltmeters, digital multimeter, digital frequency meter and digital tachometer along with the automation in digital instruments. Each chapter gives the conceptual knowledge about the topic dividing it in various sections and subsections. Each chapter provides the detailed

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explanation of the topic, practical examples and variety of solved problems. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

With The Authors Experience Of Teaching The Courses On Finite Element Analysis To Undergraduate And Postgraduate Students For Several Years, The Author Felt Need For Writing This Book. The Concept Of Finite Element Analysis, Finding Properties Of Various Elements And Assembling Stiffness Equation Is Developed Systematically By Splitting The Subject Into Various Chapters. The Method Is Made Clear By Solving Many Problems By Hand Calculations. The Application Of Finite Element Method To Plates, Shells And Nonlinear Analysis Is Presented. After Listing Some Of The Commercially Available Finite Element Analysis Packages, The Structure Of A Finite Element Program And The Desired Features Of Commercial Packages Are Discussed.

Simplification and Analysis Techniques (A.C. and D.C. Circuits) Sinusoidal steady state. Phasors & phasor diagram. Energy sources. Mesh and nodal analysis. Source transformation. Network theorems. 1) Superposition theorem. 2) Thevenin's theorem. 3) Norton's theorem. 4) Maximum power transfer theorem. Resonance and Applications Definition of figure of merit, Q. Series resonance : Current bandwidth, Impedance, & selectivity in series resonance. Parallel (anti) resonance : Application of resonance circuits including impedance transformation. Transient Response Initial conditions in elements. A procedure for evaluating initial conditions. Solution of RC, RL, RLC step response using classical method. Solution of RC, RL, RLC step response using Laplace transform. Four Terminal Networks Classification of four terminal networks (Symmetrical, asymmetrical, balanced & unbalanced) Characteristic impedance & propagation constant for symmetrical networks. Image & iterative impedance for symmetrical networks. Filter fundamentals : Constant K type low-pass filter. Constant K type high pass filter. Constant K type band pass filter. Constant K type band stop filter. M-derived T and sections of low pass filter. Composite low pass filter. Attenuators : Introduction. Nepers & decibels. Symmetrical T & type attenuators. Network Functions Terminal pairs and ports. Network functions for one and two port networks. Poles & zeros of network function. Time domain behaviour from pole zero plot. Two Port Network Parameters Introduction. Open circuit impedance parameters. Short circuit admittance parameters. Hybrid parameters. Transmission parameters. Inter-relation between different parameters. Interconnection of two port networks.

The book is written for an undergraduate course on the theory of Feedback Control Systems. It provides comprehensive explanation of theory and practice of control system engineering. It elaborates various aspects of time domain and frequency domain analysis and design of control systems. Each chapter starts with the background of the topic. Then it gives the conceptual knowledge about the topic dividing it in various sections and subsections. Each chapter provides the detailed explanation of the topic, practical examples and variety of solved problems. The explanations are given using very simple and lucid language. All the chapters are arranged in a specific sequence which helps to build the understanding of the subject in a logical fashion. The book starts with explaining the various types of control systems. Then it explains how to obtain the mathematical models of various types of systems such as electrical, mechanical, thermal and liquid level systems. Then the book includes good coverage of the block diagram and signal flow graph methods of representing the various systems and the reduction methods to obtain simple system from the analysis point of view. The book further illustrates the steady state and transient analysis of control systems. The book covers the fundamental knowledge of controllers used in practice to optimize the performance of the systems. The book emphasizes the detailed analysis of second order systems as these systems are common in practice and higher order systems can be approximated as second order systems. The book teaches the concept of stability and time domain stability analysis using Routh-Hurwitz method and root locus method. It further explains the fundamentals of frequency domain analysis of the systems including co-relation between time domain and frequency domain. The book gives very simple techniques for stability analysis of the systems in the frequency domain, using Bode plot, Polar plot and Nyquist plot methods. It also explores the concepts of compensation and design of the control systems in time domain and frequency domain. The classical approach loses the importance of initial conditions in the systems. Thus the book provides the detailed explanation of modern approach of analysis which is the state variable analysis of the systems including methods of finding the state transition matrix, solution of state equation and the concepts of controllability and observability. The book also introduces the concept of discrete time systems including digital and sample data systems, z-transform, difference equations, state space representation, pulse transfer functions and stability of linear discrete time systems. The variety of solved examples is the feature of this book which helps to inculcate the knowledge of the design and analysis of the control systems in the students. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The book covers all the aspects of Network Analysis for undergraduate course. The book provides comprehensive coverage of network analysis and simplification techniques, network theorems, graph theory, transient analysis, filters, attenuators, Laplace transform, network functions and two port network parameters with the help of large number of solved problems. The book starts with explaining the various network simplification techniques including mesh analysis, node analysis and source shifting. The basics of a.c. fundamentals are also explained in support. The book covers the various network theorems. Then the book explains the graph theory, its application in network analysis along with the concept of duality. The transient analysis of various networks is also explained in the book. The book incorporates the detailed discussion of resonant circuits. The book also explains the theory of four terminal networks, filters and attenuators. The Laplace transform plays an important role in the network analysis. The chapter on Laplace transform includes properties of Laplace transform and its application in the network analysis. The book includes the discussion of network functions of one and two port networks. The book covers the various aspects of two port network parameters along with the conditions of symmetry and reciprocity. It also derives the interrelationships between the two port network parameters. The book uses plain and lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. The variety of solved examples is the feature of this book. The book explains the philosophy of the subject which makes the understanding of the subject very clear and makes the subject more interesting. The students have to omit nothing and possibly have to cover nothing more.

The book is written for an undergraduate course on the Signals and Systems. It provides comprehensive explanation of continuous time signals and systems, analogous systems, Fourier transform, Laplace transform, state variable analysis and z-transform analysis of systems. The book starts with the various types of signals and operations on signals. It explains the classification of continuous time signals and systems. Then it includes the discussion of analogous systems. The book provides detailed discussion of Fourier transform representation, properties of Fourier transform and its applications to network analysis. The book also covers the Laplace transform, its properties and network analysis using Laplace transform with and without initial conditions. The book provides the detailed explanation of modern approach of system analysis called the state variable analysis. It includes various methods of state space representation of systems, finding the state transition matrix and solution of state equation. The discussion of network topology is also included in the book. The chapter on z-transform includes the properties of ROC, properties of z-transform, inverse z-transform, z-transform analysis of LTI systems and pulse transfer function. The state space representation of discrete systems is also incorporated in the book. The book uses plain, simple and lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. The variety of solved examples is the feature of this book. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The Second Edition of this critically-acclaimed text continues the standard of excellence set in the first edition by providing a thorough introduction to the fundamentals of telecommunication networks without

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bogging you down in complex technical jargon or math. Although focusing on the basics, the book has been thoroughly updated with the latest advances in the field, including a new chapter on metropolitan area networks (MANs) and new sections on Mobile Fi, ZigBee and ultrawideband. You'll learn which choices are now available to an organization, how to evaluate them and how to develop strategies that achieve the best balance among cost, security and performance factors for voice, data, and image communication.

The second edition of this well-received text continues to provide a coherent and comprehensive coverage of Pulse and Digital Circuits, suitable as a textbook for use by undergraduate students pursuing courses in Electrical and Electronics Engineering, Electronics and Communication Engineering, Electronics and Instrumentation Engineering, and Telecommunication Engineering. It presents clear explanations of the operation and analysis of semiconductor pulse circuits. Practical pulse circuit design methods are investigated in detail. The book provides numerous fully worked-out, laboratory-tested examples to give students a solid grounding in the related design concepts. It includes a number of classroom-tested problems to encourage students to apply theory in a logical fashion. Review questions, fill in the blanks, and multiple choice questions offer the students the opportunity to test their understanding of the text material. This text will be also appropriate for self-study by AMIE and IETE students. NEW TO THIS EDITION : • Includes two new chapters—Logic Gates and Logic Families—to meet the curriculum requirements. • Provides short questions with answers at the end of each chapter. • Presents several new illustrations, examples and exercises

First Published in 1970. Routledge is an imprint of Taylor & Francis, an informa company.

This hallmark text on Power System Engineering provides the readers a comprehensive account of all key concepts in the field. The book includes latest technology developments and talks about some crucial areas of Power system, such as Transmission & Distribution, Analysis & Stability, and Protection & Switchgear. With its rich content, it caters to the requirements of students, instructors, and professionals.

The importance of Electrical Circuit Analysis is well known in the various engineering fields. The book provides comprehensive coverage of mesh and node analysis, various network theorems, analysis of first and second order networks using time and Laplace domain, steady state analysis of a.c. circuits, coupled circuits and dot conventions, network functions, resonance and two port network parameters. The book starts with explaining the network simplification techniques including mesh analysis, node analysis and source shifting. Then the book explains the various network theorems and concept of duality. The book also covers the solution of first and second order networks in time domain. The sinusoidal steady state analysis of electrical circuits is also explained in the book. The book incorporates the discussion of coupled circuits and dot conventions. The Laplace transform plays an important role in the network analysis. The chapter on Laplace transform includes properties of Laplace transform and its application in the network analysis. The book includes the discussion of network functions of one and two port networks. The book incorporates the detailed discussion of resonant circuits. The book covers the various aspects of two port network parameters along with the conditions of symmetry and reciprocity. It also derives the interrelationships between the two port network parameters. The book uses plain and lucid language to explain each topic. Each chapter gives the conceptual knowledge about the topic dividing it in various sections and subsections. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. The variety of solved examples is the feature of this book. The book explains the philosophy of the subject which makes the understanding of the subject very clear and makes the subject more interesting.

?The importance of measuring instruments and transducers is well known in the various engineering fields. The book provides comprehensive coverage of various electrical and electronic measuring instruments, transducers, data acquisition system, storage and display devices . The book starts with explaining the theory of measurement including characteristics of instruments, classification, standards, statistical analysis and limiting errors. Then the book explains the various electrical and electronic instruments such as PMMC, moving iron, electro-dynamometer type, energy meter, wattmeter, digital voltmeters and multimeters. It also includes the discussion of various magnetic measurements, instrument transformers, power factor meters, frequency meters, phase meters and synchros. The book further explains d.c. and a.c. potentiometers and their applications. The book teaches various d.c. and a.c. bridges along with necessary derivations and phasor diagrams. The book incorporates the various storage and display devices such as, recorders, plotters, printers, oscilloscopes, LED, LCDs and dot matrix displays. The chapter on transducers is dedicated to the detailed discussion of various types of transducers such as resistive, capacitive, strain gauges, RTD, thermistors, inductive, LVDT, thermocouples, piezoelectric, photoelectric and digital transducers. It also adds the discussion of optical fiber sensors. The book also includes good coverage of data acquisition system, data loggers, DACs and ADCs. Each chapter starts with the background of the topic. Then it gives the conceptual knowledge about the topic dividing it in various sections and subsections. Each chapter provides the detailed explanation of the topic, practical examples and variety of solved problems. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The book is written for an undergraduate course on the Feedback Control Systems. It provides comprehensive explanation of theory and practice of control system engineering. It elaborates various aspects of time domain and frequency domain analysis and design of control systems. Each chapter starts with the background of the topic. Then it gives the conceptual knowledge about the topic dividing it in various sections and subsections. Each chapter provides the detailed explanation of the topic, practical examples and variety of solved problems. The explanations are given using very simple and lucid language. All the chapters are arranged in a specific sequence which helps to build the understanding of the subject in a logical fashion. The book starts with explaining the various types of control systems. Then it explains how to obtain the mathematical models of various types of systems such as electrical, mechanical, thermal and liquid level systems. Then the book includes good coverage of the block diagram and signal flow graph methods of representing the various systems and the reduction methods to obtain simple system from the analysis point of view. The book further illustrates the steady state and transient analysis of control systems. The book covers the fundamental knowledge of controllers used in practice to optimize the performance of the systems. The book emphasizes the detailed analysis of second order systems as these systems are common in practice and higher order systems can be approximated as second order systems. The book teaches the concept of stability and time domain stability analysis using Routh-Hurwitz method and root locus method. It further explains the fundamentals of frequency domain analysis of the systems including co-relation between time domain and frequency domain. The book gives very simple techniques for stability

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analysis of the systems in the frequency domain, using Bode plot, Polar plot and Nyquist plot methods. It also explores the concepts of compensation and design of the control systems in time domain and frequency domain. The classical approach loses the importance of initial conditions in the systems. Thus, the book provides the detailed explanation of modern approach of analysis which is the state variable analysis of the systems including methods of finding the state transition matrix, solution of state equation and the concepts of controllability and observability. The variety of solved examples is the feature of this book which helps to inculcate the knowledge of the design and analysis of the control systems in the students. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The comprehensive study of electric, magnetic and combined fields is nothing but electromagnetic engineering. Along with electronics, electromagnetics plays an important role in other branches. The book is structured to cover the key aspects of the course Electromagnetic Field Theory for undergraduate students. The knowledge of vector analysis is the base of electromagnetic engineering. Hence book starts with the discussion of vector analysis. Then it introduces the basic concepts of electrostatics such as Coulomb's law, electric field intensity due to various charge distributions, electric flux, electric flux density, Gauss's law, divergence and divergence theorem. The book continues to explain the concept of elementary work done, conservative property, electric potential and potential difference and the energy in the electrostatic fields. The detailed discussion of current density, continuity equation, boundary conditions and various types of capacitors is also included in the book. The book provides the discussion of Poisson's and Laplace's equations and their use in variety of practical applications. The chapter on magnetostatics incorporates the explanation of Biot-Savart's law, Ampere's circuital law and its applications, concept of curl, Stoke's theorem, scalar and vector magnetic potentials. The book also includes the concept of force on a moving charge, force on differential current element and magnetic boundary conditions. The book covers all the details of Faraday's laws, time varying fields, Maxwell's equations and Poynting theorem. Finally, the book provides the detailed study of uniform plane waves including their propagation in free space, perfect dielectrics, lossy dielectrics and good conductors. The book uses plain, lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. The variety of solved examples is the feature of this book which helps to inculcate the knowledge of the electromagnetics in the students. Each chapter is well supported with necessary illustrations and self-explanatory diagrams. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The revision of this extremely popular text, Circuits and Networks: Analysis and Synthesis, comes at a time when the industry is increasingly looking to hire engineers who are able to display learning outcomes. The book has been revised based on internationally accepted Learning Outcomes required from a course. Additionally, key pedagogical aids, such as questions from previous year question papers are added afresh to further help students in preparing for this course and its examinations. For the tech savvy, the practice of MCQs in a digital and randomized environment will provide thrill. Salient Features: - Content revised as per internationally accepted learning outcomes - 461 Frequently asked questions derived from important previous year question papers - Features like Definition and Important Formulas are highlighted within the text

**Basic Circuit Concepts**Lumped circuits-circuit elements, ideal sources (independent and dependent), linear passive parameters R, L and C; V-I relationship of circuit elements; sinusoidal voltage and current; RMS value; form factor; Kirchoff's Laws; analysis of series and parallel circuits - network reduction; voltage and current division, source transformation, star/delta transformation.**Transient Analysis of First and Second Order Circuits**Source free response of RL and RC circuits; forced (step) response of RL and RC circuits; source free response of RLC series circuit; forced (step) response of RLC series circuit; forced response of RL, RC and RLC series circuit to sinusoidal excitation; time constant and natural frequency of oscillation of circuits. Laplace Transform application to the solution of RL, RC and RLC circuits - initial and final value theorems and applications, concept of complex frequency, driving point and transfer impedance, poles and zeros of network function.**Sinusoidal Steady State Analysis**Concept of phasor and complex impedance/admittance; Analysis of simple series and parallel circuits - active power, reactive power, apparent power (volt ampere), power factor and energy associated with these circuits; concept of complex power phasor diagram, impedance triangle and power triangle associated with these circuits. Resonance in series and parallel circuits - Q factor, half-power frequencies and bandwidth of resonant circuits.**Multi Dimensional Circuit Analysis and Network Theorems**Node-voltage analysis of multi node circuit with current sources, rules for constructing nodal admittance matrix [Y] for solving matrix equation [Y]V=I, mesh-current analysis of multi node circuits with voltage sources, rules for constructing mesh impedance matrix [Z] for solving matrix equation [Z]I=V. Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem, Compensation theorem, Tellegen's theorem, Millman's theorem, maximum power transfer theorem for variable resistance load, variable impedance load and variable resistance and fixed reactance load.**Coupled Circuits and Three Phase Circuits**Coupled circuits- mutual inductance, coefficient of coupling, dot convention; analysis of simple coupled circuits. Three phase circuits - three phase balanced / unbalanced voltage sources, symmetrical components, analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads (balanced and unbalanced), phasor diagram of voltages and currents, power and power factor measurements in three phase circuits.

**Basic Electrical and Electronics Engineering** provides an overview of the basics of electrical and electronic engineering that are required at the undergraduate level. The book allows students outside electrical and electronics engineering to easily

**Basic Concepts** Practical sources, source transformation, network reduction using star-delta transformation. Loop and node analysis with linearly dependent and independent sources for DC and AC networks.**Network Topology**Graph of network, Concept of a tree and co-tree, incidence matrix, tieset and cut-set schedules, formulation of equilibrium equations in matrix form, solution of resistive networks, principles of duality.**Network Theorems**Superposition, Reciprocity, Thevenin's, Norton's, Maximum power transfer and Millman's theorems.**Resonant Circuits**Series and parallel resonance, frequency-response of series and parallel circuits, Q-factor, Bandwidth.**Transient Behaviour and Initial Conditions**Behaviour of circuit element under switching condition and their representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations.**Laplace Transformation and Applications**Solution of networks, step, ramp and impulse functions, waveform synthesis, initial and final values, convolution integral, Transformed networks and their solution.**Two Port Network Parameters**Short circuit admittance parameters, open circuit impedance parameters, transmission parameters, hybrid parameters, relationship between parameters sets.

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The book is written for an undergraduate course on the Communication Network and Transmission Lines. It provides comprehensive explanation of four terminal symmetrical and asymmetrical networks, attenuators, filters, network synthesis, equalizers, transmission line theory and Smith chart. The book starts with explaining the symmetrical and asymmetrical four terminal networks which form the basis of attenuators and filters. Then book provides the detailed discussion of various types of attenuators and filters. The discussion of composite filters, lattice filter and crystal filter is also included in support. The book incorporates the discussion of Hurwitz polynomials and positive real function and continues to explain the network synthesis of LC, RC, RL and RLC networks. The book also explains the various types of equalizers. The book covers the transmission line parameters in detail along with reflection on a line, reflection loss and reflection factor. The chapter on transmission line at radio frequency includes parameters of line at high frequency, standing waves, standing wave ratio, single stub matching, double stub matching and Smith chart. The book uses plain, simple and lucid language to explain each topic. The book provides the logical method of explaining the various complicated topics and stepwise methods to make the understanding easy. The variety of solved examples is the feature of this book. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

The importance of measuring instruments is well known in the various engineering fields. The book provides comprehensive coverage of various analog, electronic and digital instruments, d.c. and a.c. bridges, signal generators and analyzers, virtual instrumentation and data acquisition system. The book starts with explaining the theory of measurement including characteristics of instruments, classification, standards, statistical analysis and limiting errors. Then the book explains the various analog and electronic instruments such as PMMC, moving iron, electro-dynamometer type, true RMS, Q-meter and sampling voltmeter. The book also includes the discussion of various d.c. and a.c. bridges along with necessary derivations and phasor diagrams. The book incorporates the detailed discussion of various types of oscilloscopes including simple, dual beam, dual trace, analog storage, sampling and digital oscilloscope. It also explains the various oscilloscope measurements and Lissajous figures. The book further explains the various signal generators and analyzers. It also covers the discussion of DAC, ADC, various digital instruments and data acquisition system. Finally the book provides the details of computer controlled systems, virtual instrumentation and fiber optic measurements. Each chapter starts with the background of the topic. Then it gives the conceptual knowledge about the topic dividing it in various sections and subsections. Each chapter provides the detailed explanation of the topic, practical examples and variety of solved problems. The book explains the philosophy of the subject which makes the understanding of the concepts very clear and makes the subject more interesting.

Circuit Elements & Kirchoff's Laws Lumped & Discrete Circuit Elements, Characterization of Resistors, Capacitors & Inductors in Terms of Their Livearity & Time Dependence Nature, Characteristics of Independent & Dependent Sources, KCL & KVL for Circuits with Dependent & Independent. Sources, Terminal Characteristics of Active Circuit Elements like Diodes, OPAMPS & transistors, Dot Convention for Coupled Inductor. Time Domain Analysis of Circuits Initial and Final Conditions on Network Elements, Differential Equations & integrodifferential Equations of First-and Second Order System, Step and Impulse response of First and Second-Order System, Zero-Input & Zero-State Response. Sinusoidal Steady-State Analysis Difference of Sinusoidal Steady<sup>^</sup> State, Difference between a Phasor and a Vector. Concept of Impedance and Admittance, Node & Mesh Analysis in the Sinusoidal Steady State, Network Theorems Like Superposition, Thevenin's & Superposition in'the Sinusoidal Steady State, Present Circuits (both Series & Parallel) Coupling Elements and Coupled Circuits Coupled Inductors & Their Characterisation, Co-efficient of Coupling, Multiwin'ding Inductors & their I Inductance Matrix, Double Tuned Circuits. Transform Domain Analysis of Networks The philosophy of Transform Methods, The Laplace Transform, Use of Laplace Transform for the Solution of Integra. Differential Equations, Transforms of Wave Forms Synthesized with Step, Rampm Gate and Sinusoidal Fuctions, The transformed Network, Network Theorems (the Venin, Norton, Maximum power. Superposition & Reciprocity) in transform Domain. Network Functions The concept of complex frequency, Concept of Ports, Network Functions of one Port & Two ports, Calculation of Network Functions for General Networks, Pole & Zeros of Network Functions of Different Kinds, Time Domain Behaviour from Pole-Zero plots. Two Port Networks Relationship of Two-port Variables, Short Circuit Admittance & Parameters, Open Circuit Impedance, Transmission Parameters, Hybrid Parameters, Relationship between Parameters Sets, Interconnection between Two-ports, Terminated Two-ports. Fourier Series & Fourier Transforms Concept of Signal Spectra, Fourier Series Co-efficients of a periodic Wave-form, Waveform Symmetrics, Exponential Form of Fourier Series, Steady State Response to Periodic Signals, Fourier integral & transform. Properties of Fourier Transform, Applications in Network analysis. Network Synthesis of One-port Networks with Two Kind of Elements Concept of Positive real functions, Hurwitz polynomials, Properties of L-C, RL & RC immittance function, Synthesis of RC, RL & LC immittance functions in cauer, Foster & mixed canonical form. Topological Analysis of electrical Networks Concept of Network Graphs, Incidence matrix. Cut-sets and loops. Fundamental cut-set and loop matrices, Dual graphs. Cut-set and loop Analysis.

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