



SEMICONDUCTOR PHYSICS AND DEVICES

Basic Principles

Donald A. Neamen

Fourth Edition

Semiconductor Physics And Devices

Mykhaylo Evstigneev



Semiconductor Physics And Devices:

Fundamentals of Semiconductor Physics and Devices, 1997 This book is an introduction to the principles of semiconductor physics linking its scientific aspects with practical applications It is addressed to both readers who wish to learn semiconductor physics and those seeking to understand semiconductor devices It is particularly well suited for those who want to do both

Semiconductor Physics And Devices Donald Neamen, 2003 Neamen's Semiconductor Physics and Devices Third Edition deals with the electrical properties and characteristics of semiconductor materials and devices The goal of this book is to bring together quantum mechanics the quantum theory of solids semiconductor material physics and semiconductor device physics in a clear and understandable way Semiconductor Physics and Devices Donald A. Neamen, 2012 Provides a basis for understanding the characteristics operation and limitations of semiconductor devices This title deals with the electrical properties and characteristics of semiconductor materials and devices It intends to bring together quantum mechanics the quantum theory of solids and semiconductor material physics

Physics of Semiconductor Devices Simon M. Sze, Kwok K. Ng, 2006-12-13 The Third Edition of the standard textbook and reference in the field of semiconductor devices This classic book has set the standard for advanced study and reference in the semiconductor device field Now completely updated and reorganized to reflect the tremendous advances in device concepts and performance this Third Edition remains the most detailed and exhaustive single source of information on the most important semiconductor devices It gives readers immediate access to detailed descriptions of the underlying physics and performance characteristics of all major bipolar field effect microwave photonic and sensor devices Designed for graduate textbook adoptions and reference needs this new edition includes A complete update of the latest developments New devices such as three dimensional MOSFETs MODFETs resonant tunneling diodes semiconductor sensors quantum cascade lasers single electron transistors real space transfer devices and more Materials completely reorganized Problem sets at the end of each chapter All figures reproduced at the highest quality Physics of Semiconductor Devices Third Edition offers engineers research scientists faculty and students a practical basis for understanding the most important devices in use today and for evaluating future device performance and limitations A Solutions Manual is available from the editorial department

Introduction to Semiconductor Physics and Devices Mykhaylo Evstigneev, 2022-09-29 This classroom tested textbook provides a self contained one semester course in semiconductor physics and devices that is ideal preparation for students to enter burgeoning quantum industries Unlike other textbooks on semiconductor device physics it provides a brief but comprehensive introduction to quantum physics and statistical physics with derivations and explanations of the key facts that are suitable for second year undergraduates rather than simply postulating the main results The book is structured into three parts each of which can be covered in around ten lectures The first part covers fundamental background material such as quantum and statistical physics and elements of crystallography and band theory of solids Since this provides a vital

foundation for the rest of the text concepts are explained and derived in more detail than in comparable texts For example the concepts of measurement and collapse of the wave function which are typically omitted are presented in this text in language accessible to second year students The second part covers semiconductors in and out of equilibrium and gives details which are not commonly presented such as a derivation of the density of states using dimensional analysis and calculation of the concentration of ionized impurities from the grand canonical distribution Special attention is paid to the solution of Poisson's equation a topic that is feared by many undergraduates but is brought back down to earth by techniques and analogies from first year physics Finally in the third part the material in parts 2 and 3 is applied to describe simple semiconductor devices including the MOSFET the Schottky and PN junction diodes and optoelectronic devices With a wide range of exercises this textbook is readily adoptable for an undergraduate course on semiconductor physics devices and with its emphasis on consolidating and applying knowledge of fundamental physics it will leave students in engineering and the physical sciences well prepared for a future where quantum industries proliferate

Semiconductor Devices Jasprit Singh, 2000-08-03 This introductory text designed for the first course in semiconductor physics presents a well balanced coverage of semiconductor physics and device operation and shows how devices are optimized for applications The text begins with an exploration of the basic physical processes upon which all semiconductor devices diodes transistor light emitters and detectors are based Topics such as bandstructure effective masses holes doping carrier transport and lifetimes are discussed Next the author focuses on the operation of the important semiconductor devices along with issues relating to the optimization of device performance Issues such as how doping device dimensions and parasitic effects influence device operation are also included The book is appropriate for the following courses Device Physics Semiconductor Devices Device Electronics Physics of Semiconductor Devices Integrated Circuit Devices Device Electronics Solid State Devices

Semiconductor Device Physics and Design Umesh Mishra, Jasprit Singh, 2007-11-28 Semiconductor Device Physics and Design teaches readers how to approach device design from the point of view of someone who wants to improve devices and can see the opportunity and challenges It begins with coverage of basic physics concepts including the physics behind polar heterostructures and strained heterostructures The book then details the important devices ranging from p-n diodes to bipolar and field effect devices By relating device design to device performance and then relating device needs to system use the student can see how device design works in the real world

An Introduction to Semiconductor Devices Donald A Neamen, 2006 An Introduction to Semiconductor Devices by Donald Neamen is designed to provide a fundamental understanding of the characteristics operations and limitations of semiconductor devices In order to meet this goal the book brings together explanations of fundamental physics of semiconductor materials and semiconductor device physics This new text provides an accessible and modern approach to the material Aimed at the undergraduate Neamen keeps coverage of quantum mechanics to a minimum and labels the most advanced material as optional MOS transistors are covered before

bipolar transistors to reflect the dominance of MOS coverage in today's world **BOOK JACKET** **Semiconductor Physics and Devices-4e** Donald Neamen, 2012 **Physics of Semiconductor Devices** J.-P. Colinge, C.A. Colinge, 2005-10-03

Physics of Semiconductor Devices covers both basic classic topics such as energy band theory and the gradual channel model of the MOSFET as well as advanced concepts and devices such as MOSFET short channel effects low dimensional devices and single electron transistors Concepts are introduced to the reader in a simple way often using comparisons to everyday life experiences such as simple fluid mechanics They are then explained in depth and mathematical developments are fully described Physics of Semiconductor Devices contains a list of problems that can be used as homework assignments or can be solved in class to exemplify the theory Many of these problems make use of Matlab and are aimed at illustrating theoretical concepts in a graphical manner *Introductory Semiconductor Device Physics* Greg Parker, 2004-09-30 Introduction to Semiconductor Device Physics is a popular and established text that offers a thorough introduction to the underlying physics of semiconductor devices It begins with a review of basic solid state physics then goes on to describe the properties of semiconductors including energy bands the concept of effective mass carrier concentration **Semiconductor Physics And Devices** Neamen, 2003 **Selected Solutions for Semiconductor Devices** S. M. Sze, 1985 *Semiconductor Physics: Devices and Technology* Karla Hodges, 2019-06-27 A semiconductor is a material that has the value of the electrical conductivity between that of a conductor and an insulator Unlike metals the electrical resistance decreases as the temperature increases in semiconductors Silicon germanium and compounds of gallium are commonly used semiconducting materials The charge carriers in such materials are electrons ions and electron holes By controlling the introduction of impurities into their crystal structures their conducting properties can be altered to suit requirements This textbook is a compilation of chapters that discuss the most vital concepts in the field of semiconductor physics It elucidates new techniques and applications of semiconductors in a multidisciplinary manner It will serve as a valuable source of reference for physicists engineers and students associated with this important discipline **Modern Semiconductor Physics and Device Applications** Vitalii Dugaev, Vladimir Litvinov, 2021-11-14 This textbook provides a theoretical background for contemporary trends in solid state theory and semiconductor device physics It discusses advanced methods of quantum mechanics and field theory and is therefore primarily intended for graduate students in theoretical and experimental physics who have already studied electrodynamics statistical physics and quantum mechanics It also relates solid state physics fundamentals to semiconductor device applications and includes auxiliary results from mathematics and quantum mechanics making the book useful also for graduate students in electrical engineering and material science Key Features Explores concepts common in textbooks on semiconductors in addition to topics not included in similar books currently available on the market such as the topology of Hilbert space in crystals Contains the latest research and developments in the field Written in an accessible yet rigorous manner **Semiconductor Devices** Simon Min Sze, 2002 **The Physics of**

Semiconductor Devices D. A. Fraser, 1979 **Semiconductor Devices** S. M. Sze, 2012-08-01 Semiconductor Devices Physics and Technology Third Edition is an introduction to the physical principles of modern semiconductor devices and their advanced fabrication technology It begins with a brief historical review of major devices and key technologies and is then divided into three sections semiconductor material properties physics of semiconductor devices and processing technology to fabricate these semiconductor devices *Semiconductor Devices* Yaduvir Singh, 2013-12-30 Semiconductor devices is an interdisciplinary subject of great industrial importance This subject has led to the emergence of various state of art areas of engineering and technology like IC fabrication and packaging Microelectronics VLSI analog digital electronics semiconductor electronics etc This book provides an integrated treatment of all aspects of semiconductor devices like semiconductor physics semiconductor electronics device designing circuit development analog circuit design development and analysis etc This book has been written as per the syllabus of Semiconductor Devices of various technical universities like UPTU PTU Thapar University BITS VIT BIT PEC NITs IITs SLIET DEI NSIT DEC VJTI RGPV MIT NERIST MAHE GBPUAT JU BEC BVP Pune Pune University Mumbai University It discusses p n junction diodes bipolar junction transistors high frequency transistors field effect transistors and power supplies in detail Salient features Minutely worked out examples give a complete understanding and hold on this subject Variety of solved unsolved and multiple choice questions completely cover the diversity of this subject which is extremely useful for semester examinations GATE PSUs examinations Pedagogy includes relevant and to the point text solved questions unsolved questions and multiple choice questions Fundamentals of Semiconductor Physics Mijoe Joseph, 2015-05-11 Semiconductors have made an enormous impact on 20th century science and technology This is because components made from semiconductors have very favorable properties such as low energy consumption compactness and high reliability and so they now dominate electronics and radio engineering Semiconductors are indispensable for space exploration and where the requirements of small size low weight and low energy consumption are especially stringent The book uses quantum mechanical concepts and band theory to present the theory of semiconductors in a comprehensible for It also describes how basic semiconductor devices e g diodes transistors and lasers operate The book was written for senior high school students interested in physics

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