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Power Electronics is a large
size technology, mainly

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covering four categories:
the AC/DC rectifiers, DC/DC
converters, DC/AC inverters,
and AC/AC converters. This
book offers approximately
100 novel topologies of all
four. The applications are
used in sustainable energy

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generation areas, such as distributed generation (DG), micro-grid (MG), smart grid (SG) systems, and electrical vehicles (EV). With case studies from GE, AEG, Simplatroll Ltd, and Chinese Power Manufacturing Co., the

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reader will be exposed to practical applications in industry and real-world settings. This new edition features an entirely new chapter on best switching angles to obtain lowest THD for multilevel DC/AC

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inverters. Additionally, all chapters have been updated and include homework problems throughout.

Power electronics, which is a rapidly growing area in terms of research and applications, uses modern

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electronics technology to convert electric power from one form to another, such as ac-dc, dc-dc, dc-ac, and ac-ac with a variable output magnitude and frequency.

Power electronics has many applications in our every

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day life such as air-conditioners, electric cars, sub-way trains, motor drives, renewable energy sources and power supplies for computers. This book covers all aspects of switching devices, converter

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circuit topologies, control techniques, analytical methods and some examples of their applications. * 25% new content * Reorganized and revised into 8 sections comprising 43 chapters * Coverage of numerous

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applications, including uninterruptable power supplies and automotive electrical systems * New content in power generation and distribution, including solar power, fuel cells, wind turbines, and flexible

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transmission

This textbook, designed for undergraduate students of electrical engineering, offers a comprehensive and accessible introduction to state-of-the-art power semiconductor devices and

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power electronic converters with an emphasis on design, analysis and realization of numerous types of systems. Each topic is discussed in sufficient depth to expose the fundamental principles, concepts, techniques,

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methods and circuits,
necessary to thoroughly
understand power electronic
systems.

Power electronics can be a
difficult course for
students to understand and
for professors to teach.

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Simplifying the process for both, SPICE for Power Electronics and Electric Power, Third Edition illustrates methods of integrating industry standard SPICE software for design verification and as a

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theoretical laboratory
bench. Helpful PSpice
Software and Program Files
Available for Download Based
on the author Muhammad H.
Rashid's considerable
experience merging design
content and SPICE into a

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power electronics course, this vastly improved and updated edition focuses on helping readers integrate the SPICE simulator with a minimum amount of time and effort. Giving users a better understanding of the

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operation of a power electronics circuit, the author explores the transient behavior of current and voltage waveforms for each and every circuit element at every stage. The book also

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includes examples of all types of power converters, as well as circuits with linear and nonlinear inductors. New in this edition: Student learning outcomes (SLOs) listed at the start of each chapter

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Changes to run on OrCAD
version 9.2 Added VPRINT1
and IPRINT1 commands and
examples Notes that identify
important concepts Examples
illustrating EVALUE, GVALUE,
ETABLE, GTABLE, ELAPLACE,
GLAPLACE, EFREQ, and GFREQ

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Mathematical relations for expected outcomes, where appropriate The Fourier series of the output voltages for rectifiers and inverters PSpice simulations of DC link inverters and AC voltage controllers with PWM

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control This book demonstrates techniques of executing power conversions and ensuring the quality of the output waveforms rather than the accurate modeling of power semiconductor devices. This approach

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benefits students, enabling them to compare classroom results obtained with simple switch models of devices. In addition, a new chapter covers multi-level converters. Assuming no prior knowledge of SPICE or

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PSpice simulation, the text provides detailed step-by-step instructions on how to draw a schematic of a circuit, execute simulations, and view or plot the output results. It also includes suggestions

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for laboratory experiments
and design problems that can
be used for student homework
assignments.

Shipboard Propulsion, Power
Electronics, and Ocean
Energy
Advanced Conversion

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**Technologies, Second Edition
Power Electronics Handbook
PWM Converters Processing AC
Voltages
Advanced Power Electronics
Converters**

Initially, the only electric loads
encountered in an automobile were for

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lighting and the starter motor. Today, demands on performance, safety, emissions, comfort, convenience, entertainment, and communications have seen the working-in of seemingly innumerable advanced electronic devices. Consequently, vehicle electric systems require larger capacities and

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more complex configurations to deal with these demands. Covering applications in conventional, hybrid-electric, and electric vehicles, the Handbook of Automotive Power Electronics and Motor Drives provides a comprehensive reference for automotive electrical systems. This

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authoritative handbook features contributions from an outstanding international panel of experts from industry and academia, highlighting existing and emerging technologies. Divided into five parts, the Handbook of Automotive Power Electronics and Motor Drives offers an overview of

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automotive power systems, discusses semiconductor devices, sensors, and other components, explains different power electronic converters, examines electric machines and associated drives, and details various advanced electrical loads as well as battery technology for automobile

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applications. As we seek to answer the call for safer, more efficient, and lower-emission vehicles from regulators and consumer insistence on better performance, comfort, and entertainment, the technologies outlined in this book are vital for engineering advanced vehicles that

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will satisfy these criteria.

This book covers power electronics, in depth, by presenting the basic principles and application details, which can be used both as a textbook and reference book. Introduces a new method to present power electronics converters called Power Blocks

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Geometry (PBG) Applicable for courses focusing on power electronics, power electronics converters, and advanced power converters Offers a comprehensive set of simulation results to help understand the circuits presented throughout the book
This book constitutes the refereed

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proceedings of the Second International Conference on Advances in Power Electronics and Instrumentation Engineering, PEIE 2011, held at Nagpur, India, in April 2011. The 9 revised full papers presented together with 4 short papers and 7 poster papers were carefully

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reviewed and selected from numerous submissions. The papers address current issues in the field of power electronics, communication engineering, instrumentation engineering, digital electronics, electrical power engineering, electrical machines, information technology,

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control systems, and the like.

This new resource is a practical overview of designing, testing and troubleshooting power electronics in alternative energy systems, providing you with the most important information on how power electronics components such as inverters,

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and grid-connected systems Covers
wind and solar applications, as well as
ocean and geothermal energy, hybrid
systems and fuel cells

Devices, Circuits, and Applications

Handbook of Automotive Power

Electronics and Motor Drives

Second International Conference,

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PEIE 2011, Nagpur, Maharashtra,
India, April 21-22, 2011. Proceedings
Advances in Power Electronics and
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Basic Principles of Power Electronics
*Power electronics became an
identifiably separate area of electrical
engineering with the invention of the*

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thyristor about 30 years ago. The growing demand for controllability and conversion of electric energy has made this area increasingly important, which in turn has resulted in new device, circuit and control developments. In particular, new components, such as

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the GTO and power MOSFET, continue to extend power electronic technology to new applications. The technology embodied by the name "power electronics" is complex. It consists of both power level and signal level electronics, as well as thermal,

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mechanical, control, and protection systems. The power circuit, that part of the system actually processing energy, can be thought of as an amplifier around which is placed a closed loop control system. The goal of this book is to provide an easily understood

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exposition of the principles of power electronics. Common features of systems and their behavior are identified in order to facilitate understanding. Thyristor converters are distinguished and treated according to their mode of

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commutation. Circuits for various converters and their controls are presented, along with a description of ancillary circuits such as those required for snubbing and gate drives. Thermal and electrical properties of semiconductor power devices are

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discussed. The line-converter and converter-load interfaces are examined, leading to some general statements being made about energy transfer. Application areas are identified and categorized with respect to power and frequency ranges. The

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many tables presented in the book provide an easily used reference source.

Control circuits are a key element in the operation and performance of power electronics converters. This book describes practical issues related

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to the design and implementation of these control circuits, and is divided into three parts - analogue control circuits, digital control circuits, and new trends in control circuits.

Building on solid state device and electromagnetic contributions to the

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series, this text book introduces modern power electronics, that is the application of semiconductor devices to the control and conversion of electrical power. The increased availability of solid state power switches has created a very rapid

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"This book is an introduction to automotive technology, with specific reference to battery electric, hybrid electric, and fuel cell electric vehicles. It could serve electrical engineers who need to know more about automobiles

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or automotive engineers who need to know about electrical propulsion systems. For example, this reviewer, who is a specialist in electric machinery, could use this book to better understand the automobiles for which the reviewer is designing electric

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drive motors. An automotive engineer, on the other hand, might use it to better understand the nature of motors and electric storage systems for application in automobiles, trucks or motorcycles. The early chapters of the book are accessible to technically literate people

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who need to know something about cars. While the first chapter is historical in nature, the second chapter is a good introduction to automobiles, including dynamics of propulsion and braking. The third chapter discusses, in some detail, spark ignition and compression

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ignition (Diesel) engines. The fourth chapter discusses the nature of transmission systems.” —James Kirtley, Massachusetts Institute of Technology, USA “The third edition covers extensive topics in modern electric, hybrid electric, and fuel cell vehicles,

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in which the profound knowledge, mathematical modeling, simulations, and control are clearly presented. Featured with design of various vehicle drivetrains, as well as a multi-objective optimization software, it is an estimable work to meet the needs of

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automotive industry.” —Haiyan Henry Zhang, Purdue University, USA “The extensive combined experience of the authors have produced an extensive volume covering a broad range but detailed topics on the principles, design and architectures of Modern

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technical chapters are complemented with example problems and user guides to assist the reader in practical calculations through the use of common scientific computing packages. It will be of interest mainly to research postgraduates working in this field as

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well as established academic researchers, industrial R&D engineers and allied professionals.”

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methodologies of conventional internal combustion engine (ICE) vehicles, electric vehicles (EVs), hybrid electric vehicles (HEVs), and fuel cell vehicles (FCVs). The design methodology is described in mathematical terms, step-by-step, and the topics are approached

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from the overall drive train system, not just individual components.

Furthermore, in explaining the design methodology of each drive train, design examples are presented with simulation results. All the chapters have been updated, and two new

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*Dacie and Lewis Practical
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Power electronics

*Introduction to Modern Power
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Converters

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pulse inverters,
multilevel inverters,
controlled rectifiers,
AC voltage controllers,
static switches,
flexible ac transmission*

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integrated
circuits/circuit design
and delve into topics
such as digital design,
flip flops, A/D and D/A.
The book then moves on*

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electric power from one
form to another, such as
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frequency. It has many applications in our every day life such as air-conditioners, electric cars, sub-way trains, motor drives, renewable energy sources

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on the author Muhammad H. Rashid's considerable experience merging design content and SPICE into a power electronics course, this vastly improved and updated edition focuses on helping readers integrate

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the output waveforms rather than the accurate modeling of power semiconductor devices. This approach benefits students, enabling them to compare classroom results obtained with simple switch models of devices. In

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addition, a new chapter covers multi-level converters. Assuming no prior knowledge of SPICE or PSpice simulation, the text provides detailed step-by-step instructions on how to draw a schematic of a

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Power electronics, which is a rapidly growing area in terms of research and applications, uses modern electronics technology to convert electric power from one form to another, such as ac-dc, dc-dc, dc-ac, and ac-

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ac with a variable output magnitude and frequency. It has many applications in our every day life such as air-conditioners, electric cars, sub-way trains, motor drives, renewable energy sources and power supplies

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behind power electronic circuits, and an effective problem-solving approach. The text first prepares you with necessary background material on devices, switching circuit analysis techniques, and converter

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types and methods of conversion, and then covers high-frequency non-isolated dc-to-dc converters, isolated dc-to-dc converters, and resonant soft-switching converters. The final chapters address

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converters and dc-ac
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chapter features at least 10
exercises, which will help
you understand basic
concepts, equations, and
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electric power conversion and the latest developments in the field This book constitutes a comprehensive overview of the modern power electronics.

Various semiconductor power switches are described, complementary components and systems are presented,

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converters, multilevel inverters, and applications of the Z-source in cascaded power converters. The book is accompanied by a website hosting an instructor's manual, a PowerPoint presentation, and a set of PSpice files for simulation of a variety of power

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version 9.2 Added VPRINT1 and
IPRINT1 commands and examples
Notes that identify important concepts
Examples illustrating EVALUE,
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inverters; grid-
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"Cycloconverter" type
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