

This practically-oriented, all-inclusive guide covers the essential concepts of power electronics through MATLAB examples and Simulations. The in-depth explanation of important topics including digital control, power electronic applications, and electrical drives make it a valuable reference for the readers. The experiments and applications based on MATLAB models using fuzzy logic and neural networks are included for better understanding. Engrossing discussion of concepts such as diac, light-emitting diode, thyristors, power MOSFET and static induction transistor, this offers an enlightening experience to the readers.

With numerous solved examples, exercises, review questions, and GATE questions, the undergraduate and graduate students of electrical and electronics engineering will find this text useful.

### **Key features**

- Covers the fundamental concepts of power electronics including semiconductors, power supplies, converters and inverters
- Includes useful projects and formulas for readers
- Plenty of MATLAB examples, Simulink and solved examples for conceptual understanding
- Competitive exam questions with hints

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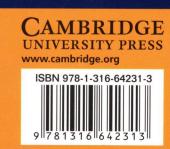
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# Power Electronics with MATLAB®

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### Power Electronics with MATLAB®

Power electronics play an important role in the functioning of AC drives, semiconductors, power supplies, converters and inverters. The aim of studying the tools and techniques of power electronics is to obtain familiarity with advanced electronic applications and systems. With this aim in mind, this textbook is designed specifically for undergraduate and graduate students of electrical and electronics engineering, and electronics and communication engineering. It presents the fundamental concepts of power electronics including semiconductor devices, rectifiers, inverters, converters, choppers and cycloconverters. It provides a comprehensive discussion on power electronic drives and electrical circuits. The latest developments including diac, diode, light-emitting diode, thyristors, power MOSFET and static induction transistor are also discussed in detail.

The book elaborates the essential concepts with the MATLAB examples and simulations. Plenty of applications based on MATLAB models using fuzzy logic and neural networks are interspersed throughout the text. Numerous solved examples, practice questions, objective type questions and review questions are provided at the end of each chapter.

The text can also serve as a reference book for researchers who need preliminary knowledge of the design and investigation of power electronic circuits.

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## **Preface**

Unlike electronic systems that transmit and process signals and data, power electronics involves the processing of substantial amounts of electrical energy. The power range begins with tens of watts to a few hundred watts in the common AC/DC converter (rectifier) used in consumer electronic devices such as battery chargers, personal computers or television sets. In the industry, a common application such as the Variable Speed Drive (VSD), which is used to control an induction motor, has a power range that starts from a few hundred watts and can go upto tens of megawatts.

Beginnning with high-vacuum and gas-filled diode thermionic rectifiers, and triggered devices such as the thyratron and ignitron, the field has evolved to a stage where it can be said that today power electronics is the application of solid-state electronics to the control and conversion of electric power. Steady improvements in the voltage and current handling capacity of solid state devices have made this possible.

During the past few decades the technical aspect of power electronics and drives has gone through significant scientific progression. Many inventions in strategy, apparatus, circuit, control and systems have made power electronics a formidable technology during this period. MATLAB helps learners understand the field because it integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation. This book introduces this promising technology with MATLAB/SIMULÏNK in Power Electronic Circuits. It addresses the progress of early semiconductor devices and then moves on to introduce recently developed high-performance power semiconductor switching devices and their applications using MATLAB/SIMULÏNK. It also gives a condensed review of the current power electronic circuits and their outcomes.

The ultimate purpose of this book is to help engineering students engage in energy conversion on the up-to-date electronic applications. It covers almost all features and facilities of MATLAB/SIMULÏNK and their influence in Power Electronic Circuits like Rectifiers, Inverters, Converters, Choppers, Cyclo converters etc.

The book is recommended as an introductory handbook for starters and as a text book for undergraduate and postgraduate engineering students. It can also serve as a reference book for researchers who need preliminary knowledge of the design and investigation of Power Electronic Circuits.

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