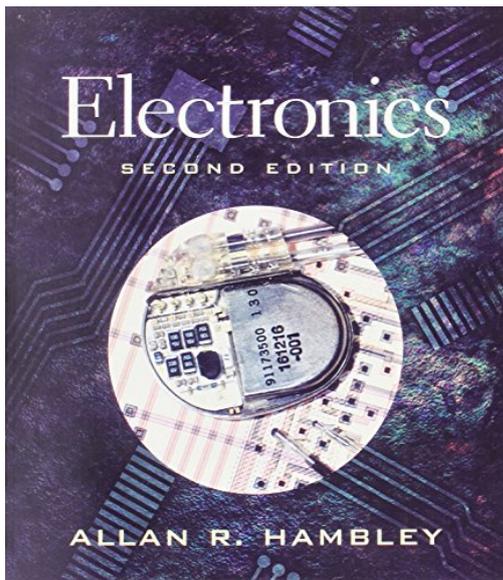


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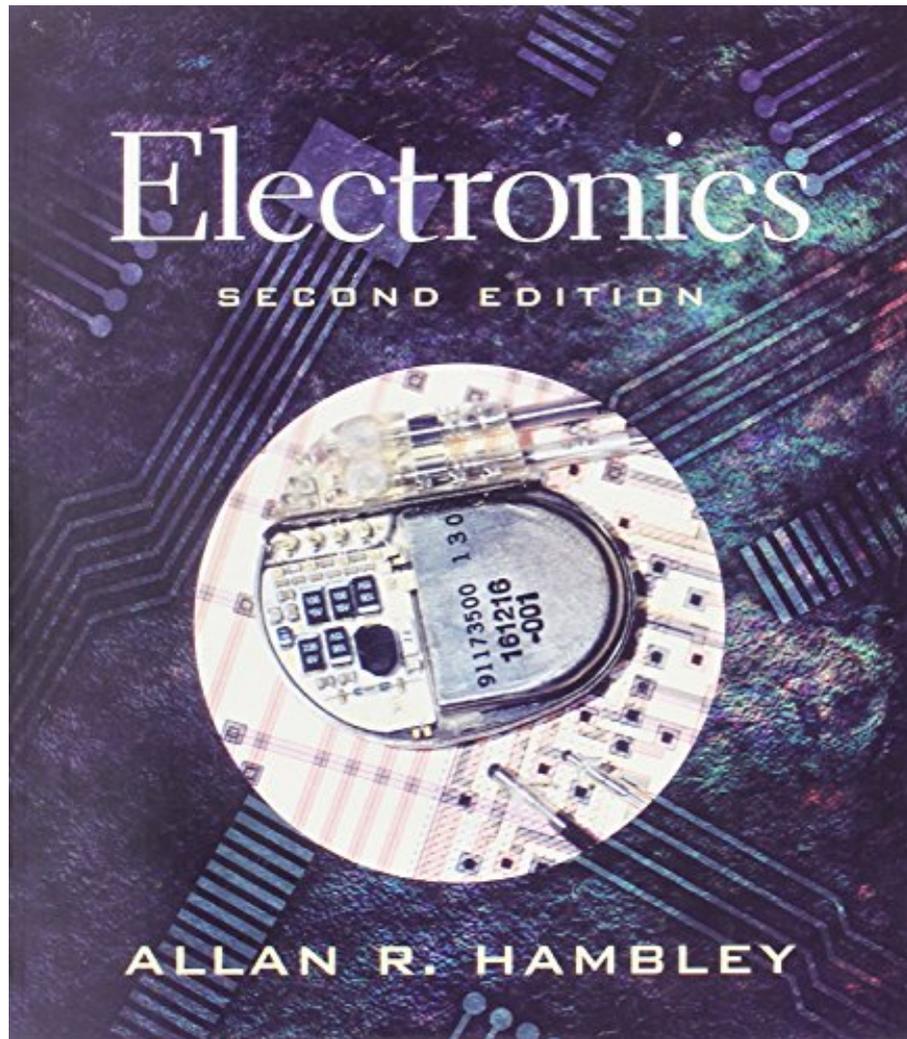
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Dullness of checking out book precisely is really felt by some individuals, additionally those that are not fond of this task. But, it will certainly worsen of their problem. One of the ways that you can get is by starting analysis. Simple as well as very easy book can be the material and resource for the beginner. As this publication, you could take Electronics By Allan R. Hambley as the motivating reading material for both beginner and reading fans. It will certainly recognize the opportunities of caring publications growing a lot more.

From the Inside Flap

Preface

This book is intended for use in the core electronics courses for undergraduate electrical and computer engineering majors. The book frequently takes the designer's point of view in discussing circuits, illustrates design with numerous examples, shows how to test circuit designs using SPICE, and provides numerous open-ended design problems with which students can practice.

WHAT'S NEW IN THE SECOND EDITION

The entire book has been reorganized and rewritten with an eye toward reducing its length and making it more student friendly. Integrated-circuit techniques are treated earlier and receive greater emphasis throughout. The needs of computer-engineering students are addressed by treating the switching behavior of devices early in the book, adding a chapter on CMOS logic circuits, and adding a discussion of data converters. Several motivational examples are provided in the "Anatomy of a Design" sections as asides from the main text to show how interesting circuits can be designed using the material learned to that point in the book. For example just after the chapters on op-amps and diodes, the design of a function generator is illustrated. The introduction and the treatment of external amplifier characteristics have been condensed into the first chapter. MOSFETs are emphasized over JFETs. Op-amps are treated in a single chapter. The treatment of device physics has been shortened and appears in the various chapters on an as needed basis. The chapter on SPICE has been eliminated because most students learn to use SPICE in their circuits courses.

ASSUMED BACKGROUND AND LEVEL OF PRESENTATION

The background assumed is a first course in circuit analysis. In the beginning, the level of presentation is appropriate for an introductory core course. Starting with Chapter 7, the level gradually increases to that appropriate for juniors having a stronger interest in the subject. Circuit analysis by Laplace transform methods is helpful (but not required) background for frequency response and compensation of feedback amplifiers in Chapter 9.

INSTRUCTIONAL AIDS

A website located at prenhall.com/hambley contains a number of resources for instructors and students including: Answers to selected end-of-chapter problems PDF files of key figures from the book that can be used to make transparency masters Schematic files for the circuits discussed in the book Schematic files that are the answers to Exercises that call for SPICE analysis A selection of links to manufacturers' sites where additional data may be downloaded

A solutions manual containing complete solutions for the exercises and problems is available to instructors who adopt the textbook for classroom use. To obtain a copy, contact your local Prentice Hall sales representative or write to the publisher on your school letterhead. The address of the publisher is:

Electrical and Computer Engineering Editor
Prentice Hall
1 Lake Street,
Upper Saddle River, NJ 07458

CONTENT

This book supports a wide variety of course plans. More than enough material is provided for a two-semester (or three-quarter) course sequence, allowing topic selection suited to the interests of the instructor and students.

Chapter 1 contains an overview of electronics and treats the external characteristics of amplifiers. The first several sections acquaint students with the big picture and illustrate how the details studied in this book fit into that picture. Usually, I assign this material for reading but don't spend class time on it. Next, we introduce basic amplifier concepts including gain, input resistance, output resistance, frequency response, and circuit models for amplifiers. The chapter concludes with a discussion of differential amplifiers, setting the stage for op-amps.

Chapter 2 treats operational amplifier circuits including basic amplifiers, imperfections of op-amps, integrators, and differentiators. The discussion of amplifiers gives immediate application for the concepts (that were introduced in Chapter 1) of gain, input resistance, output resistance, and ideal amplifier types.

Chapter 3 treats diodes and diode circuits, including load lines, ideal diodes, rectifiers, wave shapers, logic circuits, voltage regulators, device physics, and switching behavior. The small-signal-equivalent-circuit concept is introduced in Section 3.8 setting the stage for BJT and FET amplifier analysis.

"Anatomy of a Circuit Design: A Function Generator" is set aside from the main text and appears between Chapters 3 and 4. It shows students how the material from the first three chapters can be used in designing a useful and interesting circuit.

Chapter 4 covers BJT characteristics, load-line analysis, large-signal models, biasing, small-signal equivalent circuit analysis, the common-emitter amplifier, the emitter follower, and use of the BJT as a switch in logic circuits.

Chapter 5 contains a similar treatment of FETs with the main emphasis on MOSFETs. If desired, the order of Chapters 5 and 6 can be reversed with little difficulty.

"Anatomy of a Circuit Design: A Multistage Amplifier" appears immediately after chapter 5 and illustrates how a multistage amplifier can be designed using what was learned from Chapters 4 and 5.

Chapter 6 treats digital logic circuits with very strong emphasis on CMOS. Basic logic circuit concepts, the

resistor-pull-up NMOS inverter, the CMOS inverter, propagation delay, NOR and NAND gates, dynamic logic, and transmission gates are covered. Differential and multistage integrated amplifiers including IC bias techniques are treated in Chapter 7.

Chapter 8 covers amplifier frequency response, including the Miller effect, the BJT hybrid model, and common amplifier configurations.

Chapter 9 examines feedback and oscillators. Sections 9.1 through 9.4 deal with types of feedback and their effects on gain and impedances. Then several design examples are given in Section 9.5. Sections 9.6 through 9.9 treat transient response, frequency response, and compensation of feedback amplifiers. Several examples of feedback amplifiers are discussed in Section 9.10. Finally, oscillator principles are discussed in Sections 9.11 and 9.12.

"Anatomy of a Circuit Design: A Cardiac Pacemaker" appears after Chapter 9 and shows an interesting application of many of the circuits and concepts discussed in the book.

Output stages and power supplies are presented in Chapter 10 including thermal considerations, power devices, Class A and B amplifiers, linear voltage regulators, and power-supply design.

Chapter 11 treats active filters, tuned circuits, impedance-matching networks, LC oscillators, and crystal oscillators.

Chapter 12 considers comparators, timer circuits and data converters, including the Schmitt trigger, multivibrator circuits, the 555 timer IC, digital-to-analog converters, and analog-to-digital converters.

Finally, "Anatomy of a Circuit Design: A Precision AC to DC Converter," illustrates another practical design using many of the concepts treated earlier in the book.

CHAPTER DEPENDENCY

The first five chapters form the foundation upon which the remainder of the book rests. The order of coverage of the remaining chapters is extremely flexible. Chapter 5 on MOSFETs can be covered before Chapter 4 on BJTs if desired.

ACKNOWLEDGMENTS

I wish to acknowledge my many friends at Michigan Technological University, ASEE, and elsewhere who gave help and encouragement in writing this text. I especially appreciate the enthusiastic support that I have received from my colleague Noel Schulz.

I am grateful to Dr. Orhan Soykan of Medtronic, Inc. for many helpful discussions and for contributing the section on cardiac pacemaker design that appears between Chapters 9 and 10.

A great deal of excellent advice has come from professors at other institutions who reviewed the manuscript in various stages. This advice has improved the final result very much, and I am grateful for their help. The reviewers for the first edition are: Robert Collin, Case Western University; W. T. Easter, North Carolina State University;.. John Pavlat, Iowa State University; Edward Yang, Columbia University; Ibrahim Abdel Motalad, Northwestern University; Clifford Pollock, Cornell University; Victor Gerez, Montana State University; William Sayle II, Georgia Institute of Technology; Michael Reed, Carnegie Mellon University; D. B. Brumm, Michigan Technological University; Sunanda Mitra, Texas Tech University; and Elmer Grubbs, New Mexico Highlands University.

I would like to offer a special thanks to the reviewers who viewed drafts of this book, and provided their comments and insight. Our reviewers:

Gennady Gildenblat, Penn State;

Dr. Dan Moore, Rose Hulman Institute of Technology;

Art Davis, San Jose State University;

Albert H. Titus, Rochester Institute of Technology.

Finally, I thank my loving wife Judy for many good things too extensive to list.

Allan R. Hambley

From the Back Cover

The book provides a wealth of readily accessible information on basic electronics for those interested in electrical and computer engineering. Its friendly approach, clear writing style, and realistic design examples, which earned Hambley the 1998 ASEE Meriam/Wiley Distinguished Author Award, continue in the Second Edition.

FEATURES/BENEFITS

- **NEW**—Refines and reorganizes chapter content. The introduction and treatment of external amplifier characteristics has been condensed into the first chapter; op amps are treated in a single chapter; and treatment of device physics has been shortened and appears in various chapters on an as-needed basis.
 - Avoids overloading beginners with unnecessary detail, making the book more succinct and user friendly.
- **NEW**—Provides early treatment of integrated-circuit techniques with greater emphasis throughout.
 - Enabling readers to gain knowledge of integrated circuits without taking an advanced course. It also integrates the concepts, rather than presenting them in piecemeal fashion.
- **NEW**—Emphasizes MOSFETs over JFETs.
 - Preparing the reader for advanced study of analog and digital CMOS and IC's.
- Offers outstanding pedagogical features throughout. Chapter opening material shows the reader how each chapter is organized. Example titles allow the reader to easily locate examples related to a particular topic. Margin comments summarize procedures and emphasize important points.
- Treats digital circuits early in the book.
- Emphasizes design. For example, Anatomy of Design sections show realistic design examples.
 - Demonstrates ways in which material fits together, providing motivation and creating interest.

About the Author

ALLAN R. HAMBLEY received his B.S. degree from Michigan Technological University, his M.S. degree from Illinois Institute of Technology, and his Ph.D. from Worcester Polytechnic Institute. He has worked in industry for Hazeltine Research Inc., Warwick Electronics, and Harris Government Systems. He is currently Professor of Electrical Engineering at Michigan Tech. The Michigan Tech chapter of Eta Kappa Nu named him the Outstanding Electrical Engineering Teacher of the Year in 1995. He has won the National Technological University Outstanding Instructor Award six times for his courses in communication systems. The American Society for Engineering Education presented him with the 1998 Meriam Wiley Distinguished

Author Award for the first edition of this book. His hobbies include fishing, boating in remote areas of Lake Superior, and gardening.

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