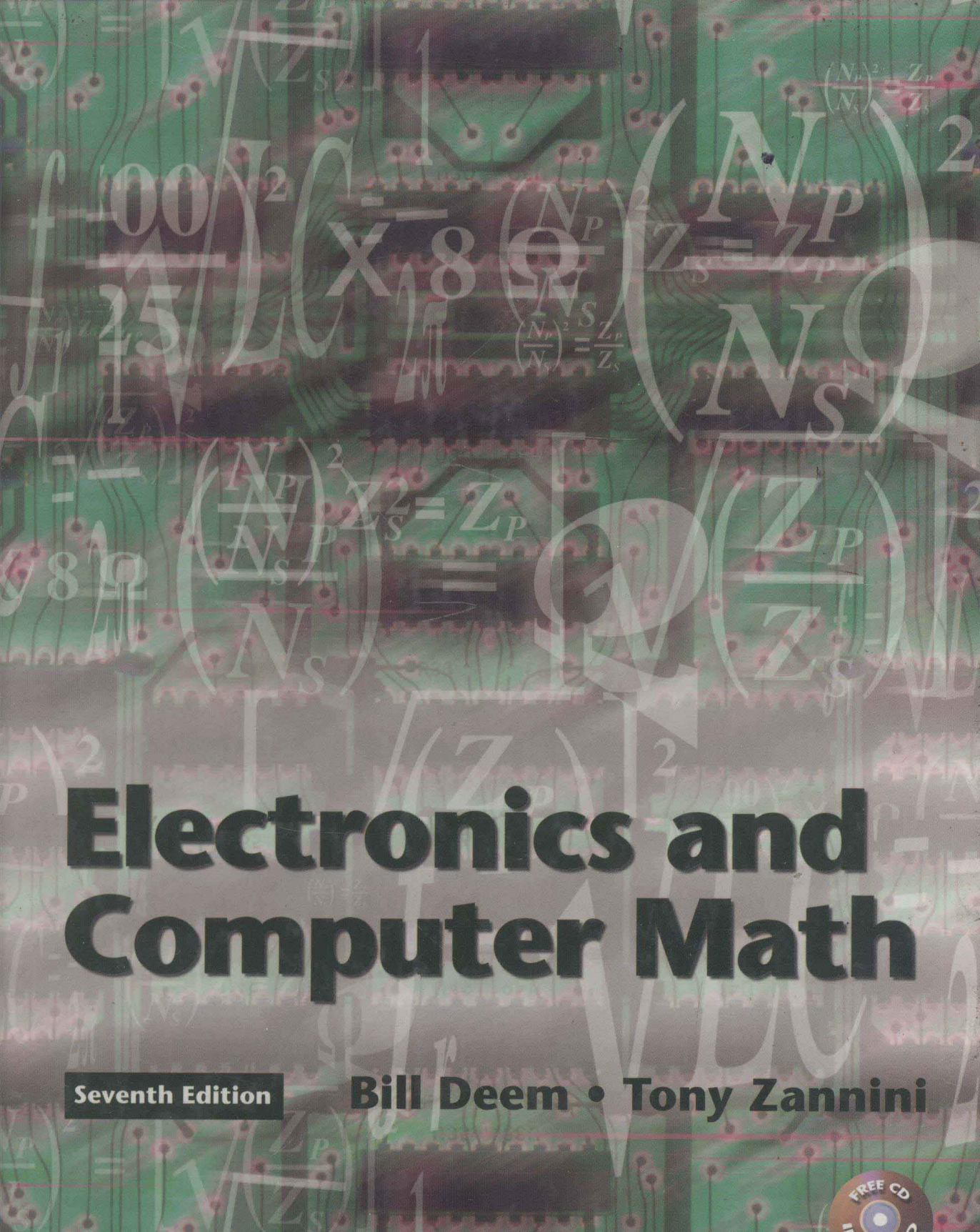

Electronics and Computer Math

Seventh Edition

Bill Deem • Tony Zannini

Electronics and Computer Math

SEVENTH EDITION

Bill Deem
Tony Zannini

Prentice Hall

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PREFACE

As a top-selling text in its field, *Electronics and Computer Math* has been used in several hundred classrooms over the last six editions. The book is written for students in high schools, community colleges, and technical institutes and for technicians in the field of electronics. There are no course prerequisites for this text. It is intended to be used as a separate text in electronics math or as a text that could be used as a reference throughout the study of electronics.

Electronics and Computer Math provides a thorough, complete, and practical study of electronics math and its relationship to the world of electronics. The mathematical topics chosen are those that the authors feel are most useful in solving electronics problems. As such, this book places greater emphasis on certain areas of the discipline than does abstract math. The grouping and sequencing of topics are designed to support various configurations of related courses in DC, AC, and digital electronics.

Because the calculator is an integral part of all technical students' classroom tools, the use of the calculator in problem solving is introduced in the text as the need arises. Algorithms are presented when appropriate.

To reinforce new concepts and to help students test their understanding of the material, *Electronics and Computer Math* features:

- Key Concept highlights
- over 300 examples
- over 1300 practice problems within chapters
- over 2600 end-of-chapter problems
- chapter summary tables
- self-tests at the end of topics

If the text is being used for self-study, the self-tests can be used to determine whether or not the student already possesses that skill. To ensure accuracy, technical reviewers have worked every example, practice problem, self-test, and end-of-chapter problem. In addition, each supplement has been technically checked by additional technical reviewers.

CHANGES IN THIS EDITION

Although the title of the seventh edition has been changed to *Electronics and Computer Math*, it retains all of the material from the sixth edition. In addition, it incorporates numerous ideas suggested by instructors who have used previous editions for many years.

New Title

The most obvious change in this edition is the new title, which reflects changes in technology. Today's electronics technicians must not only know how to work with computers, they must also know how computers work. Section six combines three chapters from the previous edition into one section, "Math for Digital Electronics," which is important for the understanding of how computers work. In addition, some of the new example and end-of-chapter problems are taken from the computer field.

New Co-author Tony Zannini

A less obvious change is the addition of a co-author. Tony Zannini has joined Bill Deem in the development of this edition. Tony brings his experience as an electronics design engineer (over twenty years) and his experience in the education field (over ten years in electronics, computers, and math) to help students understand the math principles upon which all electronics and computers are built.

Arrangement of Chapters

We have, in general, retained the previous order of the chapters. Twenty-six of the twenty-eight chapters remain in the same order as in the previous edition. The biggest change is that the chapter "Computer Number Systems" has been moved from Chapter 4 in the sixth edition to Chapter 25 in this edition, so that it directly precedes the chapter on Boolean algebra. The other change is that the chapter "Fractions, Decimals, and Percents," which does not include any algebraic concepts, now precedes "Algebraic Terms: Roots and Powers."

Section Organization

Upon examining the table of contents, you will notice that the chapters have now been divided into seven sections:

- Section 1—Review of Arithmetic
- Section 2—Algebra Fundamentals
- Section 3—Math for DC Electronics
- Section 4—Math for AC Electronics
- Section 5—Logarithms in Electronics
- Section 6—Math for Digital Electronics
- Section 7—Introduction to Statistics in Electronics

This helps students see the relationship between math topics, other courses in their curriculum, and applications in technology. The grouping also helps guide instructors

adjust the order in which math topics are taught because of changes in course offerings from term to term.

Sections 1 and 2 should be taught in sequence, and can be covered quickly with advanced math students. Section 3, "Math for DC Electronics," would normally follow Section 2; however Section 5, 6, or 7 could follow Section 2 if those math topics were needed to support other courses.

Section 3 (Chapters 10 through 14) is designed to be taught in a program where a course in basic electronics is taught concurrently. Chapters 10, 11, and 12 provide support for the principles usually taught in a DC electronics class. Chapters 13, "Graphing," and 14, "Simultaneous Linear Equations," can be used to solve some of the problems in Chapters 10, 11, and 12 but are not dependent on them so they can be taught any time after Section 2.

Section 4, "Math for AC Electronics," (Chapters 15 through 21) is normally taught after Section 3, "Math for DC Electronics." Chapter 13 is a prerequisite for Chapters 15, "Complex Numbers," and 16, "The Right Triangle." The three chapters on AC circuits, like the three on DC circuits, provide support for the principles taught in an electronics class.

Sections 5, 6, and 7 can be taught in any order after Section 2. Usually the sequence is dictated by the math support required by other courses.

Estimating

New to this edition is a discussion on an estimating technique that uses scientific notation and rounding in Chapter 2. Making quick mental mathematical estimates is helpful when troubleshooting electronic circuits, verifying calculator answers, and taking timed pre-employment tests when calculators are not allowed.

Calculator Usage

The instructions for using a calculator have been expanded. We continue to provide the instructions for the Texas Instruments TI-36X and we have added instructions for the Casio fx-115W. Both are low-cost, popular, scientific calculators and most keystrokes are the same for both calculators. We point out the instructions for the Casio when they are different from the TI. Students who are already calculator proficient can easily skip these instructions.

New Word Problems

We have added some math problems that are stated with words rather than numeric symbols. Technicians often have to translate written or verbal descriptions of problems into math symbols before they can begin a solution.

CHAPTER ORGANIZATION

Chapters 1, 2, and 3 deal with decimal numbers, powers of ten, and prefixes. These chapters introduce the student to the calculator and to problem solving involving electrical units.

Chapter 4 reviews addition, subtraction, multiplication, and division of fractions. Conversions between mixed numbers and decimal fractions and finding common denominators are covered.

Chapter 5 introduces the student to algebraic terms, roots, and powers. Typical electrical problems involving literal numbers, squares, and square roots are solved using the calculator. Chapters 6 through 9 contain topics in algebra, including linear equations, second-degree equations, fractional equations, and factoring. Throughout these chapters, problem solving applications using the calculator are presented.

In Chapters 10 through 12, student use the algebraic skills they developed in Chapters 6 through 9 to solve dc circuit problems using Kirchhoff's and Ohm's law, and Thévenin's, Norton's, and the superposition circuit theorems. Graphical and algebraic solutions to circuit problems and linear equations are presented in Chapters 13 and 14. Practical applications are presented for each technique discussed.

Chapters 15 through 18 introduce algebra and trigonometry elements needed to solve ac circuit problems. Angular velocity and the sine wave are introduced in these chapters. Problem solving using trigonometric functions and the calculator is presented. In Chapters 19 through 21, ac series, parallel, and complex circuit problems are solved. In Chapter 19, the student learns how to express phasors in either polar or rectangular form. In Chapter 20, circuit theorems are again presented as an aid in solving complex circuit problems. These problem-solving techniques are used in Chapter 21 in determining the parameters for several types of filter circuits.

Chapters 22, 23, and 24 cover both common and natural logarithms and their applications. Logarithmic equations are covered in Chapter 23. Applications including the Bode plot are found in Chapter 24.

Chapter 25 presents the various number systems (binary, octal, and hexadecimal) that are used in the study of computers. Conversions between the number systems and addition and subtraction in these systems are covered. Chapter 26 discusses the basic logic functions inherent in all logic circuits and presents those theorems, laws, and postulates used in the simplification of logic expressions. Chapter 27, Karnaugh Maps, offers an alternative method of logic circuit simplification.

In Chapter 28, Introduction to Statistics, we introduce the student to frequency distribution tables, histograms, measures of central tendency, and the normal curve.

EXTENSIVE SUPPLEMENTS PACKAGE

Electronics and Computer Math comes with a wide variety of optimal supplements for both the instructor and student.

- A **Student Study Guide with Selected Solutions** (ISBN 0-13-048782-1) contains chapter overviews and additional study questions for each chapter. It includes fully worked-out solutions to selected end-of-chapter problems.
- An **Instructor's Solutions Manual with PowerPoint slides** (ISBN 0-13-091128-3) contains fully worked-out solutions to end-of-chapter problems and provides the instructor with over 120 illustrations to use.
- An **Instructor's Test Item File** (ISBN 0-13-091131-3) contains 1000 additional test questions. It is also available in computerized format.
- A **Companion Website** (ISBN 0-13-091120-8) can be accessed at www.prenhall.com/deem. It includes an online study guide with practice problems, Syllabus Manager™, and links to other resources on the Web.
- A Study Wizard continuing multiple-choice questions is found on the CD-ROM packaged with the text.

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