

# Preface to the Second Edition



This edition of *Basic Electrical Engineering* has been updated according to the syllabi changes in various universities and the latest trends in technical education that have come to pass since 1990, when this book was first published. Old topics have been thoroughly revamped and updated. Many new chapters like Electromechanical Energy Conversion, Synchronous Motors, Three Phase Transformers, Single Phase Induction Motors have been added based on the changes in curriculum of various technical universities.

## **Organisation of the Book**

The book now has four parts

Part I : Fundamentals of Electrical Engineering;

Part II : Transformers;

Part III : DC Machines; and

Part IV : AC Machines.

**Part I** has eleven chapters which deals with the fundamentals of Electrical Engineering. In Chapter 1, DC Circuits, new sections on Nodal Analysis and Reciprocity Theorem along with many new solved problems have been added. Going by the increased importance and application of AC circuits, it has been covered in four chapters (Chapters 6–9), giving due weightage to three phase circuits. The discussion on Basic Instrumentation (Chapter 10) and Fundamentals of Electrical Installations (Chapter 11) has been expanded to meet the new syllabi requirements.

**Part II** has two chapters on basic concepts of Electrical Machines and two chapters on Transformers. In Chapter 14, Single Phase Transformers, new sections on Sumpner's test and parallel operation of transformers have been

added. Chapter 15, Three Phase Transformers, is one of the chapters new to this edition. It deals with three phase transformer groups, connections, Scott connection and parallel operation.

In **Part III**, a new chapter on Electromechanical Energy Conversion (Chapter 16) has been added. It comprises detailed discussion on the principle of energy conversion, production of force and EMF and singly and multiply excited magnetic field system. DC machines is covered in four separate chapters, of which Chapter 20, Testing of DC machines, is a new chapter. The other chapters include Fundamentals of DC Machines (Chapter 17), DC Generators(Chapter 18), and DC Motors (Chapter 19).

**Part IV** has separate chapters on three phase alternator, synchronous motor, three phase induction motor and single phase induction motor. The important additions to Chapter 21, Three Phase Alternator are

- equivalent circuit and phasor diagram of turbo and salient pole alternator, and
- two-reaction theory and power angle characteristics of alternators.

The new chapter (Chapter 22) on synchronous motor includes phasor diagram, power flow equations, V-curves, hunting and starting. In Chapter 23, three phase induction motor, sections on starters and speed control have been added. Chapter 24, Single Phase Induction Motor, is also a new chapter. It deals with construction, types, equivalent circuit, performance evaluation, no load and block rotor test.

### Salient Features

A brief summary of the major changes that have been effected in this edition the book are as follows:

- Four **Appendices** on Fundamentals of Electrical Engineering, Transformers, DC Machines and AC Machines at the end of each part containing more than multiple-choice questions/short questions along with answers have been added.
- At the start of each chapter, a brief **Introduction** to the chapter and a **Summary** at the end of each chapter are features new to this edition. These will enable quick learning by the students.
- All the important points/formulae discussed in each chapter have been summarized at the end of the respective chapter as '**Points to Remember**', These will be very helpful to the students during the preparation of examinations.
- Several **solved examples** have also been added at appropriate places in various chapters. In all, the book now contains more than 200 solved examples.
- More than 877 **Review Questions** and 344 **Exercise Problems** given in the book will help students test their understanding of the topics covered in the book.

### **Who will benefit from this book ?**

A large emphasis on the coverage of electrical machines makes this book self sufficient for undergraduate students of Electrical Engineering. The revised book will also be useful for the first year undergraduate students of other branches of engineering, like ECE, EEE, CSE, IT, Mechanical, Civil and Chemical. Students of B.Sc Electronics and B.Sc Physics will also benefit from it. This book will be helpful to candidates preparing for AMIE examination. The objective questions given in the appendices will be useful to the students preparing for other competitive examinations like, GATE, UPSE, IES, etc. as well.

Further, to make it easier for the students to understand, the topics have been divided into small chapters. The result is a new edition that provides balanced coverage of the fundamentals, theory, solved examples and multiple-choice questions.

### **Web Supplements**

A dedicated Web site for this book has supplements for both students and instructors. The students resource include additional multiple-choice questions and reading material. The instructor's resource features the solution manual to the book. The site will be updated time and again and any suggestions towards this end are welcome.

In the end, the authors express their thanks to all those who have directly or indirectly helped them in bringing out the second edition of this book and look forward to critical feedback and suggestions from the users of the book.

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