

ELECTRICAL CIRCUIT THEORY AND TECHNOLOGY

JOHN BIRD

REVISED EDITION

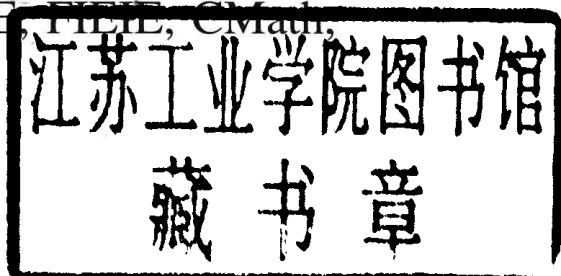


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Electrical Circuit Theory and Technology

Revised second edition

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Electrical Circuit Theory and Technology

In Memory of Elizabeth

Preface

‘Electrical Circuit Theory and Technology, Revised second Edition’ provides coverage for a wide range of courses that contain electrical principles, circuit theory and technology in their syllabuses, from introductory to degree level. The chapter ‘Transients and Laplace transforms’, which had been removed from the second edition due to page restraints, has been included in this edition in response to popular demand. The text is set out in four parts as follows:

PART 1, involving chapters 1 to 12, contains **‘Basic Electrical Engineering Principles’** which any student wishing to progress in electrical engineering would need to know. An introduction to electrical circuits, resistance variation, chemical effects of electricity, series and parallel circuits, capacitors and capacitance, magnetic circuits, electromagnetism, electromagnetic induction, electrical measuring instruments and measurements, semiconductor diodes and transistors are all included in this section.

PART 2, involving chapters 13 to 22, contains **‘Electrical Principles and Technology’** suitable for Advanced GNVQ, National Certificate, National Diploma and City and Guilds courses in electrical and electronic engineering. D.c. circuit theory, alternating voltages and currents, single-phase series and parallel circuits, d.c. transients, operational amplifiers, three-phase systems, transformers, d.c. machines and three-phase induction motors are all included in this section.

PART 3, involving chapters 23 to 45, contains **‘Advanced Circuit Theory and Technology’** suitable for Degree, Higher National Certificate/Diploma and City and Guilds courses in electrical and electronic/telecommunications engineering. The two earlier sections of the book will provide a valuable reference/revision for students at this level.

Complex numbers and their application to series and parallel networks, power in a.c. circuits, a.c. bridges, series and parallel resonance and Q-factor, network analysis involving Kirchhoff’s laws, mesh and nodal analysis, the superposition theorem, Thévenin’s and Norton’s theorems, delta-star and star-delta transforms, maximum power transfer theorems and impedance matching, complex waveforms, harmonic analysis, magnetic materials, dielectrics and dielectric loss, field theory, attenuators, filter networks, magnetically coupled circuits, transmission line theory and transients and Laplace transforms are all included in this section.

PART 4 provides a short, **‘General Reference’** for standard electrical quantities—their symbols and units, the Greek alphabet, common prefixes and resistor colour coding and ohmic values.

At the beginning of each of the 45 chapters **learning objectives** are listed.

At the end of each of the first three parts of the text is a handy reference of the **main formulae** used.

It is not possible to acquire a thorough understanding of electrical principles, circuit theory and technology without working through a large number of numerical problems. It is for this reason that '*Electrical Circuit Theory and Technology, Revised second Edition*' contains some **740 detailed worked problems**, together with over **1100 further problems**, all with answers in brackets immediately following each question. Over **1100 line diagrams** further enhance the understanding of the theory.

Fourteen Assignments have been included, interspersed within the text every few chapters. For example, Assignment 1 tests understanding of chapters 1 to 4, Assignment 2 tests understanding of chapters 5 to 7, Assignment 3 tests understanding of chapters 8 to 12, and so on. These Assignments do not have answers given since it is envisaged that lecturers could set the Assignments for students to attempt as part of their course structure. Lecturers' may obtain a complimentary set of solutions of the Assignments in an **Instructor's Manual** available from the publishers via the internet — see below.

'**Learning by Example**' is at the heart of '*Electrical Circuit Theory and Technology, Revised second Edition*'.

JOHN BIRD
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