

# Preface

This book is exclusively designed for use as a text for the course on Electrical Circuit Analysis offered to first year undergraduate engineering students of Jawaharlal Nehru Technological University (JNTU), Hyderabad. The primary goal of this text is to establish a firm understanding of the basic laws of electric circuits which develop a working knowledge of the methods of analysis used most frequently in further topics of electrical engineering. This book also provides a comprehensive insight into the principal techniques available for characterizing circuits and networks theoretically.

Illustrative examples are interspersed throughout the book at their natural locations. These have been selected carefully from the university question papers. With so many years of teaching, we have found that such illustrations permit a level of understanding otherwise unattainable. As an aid to both, the instructor and the student, objective questions and the tutorial problems provided at the end of each chapter progress from simple to complex. Answers to selected problems have been given to instill confidence in the reader. Due care is taken to see that the reader can easily start learning circuit analysis without prior knowledge of mathematics. As such, a student of first year B.Tech/B.E will be able to follow the book without any difficulty.

All the elements with definitions, basic laws and different configurations of the resistive circuits have been introduced in the first chapter. Analyses of the D.C. resistive circuits have been discussed in Chapter 2. Graph theory has been written in an easy to understand manner. Network theorems on resistive circuits have been presented in Chapter 3. A.C. fundamentals have been introduced in Chapters 4 and 5 which include voltage–current relation of elements, complex impedance. Power and power factor concept is discussed in Chapter 6. Due emphasis has been laid on finding out the average and rms values of different waveforms in Chapter 4. The steady state analysis of A.C. circuits including network theorems have been discussed in Chapter 7. Problems, tutorials and objective questions on dependent sources have been included in Chapters 1 to 7. Resonance phenomena in series and parallel circuits and locus diagrams are presented in Chapter 8. A comprehensive study of polyphase systems and power measurement in both balanced and unbalanced circuits is presented in Chapter 9. A brief study of coupled and tuned circuits is introduced in Chapter 10. Magnetic circuits are also discussed in this chapter.

A brief discussion of differential equations is included in Chapter 11. The necessary mathematical background for transient analysis, the transient

behavior of A.C and D.C circuits and their response has been discussed in Chapter 12. Laplace transforms and their application is presented in Chapter 13. Network functions and stability criteria have been discussed in Chapter 14. The parameters of two-port network and their inter-relations have been discussed in Chapter 15. The book also includes brief topics of Fourier series, Fourier Transforms and operator  $j$  in appendices. Twelve Model Question Papers, Solved May/June 2006, Apr/May 2007 Question Papers and Apr/May 2008 Question Paper (12 Sets) are provided at the end of the book.

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