

PREFACE

Engineering students are irritated by the amount of math they have to study. However, they will soon find out how much this quantity of math will serve them for understanding other subjects. The advanced mathematic topics are rarely related, which renders the writing of a specific book an entertaining subject. The selection of specific topics for a book usually follows the sequence of subjects appearing in the syllabus or using the concept of units. For instance, one can create a unit of continuous and discrete functions or signals analysis. Also, the subjects of a space vector analysis and complex variable function belong to the multi-variable function category. In this volume, the four chapters consist of the mentioned two units.

As in volume 1, the pure mathematical derivations are omitted without sacrificing the quality of the included materials, and a balance between the pure mathematical examples and physical problems is considered. The book elucidates the subjects in a self-contain style. The reader can select what he wants to read without following a particular sequence of reading. All chapters in these volumes have their own sets of exercises, and for selected exercises, the answers are given at the end of the book.

In volume 2, chapter one deals with the continuous function analysis based on the Fourier series and Fourier transforms of periodic and aperiodic signals. Both finite and infinite energy signals are considered. The energy and power signals are defined and their energy and power are computed. At the end of the chapter fast locking tables that give Fourier series and transforms, are presented. The second chapter is devoted to dealing with discrete function analysis based on z-transform theories, methods of determining the inverse z-transform, and the solution of difference equations. The problem of the discrete control system's stability and a moderated size of information about discrete Fourier transform and its computation are also included.

Chapter three reviews the basic concepts of scalar vectors and the basic computations aspects. The special operators working on vectors in different coordinate systems are also introduced. The largest part of the chapter is devoted to vector functions' calculus. The line, surface, and volume integrals and the related theorems are included. Some of the well-known practical applications are briefly discussed. Chapter four elucidates the calculus of analytic functions with complex variables and

the computation with complex numbers. A lot of intention is oriented toward the methods of integration of complex integrand. Moreover, the use of a complex variable to evaluate some kinds of real integrals is also introduced. The chapter is ended with complex series and complex sequences including the fundamentals and the known Taylor, Maclaurin, and Laurent series.