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Engineering Mathematics
for Semesters III and IV

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Preface

Engineering Mathematics for Semesters III and IV deals with the applications of applied Mathematics in the field of Engineering. This subject is generally taught in the III and IV semester of engineering. In the first edition of book "Engineering mathematics for Semester I and II" we learnt about the basics of engineering mathematics as a branch of applied mathematics concerning mathematical models (mathematical methods and techniques) that are typically used in engineering and industry. This book on semesters III and IV will prepare students for their domain specific study and applications in their respective branches.

This book will also introduce the students to the concepts of Fourier transform, z-transform, complex variable, probability and numerical techniques.

Salient Features

- Engrossing problem sets based on **real life situations**
- 360° coverage of subject matter: **Introduction–History–Pedagogy–Applications**
- Introduction to Fourier Transform, Z-transform, Complex Variable, Probability and Numerical Techniques with reference to **applications in the field of engineering**
- 582 Solved problems with stepwise solutions with answers
- **535 MCQs** for various competitive examinations
- Appendix includes Statistical tables and chapter-wise list of formulae
- Other pedagogical aids include:
  - Drill and Practice Problem: **1100**

Chapter Organization

The book is divided in fifteen chapters. In **Chapter 1**, we have discussed Fourier transform which includes Fourier transform of some basic functions and the properties of the Fourier Transform. **Chapter 2** deals with Z-Transform, inverse Z-transform, Cauchy's residue theorem, convolution theorem and properties of Z-transform. In **Chapter 3**, basic concepts of complex theory including basic concepts of complex numbers, Cauchy–Riemann equations, conjugate and conjugate harmonic equations, complex integrals, expansion of analytic functions as power series, zeros of analytic functions, calculus of residues, singularities, complex integrals, Cauchy's residue theorem, etc., are discussed. **Chapter 4** covers empirical laws and curve fitting along with scatter diagram and various methods of curve fitting. In **Chapter 5,** we present various statistical methods while in **Chapter 6** basic concepts of probability such as additive law, multiplicative and conditional probability, Baye's theorem,

probability distribution (discrete and continuous in general and some specific distributions such as binomial, Poisson, uniform, exponential and normal are discussed. **Chapter 7** deals with sampling, inference and testing of hypotheses which includes parameters and statistics, type I and II errors, confidence intervals and F, chi-square and Z statistic. In **Chapter 8,** various formulas for numerical differentiation and integrations are discussed while **Chapters 9** and **10** deal with numerical solution of differential equations and finite differences and interpolation, respectively. **Chapters 11 and 12** talk about numerical solutions of ordinary differential equations and partial differential equations, respectively. In **Chapter 13,** linear programming and various methods to solve linear programming including transportation and assignment problems, duality and dual simplex method, etc., have been discussed. **Chapters 14 and 15** cover the method of variational with fixed boundaries while **Chapter 15** deals with integral equations.

Online Learning Center

The Online Learning Center can be accessed at *http://www.mhhe.com/gupta/em3/4* and contains the *Instructor Elements*: Solutions Manual.

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