

## Table of Contents

- Chapter 1 Tables William F. Ames
- 1.1 Greek Alphabet p. 1
- 1.2 International System of Units (SI) p. 1
- 1.3 Conversion Constants and Multipliers p. 4
- 1.4 Physical Constants p. 6
- 1.5 Symbols and Terminology for Physical and Chemical Quantities p. 7
- 1.6 Elementary Algebra and Geometry p. 10
- 1.7 Table of Derivatives p. 17
- 1.8 Integrals p. 18
- 1.9 The Fourier Transforms p. 20
- 1.10 Bessel Functions p. 27
- 1.11 Legendre Functions p. 28
- 1.12 Table of Differential Equations p. 29
- Chapter 2 Linear Algebra and Matrices George Cain
- 2.1 Basic Definitions p. 1
- 2.2 Algebra of Matrices p. 2
- 2.3 Systems of Equations p. 2
- 2.4 Vector Spaces p. 4
- 2.5 Rank and Nullity p. 4
- 2.6 Orthogonality and Length p. 5
- 2.7 Determinants p. 6
- 2.8 Eigenvalues and Eigenvectors p. 6
- Chapter 3 Vector Algebra and Calculus George Cain
- 3.1 Basic Definitions p. 1
- 3.1 Coordinate Systems p. 2
- 3.3 Vector Functions p. 2
- 3.4 Gradient, Curl, and Divergence p. 4
- 3.5 Integration p. 4
- 3.6 Integral Thorems p. 5
- Chapter 4 Differential Equations William F. Ames
- 4.1 First-Order Equations p. 1
- 4.2 Second-Order Equations p. 1
- 4.3 Linear Equations with Constant Coefficients p. 2
- 4.4 Generating Function (z Transform) p. 2
- Chapter 5 Differential Equations William F. Ames
- 5.1 Ordinary Differential Equations p. 1
- 5.2 Partial Differential Equations p. 5
- Chapter 6 Integral Equations William F. Ames
- 6.1 Classification and Notation p. 1
- 6.2 Relation to Differential Equations p. 1
- 6.3 Methods of Solution p. 2
- Chapter 7 Approximation Methods William F. Ames
- 7.1 Perturbation p. 1
- 7.2 Iterative Methods p. 3

- Chapter 8 Integral Transforms William F. Ames
- 8.1 Laplace Transform p. 1
- 8.2 Convolution Integral p. 3
- 8.3 Fourier Transform p. 4
- 8.4 Fourier Cosine Transform p. 4
- Chapter 9 Calculus of Variations William F. Ames
- 9.1 The Euler Equation p. 1
- 9.2 The Variation p. 1
- 9.3 Constraints p. 3
- Chapter 10 Optimization Methods George Cain
- 10.1 Linear Programming p. 1
- 10.2 Unconstrained Nonlinear Programming p. 2
- 10.3 Constrained Nonlinear Programming p. 2
- Chapter 11 Engineering Statistics Y. L. Tong
- 11.1 Introduction p. 1
- 11.2 Elementary Probability p. 1
- 11.3 Random Sample and Sampling Distributions p. 3
- 11.4 Normal Distribution-Related Sampling Distributions p. 4
- 11.5 Confidence Intervals p. 7
- 11.6 Testing Statistical Hypotheses p. 8
- 11.7 A Numerical Example p. 10
- 11.8 Concluding Remarks p. 12
- Chapter 12 Numerical Methods William F. Ames
- 12.1 Introduction p. 1
- 12.5 Numerical Solution of Simultaneous Nonlinear Equations p. 9
- 12.2 Linear Algebra Equations p. 1
- 12.3 Nonlinear Equations in One Variable p. 7
- 12.4 General Methods for Nonlinear Equations in One Variable p. 9
- 12.6 Interpolation and Finite Differences p. 13
- 12.7 Numerical Differentiation p. 16
- 12.8 Numerical Integration p. 19
- 12.9 Numerical Solution of Ordinary Differential Equations p. 21
- 12.10 Numerical Solution of Integral Equations p. 24
- 12.11 Numerical Methods for Partial Differential Equations p. 25
- 12.12 Discrete and Fast Fourier Transforms p. 29
- 12.13 Software p. 30
- Chapter 13 Experimental Uncertainty Analysis W.G. Steele and H.W. Coleman
- 13.1 Introduction p. 1
- 13.2 Uncertainty of a Measured Variable p. 2
- 13.3 Uncertainty of a Result p. 4
- 13.4 Using Uncertainty Analysis in Experimentation p. 6
- Chapter 14 Chaos R. L. Kautz
- 14.1 Introduction p. 1
- 14.2 Flows, Attractors, and Liapunov Exponents p. 1
- 14.3 Synchronous Motor p. 4
- Chapter 15 Fuzzy Sets and Fuzzy Logic Dan M. Frangopol

- 15.1 Introduction p. 1
- 15.2 Fundamental Notions p. 2
- Appendices
- A. Properties of Gases and Vapors p. 2
- B. Properties of Liquids p. 35
- C. Properties of Solids p. 39
- D. SI Units p. 75
- E. Miscellaneous p. 77