- Chapter 1 Stress
- 1.1 Stress on a Surface
- 1.2 Stress at a Point
- Chapter 2 Strains
- 2.1 Displacement and Deformation
- 2.2 Lagrangian and Eulerian Strain
- 2.3 Average Strain
- 2.4 Small Strain Approximation
- 2.5 Strain Components
- 2.6 Strain at a Point
- Chapter 3 Mechanical Material Properties
- 3.1 Material Characterization
- 3.2 Isotropy and Homogeneity
- 3.3 Generalized Hooke's Law for Isotropic Materials
- 3.4 Plane Stress and Plane Strain
- 3.5 Failure and Factor of Safety
- 3.6 Stress Concentration
- 3.7 Saint-Venant's Principle
- 3.8 Effect of Temperature
- 3.9 Fatigue
- 3.10 Non-Linear Material Models
- Chapter 4 Axial Members
- 4.1 Theory
- 4.2 Composite Bars
- 4.3 Structural Analysis
- 4.4 Initial Stress or Strain
- 4.5 Temperature Effects
- 4.6 Elastic-Perfectly Plastic Axial Members
- 4.7 Stress Approximation
- 4.8 Thin Walled Pressure Vessels
- Chapter 5 Torsion of Shafts
- 5.1 Prelude to Theory
- 5.2 Theory
- 5.3 Statically Indeterminate Shafts
- 5.4 Composite Shafts
- 5.5 Elastic-Perfectly Plastic Circular Shafts
- 5.6 Torsion of Thin Walled Tubes
- Chapter 6 Symmetric Bending of Beams
- 6.1 Prelude to Theory
- 6.2 Theory
- 6.3 Shear and Moment by Equilibrium
- 6.4 Shear and Moment Diagrams
- 6.5 Beam Design Issues
- 6.6 Shear Stress in Thin Symmetric Beams
- 6.7 Composite Beams
- 6.8 Elastic-Perfectly Plastic Beams

- Chapter 7 Deflection of Symmetric Beams
- 7.1 Second Order Boundary Value Problem
- 7.2 Fourth Order Boundary Value Problem
- 7.3 Superposition
- 7.4 Deflection by Discontinuity Functions
- 7.5 Area-Moment Method
- Chapter 8 Stress Transformation
- 8.1 Prelude to Theory: The Wedge Method
- 8.2 Stress Transformation by Method of Equations
- 8.3 Stress Transformation by Mohr's Circle
- Chapter 9 Strain Transformation
- 9.1 Prelude to Theory
- 9.2 Method of Equations
- 9.3 Mohr's Circle
- 9.4 Generalized Hooke's Law in Principal Coordinates
- 9.5 Strain Gages
- Chapter 10 Design and Failure
- 10.1 Combined Loadings
- 10.2 Analysis and Design of Structures
- 10.3 Stress Intensity Factor
- 10.4 Failure Theories
- Chapter 11 Stability of Columns
- 11.1 Buckling Phenomena
- 11.2 Euler Buckling
- 11.3 Imperfect Columns
- Appendix A Statics Review
- A.1 Types of Forces and Moments
- A.2 Free Body Diagrams
- A.3 Trusses
- A.4 Centroids
- A.5 Area Moment of Inertias
- A.6 Statically Equivalent Load Systems
- Appendix B Algorithims for Numerical Methods
- B.1 Numerical Integration
- B.2 Root of a Function
- B.3 Determining Coefficients of a Polynomial
- B.4 Numerical Integration
- Appendix C Charts of Stress Concentration Factors
- C.1 Finite Plate with a Central Hole
- C.2 Stepped Axial Circular Bars with Shoulder Fillet
- C.3 Stepped Circular Shafts with Shoulder Fillet in Torsion
- C.4 Stepped Circular Beam with Shoulder Fillet in Bending
- Appendix D Properties of Selected Materials
- Table D.1 Material Properties in U.S. Customary Units
- Table D.2 Material Properties in Metric Units
- Appendix E Geometric Properties of Structural Steel Members

- Table E.1 Wide Flange Sections (FPS Units)
- Table E.2 Wide Flange Sections (Metric Units)
- Table E.3 S Shapes (FPS Units)
- Table E.4 S Shapes (Metric Units)
- Appendix F Solutions to Static Review Exams
- Appendix G Answers to Quick Tests
- Appendix H Answers to ProblemsEach
- Chapter includes an Overview, Problem Sets, General Information, and a Closure