

6. Preface
7. Acknowledgments
8. 1 Introduction
9. 1.1 Introduction to Structural Steel Design
10. 1.2 Structural Steel as a Building Material
11. 1.3 Material Properties of Steel and Cross-Sectional Shapes
12. 1.4 Structural Systems and Elements in Steel Structures
13. 1.4.1 Moment Frames
14. 1.4.2 Centrically Braced Frames
15. 1.4.3 Eccentrically Braced Frames
16. 1.4.4 Primary Internal Forces
17. 1.5 Design Specifications and Design Philosophies (LRFD/ASD)
18. 1.6 Problems
19. Appendix: Project Description
20. Bibliography
21. 2 Design Considerations
22. 2.1 Introduction
23. 2.2 Design Loads and Design Approaches
24. 2.2.1 Vertical Loads
25. 2.2.2 Lateral Loads
26. 2.3 Design of Structural Framing Systems
27. 2.4 Load Paths in Steel Structures
28. 2.5 Problems
29. Bibliography
30. 3 Tension Members
31. 3.1 Introduction
32. 3.2 General Strength Requirement for Tension Members
33. 3.3 Tension Member Strength
34. 3.3.1 Nominal Tension Strength from Yielding of Gross Area, P_n
35. 3.3.2 Nominal Strength from the Fracture of Effective Net Area
36. 3.3.3 Block Shear Failure
37. 3.4 Slenderness Requirement (Stiffness Criteria)
38. 3.5 Summary of Design Strength Requirement of Tensile Members
39. 3.6 Problems
40. Bibliography
41. 4 Design of Columns
42. 4.1 Introduction
43. 4.1.1 Brief Summary of Column Theory
44. 4.2 Column Behavior
45. 4.2.1 Global Buckling
46. 4.2.2 Local Buckling
47. 4.2.3 Effect of Imperfections
48. 4.2.4 Effective Length
49. 4.2.5 Concluding Remarks
50. 4.3 AISC Design Requirements
51. 4.3.1 General Remarks
52. 4.3.2 Compressive Strength of Non-slender Members
53. 4.3.3 Compressive Strength of Slender Members
54. 4.3.4 Compressive Strength of Built-up Members
55. 4.4 Design Examples
56. 4.5 Problems

57. Bibliography
58. 5 Design of Beams
59. 5.1 Introduction
60. 5.2 Behavior of Laterally Supported Beams
61. 5.2.1 Limit States (Failure Modes) in Pure Bending
62. 5.2.2 Plastic Hinge Formation
63. 5.2.3 Local Buckling
64. 5.3 Lateral-Torsional Buckling
65. 5.4 Shear Strength
66. 5.4.1 Nominal Shear Strength (V_n)
67. 5.5 Serviceability
68. 5.6 Concentrated Forces
69. 5.6.1 Flange Local Bending
70. 5.6.2 Web Local Yielding
71. 5.6.3 Web Local Crippling
72. 5.6.4 Web Sidesway Buckling
73. 5.6.5 Web Compression Buckling
74. 5.6.6 Web Panel Zone Shear
75. 5.7 Design of Bearing Stiffeners
76. 5.8 Design Summary
77. 5.9 Problems
78. Bibliography
79. 6 Torsion
80. 6.1 Introduction
81. 6.2 Accidental Torsion vs. Expected Torsion
82. 6.3 Fundamentals in Elastic Torsional Analysis of Steel Members
83. 6.3.1 Pure (St. Venant) Torsion, T_s
84. 6.3.2 Warping Torsion, T_w
85. 6.3.3 Total Torsion, T
86. 6.4 Stress Analysis and Design Considerations
87. 6.4.1 Pure Torsional Stress: Shear Stress, τ_s
88. 6.4.2 Warping Torsion Stresses—Shear Stress, τ_{ws} and Normal Stress, σ_{ws}
89. 6.5 Behavior and Design
90. 6.6 Problems
91. Bibliography
92. 7 Beam-Columns
93. 7.1 Introduction
94. 7.2 Demand and Capacity Evaluation on Beam-Columns
95. 7.2.1 Capacity Side
96. 7.2.2 Demand Side (P- δ Effect)
97. 7.2.3 Demand Side (P- Δ Effect)
98. 7.3 Design for Stability
99. 7.3.1 Direct Analysis Method
100. 7.3.2 Moment Amplification Method
101. 7.3.3 First-Order Analysis Method
102. 7.4 Approximate Second-Order (Amplified First-Order) Analysis Method (Moment Amplification Method)
103. 7.4.1 Moment Amplifiers, B1 and B2, and Required Design Moment
104. 7.4.2 Beam-Column Members with No Joint Translation (Δ_t)—Braced Frames
105. 7.4.3 Beam-Column Members with Lateral Translation (Δ_t): Unbraced Frames
106. 7.5 Design of Members in Unbraced (Moment) Frames

107.	7.6 Design for Combined Axial Force and Flexure (AISC 360, Section H)
108.	7.7 Basic Steps in Beam-Column Design
109.	7.8 Application of Design Tables in AISC Manual for Beam-Columns
110.	7.8.1 Background of Design Tables
111.	7.9 Problems
112.	Bibliography
113.	8 Introduction to Connections
114.	8.1 Introduction
115.	8.2 Overview of Common Connection Types in Framed Structures
116.	8.3 General Failure Modes
117.	8.4 Bolted Connections
118.	8.4.1 General Remarks
119.	8.4.2 Bolted Joint Types
120.	8.4.3 Limit States
121.	8.5 Welded Connections
122.	8.5.1 General Remarks
123.	8.5.2 Weld Types and Symbols
124.	8.5.3 Strength of Welded Connections
125.	8.6 Design Procedures for Common Beam-to-Column Connections
126.	8.6.1 Bolted Flange Plate Connections
127.	8.6.2 All-Bolted Double-Angle Connection
128.	8.7 Problems
129.	Bibliography
130.	9 Plate Girders
131.	9.1 Introduction
132.	9.2 Behavior and Design of Web under Shear
133.	9.3 Tension Field Action (Postbuckling Stage)
134.	9.4 Behavior and Design of Web under Bending Moment
135.	9.4.1 General Discussions
136.	9.4.2 Limit States Related to the Flange
137.	9.4.3 Limit States Related to the Web
138.	9.4.4 Limit State of Lateral-Torsional Buckling (LTB)
139.	9.5 Intermediate Transverse Stiffeners (ITS)
140.	9.6 Bearing Stiffeners (BS)
141.	9.7 Design of Bearing Stiffeners
142.	9.8 Summary for Design of Plate Girders
143.	9.9 Problems
144.	Bibliography
145.	Appendix Additional Seismic Design Considerations
146.	Index