

Table of contents provided by Syndetics

- **Section I Principles Of Industrial Lasers**
- **Chapter 1 Laser Generation**
- **1.1 Basic Atomic Structure**
- **1.2 Atomic Transitions**
- **1.3 Lifetime**
- **1.4 Optical Absorption**
- **1.5 Population Inversion**
- **1.6 Threshold Gain**
- **1.7 Two-Photon Absorption**
- **1.8 Summary**
- **Problems**
- **Chapter 2 Optical Resonators**
- **2.1 Standing Waves in a Rectangular Cavity**
- **2.2 Planar Resonators**
- **2.3 Confocal Resonators**
- **2.4 Generalized Spherical Resonators**
- **2.5 Concentric Resonators**
- **2.6 Stability of Optical Resonators**
- **2.7 Summary**
- **Problems**
- **Chapter 3 Laser Pumping**
- **3.1 Optical Pumping**
- **3.2 Electrical Pumping**
- **3.3 Summary**
- **Problems**
- **Chapter 4 Rate Equations**
- **4.1 Two-Level System**
- **4.2 Three-Level System**
- **4.3 Four-Level System**
- **4.4 Summary**
- **Problems**
- **Chapter 5 Broadening Mechanisms**
- **5.1 Line-Shape Function**
- **5.2 Line-Broadening Mechanisms**
- **5.3 Comparison of Individual Mechanisms**
- **5.4 Summary**
- **Problems**
- **Chapter 6 Beam Modification**
- **6.1 Quality Factor**
- **6.2 Q-Switching**
- **6.3 Q-Switching Theory**
- **6.4 Mode-Locking**
- **6.5 Laser Spiking**
- **6.6 Lamb Dip**

- **6.7 Summary**
- **Problems**
- **Chapter 7 Beam Characteristics**
- **7.1 Beam Divergence**
- **7.2 Monochromaticity**
- **7.3 Beam Coherence**
- **7.4 Intensity and Brightness**
- **7.5 Frequency Stabilization**
- **7.6 Beam Size**
- **7.7 Focusing**
- **7.8 Radiation Pressure**
- **7.9 Summary**
- **Problems**
- **Chapter 8 Types of Lasers**
- **8.1 Solid State Lasers**
- **8.2 Gas Lasers**
- **8.3 Dye Lasers**
- **8.4 Semiconductor (Diode) Lasers**
- **8.5 Free Electron Laser**
- **8.6 New Developments in Industrial Laser Technology**
- **8.7 Summary**
- **Problems**
- **Chapter 9 Beam Delivery**
- **9.1 The Electromagnetic Spectrum**
- **9.2 Reflection and Refraction**
- **9.3 Birefringence**
- **9.4 Brewster Angle**
- **9.5 Polarization**
- **9.6 Mirrors and Lenses**
- **9.7 Beam Expanders**
- **9.8 Beam Splitters**
- **9.9 Beam Delivery Systems**
- **9.10 Summary**
- **Problems**
- **Section II Engineering Background**
- **Chapter 10 Heat and Fluid Flow During Laser Processing**
- **10.1 Energy Balance During Processing**
- **10.2 Heat Flow in the Workpiece**
- **10.3 Fluid Flow in Molten Pool**
- **10.4 Summary**
- **Problems**
- **Chapter 11 The Microstructure**
- **11.1 Process Microstructure**
- **11.2 Discontinuities**
- **11.3 Summary**
- **Problems**

- **Chapter 12 Solidification**
- **12.1 Solidification Without Flow**
- **12.2 Solidification With Flow**
- **12.3 Rapid Solidification**
- **12.4 Summary**
- **Problems**
- **Chapter 13 Residual Stresses and Distortion**
- **13.1 Causes of Residual Stresses**
- **13.2 Basic Stress Analysis**
- **13.3 Effects of Residual Stresses**
- **13.4 Measurement of Residual Stresses**
- **13.5 Relief of Residual Stresses and Distortion**
- **13.6 Summary**
- **Problems**
- **Section III Laser Materials Processing**
- **Chapter 14 Background on Laser Processing**
- **14.1 System-Related Parameters**
- **14.2 Process Efficiency**
- **14.3 Disturbances that Affect Process Quality**
- **14.4 General Advantages and Disadvantages of Laser Processing**
- **14.5 Summary**
- **Problems**
- **Chapter 15 Laser Cutting and Drilling**
- **15.1 Laser Cutting**
- **15.2 Laser Drilling**
- **15.3 New Developments**
- **15.4 Summary**
- **Problems**
- **Chapter 16 Laser Welding**
- **16.1 Laser Welding Parameters**
- **16.2 Welding Efficiency**
- **16.3 Mechanism of Laser Welding**
- **16.4 Material Considerations**
- **16.5 Weldment Discontinuities**
- **16.6 Advantages and Disadvantages of Laser Welding**
- **16.7<\$\$\$>**