

## 1.21 PROBLEMS FOR SOLUTION --- ANSWERS

- 1-1 Middle of the 19<sup>th</sup> Century (1855)
- 1-2 Elastic Strain, Plastic Strain, and Strain Hardening
- 1-3 a. Cold Formed Steel --- AISI (American Iron and Steel Institute)  
b. Hot Rolled Steel --- AISC (American Institute of Steel Construction)
- 1-4 Define the following:
- a. Yield Stress --- The stress at which there is a significant increase in the elongation, or strain, without a corresponding increase in stress.
- b. Proportional Limit --- The largest stress for which Hooke's Law applies, or the highest point on the linear portion of the stress-strain diagram.
- c. Elastic Limit --- The largest stress a material can withstand without being permanently deformed.
- 1-5 List the preferred steel type (ASTM specification) for the following:
- a. Angles --- ASTM A36
- b. W Shape --- ASTM A992
- c. Plates --- ASTM A36
- 1-6 What is the range of carbon content in the following materials?
- a. Cast Iron --- ( $\geq 2\%$ )
- b. Wrought Iron --- ( $\leq 0.15\%$ )
- c. Steel --- (range 0.15% to 1.7%)
- 1-7 Rolling of the steel shapes, Fabrication of the shapes, and Erection
- 1-8 Ductility, Elasticity, Permanence, Uniformity, High-Strength / Weight Ratio, Constructability, or Fracture Toughness
- 1-9 Corrosion, Fireproofing Costs, Susceptibility to Buckling, Fatigue, or Brittle Fracture
- 1-10  $F_y = 50$  ksi
- 1-11 Insufficient Size and Strength, Details of Connections, Deflections, Erection Problems, or Foundation Settlement
- 1-12 8 ft. high, 8 ft. wide, and 60 ft. long