ARCH 614. Assignment #2

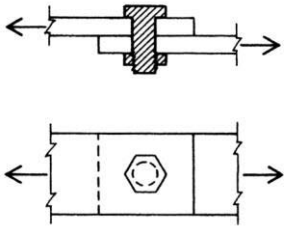
Date: 1/28/14, *due 2/4/14* *Pass-fail work*

Problems: all but 2A & 2B from Ambrose & Tripeny, Chapter 2 & 1, pgs 59, 65, 32, and 36.
*Note: Problems marked with a * have been altered with respect to the problem stated in the text.*

(4%) ***Problem 2.1.A***. What axial compression load may be placed on a short timber post whose cross-sectional dimensions are 9.5 x 9.5 in. if the allowable unit-compressive stress is 1100 psi? *(normal stress)*

Partial answers to check with: P = 99.3 kips

(6%) **2A)** What should be the diameter of the bolt shown in Figure 2.1*d* if the shearing force is 9000 lb and the allowable unit shearing stress is 15 ksi? *(shear stress)*



Partial answers to check with: d = 0.874 in.

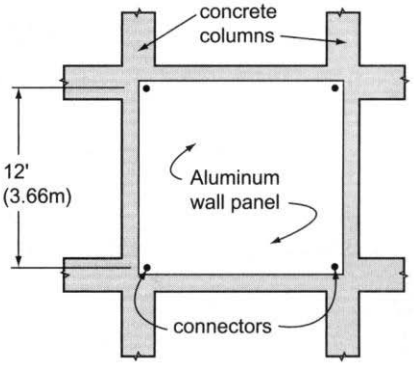
(4%) ***Problem 2.1.C***. Determine the minimum cross-sectional area of a steel bar required to support a tensile force of 50 kips if the allowable unit tensile stress is 20 ksi. *(normal stress)*

(6%) ***Problem 2.2.D***.* **USE METRIC UNITS.** A 12.7 mm diameter round steel rod 12.19 m long supports a load of 17.79 kN. How much will it elongate? *($kN/mm^2 = 10^6$ kPa))* *(axial strain and elasticity)*

Partial answers to check with: δ = 8.56 mm

(20%) **2B) Use US customary units. $E_{aluminum}$ = 10,000 ksi**

6.4.8 An aluminum curtain wall panel 12' (3.66 m) high is attached to large concrete columns (top and bottom) when the temperature is 65°F (18.3°C). No provision is made for differential thermal movement vertically. Because of insulation between them, the sun heats up the wall panel to 120°F (48.9°C) but the column only to 80°F (26.7°C). Determine the consequent compressive stress in the curtain wall. *(thermal stresses)*



Problem 6.4.8

Partial answers to check with:
$\delta_{restrained}$ = 0.0895 in, f = 6,220 psi

(20%) ***Problem 1.6.A***.* **USE METRIC UNITS.** Figure 1.18 represents a beam in equilibrium with three loads and two reactions. ~~Select five different~~ *Using the* centers of moments *at each load (not the end reactions),* ~~and~~ write the equation of moments for each, showing that the sum of the clockwise moments equals the sum of the counterclockwise moments. *(moment of a force)*

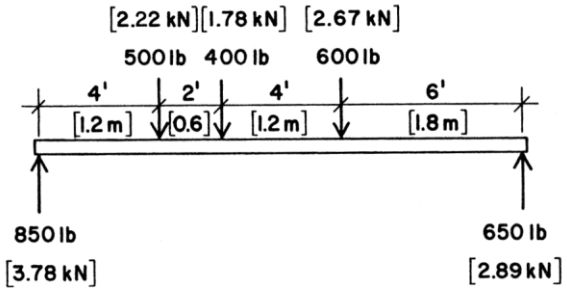


Figure 1.18 Reference for Problem 1.6

MORE NEXT PAGE

(20%) ***Problem 1.7.B.**** **USE US UNITS.** Find the reactions for the beam shown in Figure 1.22*b*. *(equilibrium of rigid bodies)*

Partial answers to check with: R_1 = 8,375 lbs, R_2 = 10,625 lbs.

(20%) ***Problem 1.7.E.**** **USE METRIC UNITS.** Find the reactions for the beam shown in Figure 1.22*e*. *(equilibrium of rigid bodies)*

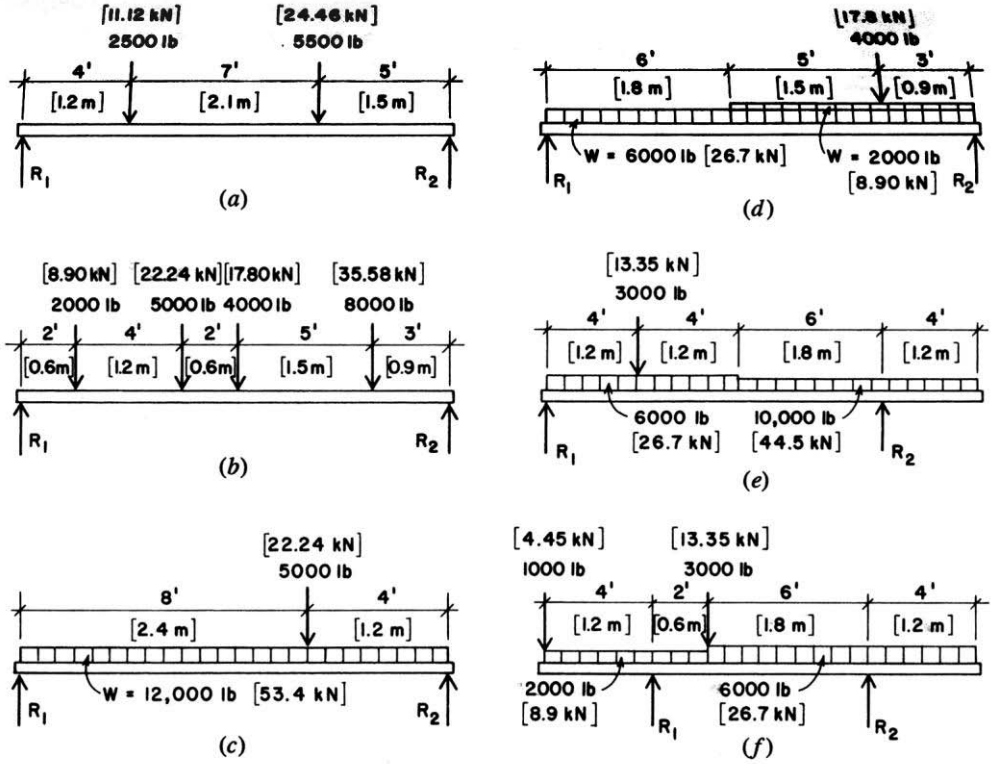


Figure 1.22 Reference for Problem 1.7