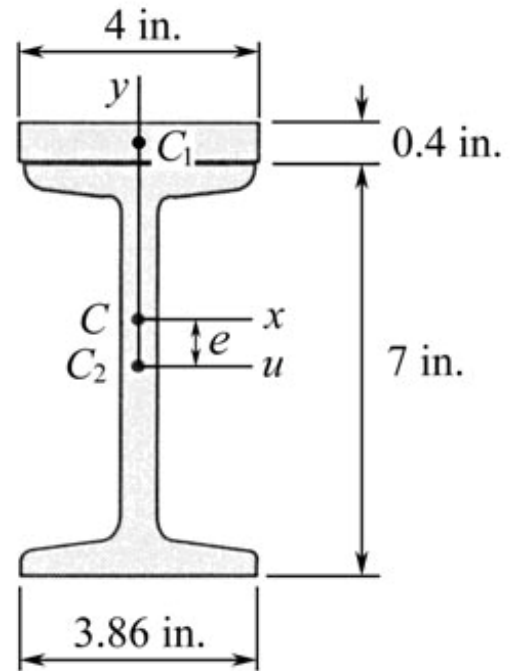


MEEG 2003 Quiz #7.m17.073

1. Define *radius of gyration* of an area about an axis. ②

2. A composite section is shown, where C_1 , C_2 , and C are the centroids of the rectangular section, the S7 × 20 section, and the composite section, respectively. The S7 × 20 section has an area $A_2 = 5.88 \text{ in}^2$ and moments of inertia $(I_u)_2 = 42.4 \text{ in}^4$ and $(I_y)_2 = 3.17 \text{ in}^4$. For this composite section, determine (a) the distance e , (b) the centroidal moments of inertia \bar{I}_x and \bar{I}_y . ⑧



2. $A_1 = 1.6 \quad A_2 = 5.88 \quad \bar{y}_1 = 3.7 - e \quad \bar{y}_2 = -e \quad \bar{y} = 0$

POM₁: $A = A_1 + A_2 = 7.48$

POM₂: $\bar{y}A = \bar{y}_1A_1 + \bar{y}_2A_2$

$$0(7.48) = (3.7 - e)(1.6) - e(5.88) \quad e = 0.7914$$

$$e = 0.791 \text{ in.} \quad \text{③}$$

PAT: $I = \bar{I} + Ad^2$

$$\bar{I}_x = \frac{1}{12}(4)(0.4)^3 + 1.6(3.7 - e)^2 + [42.4 + 5.88(e^2)] = 59.64$$

$$\bar{I}_x = 59.6 \text{ in}^4 \quad \text{③}$$

$$\bar{I}_y = \frac{1}{12}(0.4)(4)^3 + 3.17 = 5.303$$

$$\bar{I}_y = 5.30 \text{ in}^4 \quad \text{②}$$