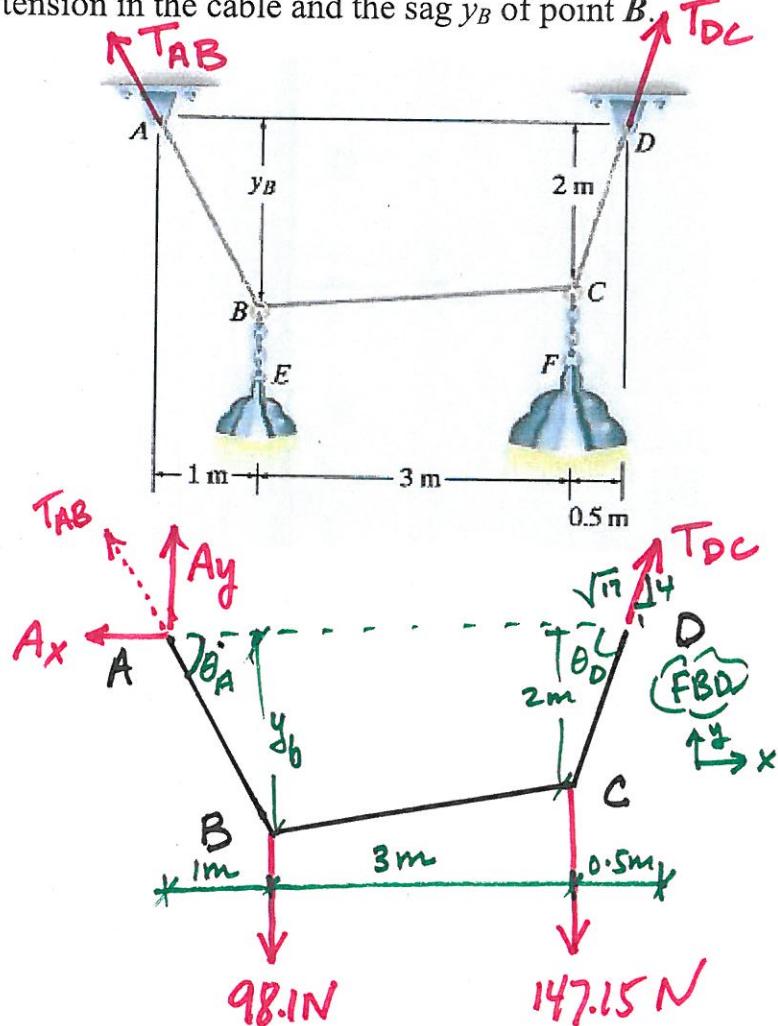


Problem 2: Cables – Concentrated Loads

Cable $ABCD$ supports the 10-kg lamp E and the 15-kg lamp F . Determine the maximum tension in the cable and the sag y_B of point B .



$$\sum M_A = 0 = T_{DC} \left(\frac{4}{\sqrt{17}} \right) (4.5m) - 98.1N(1m) - 147.15N(4m)$$

$$T_{DC} = 157.316$$

$$\Rightarrow \sum F_x = 0 = -Ax + 157.3 \left(\frac{1}{\sqrt{17}} \right) \Rightarrow Ax = 38.15 N$$

$$\uparrow \sum F_y = 0 = Ay - 98.1 - 147.15 + 157.3 \left(\frac{4}{\sqrt{17}} \right) \Rightarrow Ay = 92.65 N$$

$$\frac{Ay}{Ax} = \frac{y_B}{1m} = \frac{92.65}{38.15} \Rightarrow y_B = 2.428m = 2.43m$$

$$T_{AB} = \sqrt{38.15^2 + 92.65^2} = 100.2 N \quad T_{max} = T_{DC} = 157.3 N$$

OR Find θ_A & $\theta_D \Rightarrow \theta_D$ is $\theta_{max} \Rightarrow \therefore T_{max} = T_{DC} = 157.3 N$
 $\theta_A = \tan^{-1}(2.428) = 67.6^\circ, \theta_D = \tan^{-1}(2/0.5) = 75.96^\circ > \theta_A$