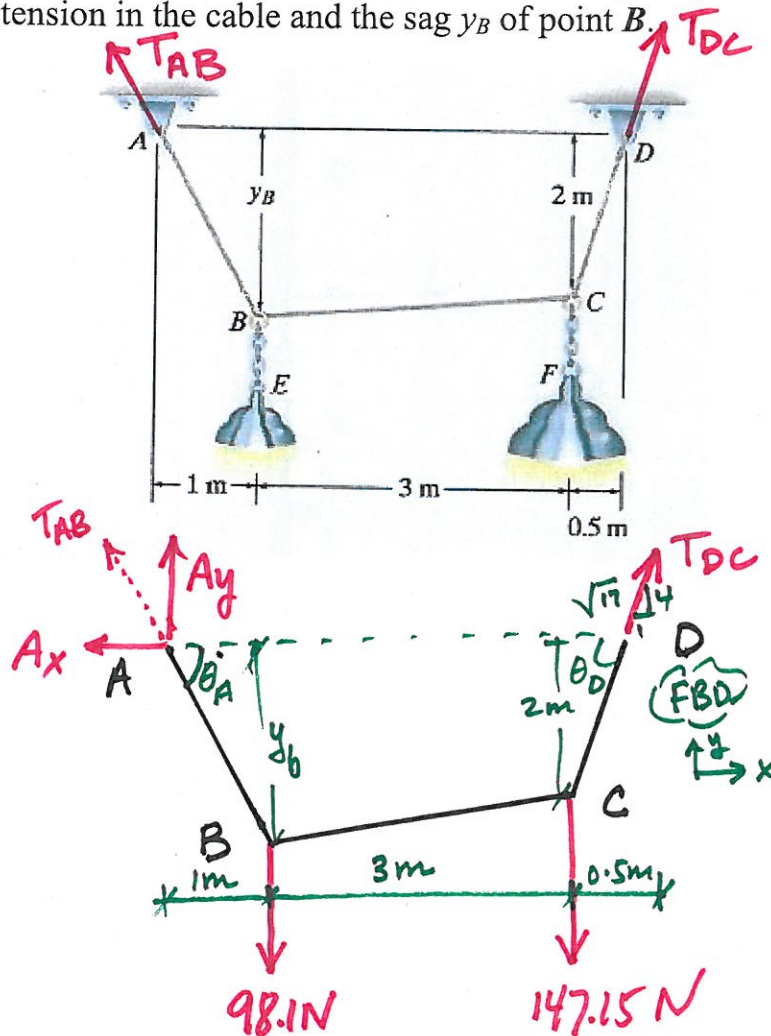


### Problem 2: Cables – Concentrated Loads

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  $B$ .



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

$$T_{DC} = 157.316$$

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

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

$$\frac{A_y}{A_x} = \frac{y_B}{1\text{m}} = \frac{92.65}{38.15} \Rightarrow y_B = 2.428\text{m} = \underline{\underline{2.43\text{m}}}$$

$$T_{AB} = \sqrt{38.15^2 + 92.65^2} = 100.2\text{N}$$

$$T_{\max} = T_{DC} = \underline{\underline{157.3\text{N}}}$$

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