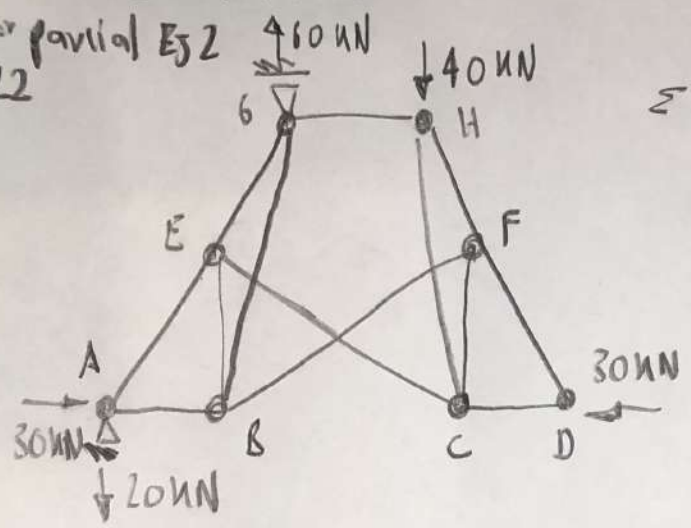
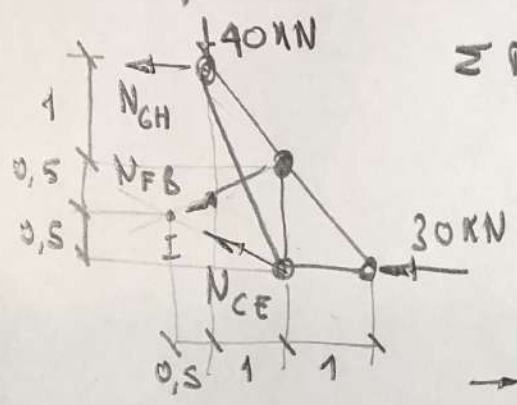


Resistencia de Materiales 1
 Primer parcial Ej 2
 2022



$$\sum M_A = 0 \rightarrow 2V_G - 3 \cdot 40 = 0 \rightarrow \boxed{V_G = 60 \text{ kN}}$$



$$\sum M_I = 0 \rightarrow 0,5 \times (30 + 40) = 1,5 \cdot N_{GH} \rightarrow \boxed{N_{GH} = 70/3 = 23,33 \text{ kN}}$$

$$\sum V_{out} = 0 \rightarrow N_{CE} \times \frac{1}{\sqrt{10}} - N_{FB} \cdot \frac{1}{\sqrt{10}} - 40 \text{ kN} = 0 \rightarrow \frac{N_{CE}}{\sqrt{10}} = 40 + \frac{N_{FB}}{\sqrt{10}}$$

$$\sum M_{HV} = 0 \rightarrow (N_{CE} + N_{FB}) \cdot \frac{3}{\sqrt{10}} + 30 + 70/3 = 0$$

$$\rightarrow 3(40 + N_{FB}/\sqrt{10}) + N_{FB} \cdot 3/\sqrt{10} + 30 + 70/3 \rightarrow N_{FB} = -\frac{\sqrt{10}}{6} (450 + 70)$$

$$\boxed{N_{CE} = 35,14 \text{ kN}} \quad \boxed{N_{FD} = -91,35 \text{ kN}}$$

Nudo A:

$$\sum V = 0 \rightarrow \frac{N_{AE}}{\sqrt{2}} = 20 \rightarrow \boxed{N_{AE} = 28,28 \text{ kN}}$$

$$\sum H = 0 \rightarrow N_{AB} + 20\sqrt{2} + 30 = 0 \rightarrow \boxed{N_{AB} = -50 \text{ kN}}$$

Nudo B:

$$\sum H = 0 \rightarrow N_{BG} \cdot \frac{1}{\sqrt{5}} + 50 - \frac{260}{9} \cdot \frac{3}{\sqrt{10}} = 0 \rightarrow \boxed{N_{BG} = 81,99 \text{ kN}}$$

$$\sum V = 0 \rightarrow -91,35 + 81,99 \cdot \frac{2}{\sqrt{5}} + N_{BE} = 0 \rightarrow \boxed{N_{BE} = -44,44 \text{ kN}}$$

Nudo G:

$$\sum V = 0 \rightarrow 81,99 \cdot \frac{2}{\sqrt{5}} - 60 + N_{EG} = 0 \rightarrow \boxed{N_{EG} = -18,86 \text{ kN}}$$

Nudo D:

$$\boxed{N_{FD} = 0; N_{DC} = -30 \text{ kN}}$$

Nudo C:

$$\sum H = 0 \rightarrow 30 + 35,14 \cdot \frac{3}{\sqrt{10}} + N_{HC} = 0 \rightarrow \boxed{N_{HC} = -141,62 \text{ kN}}$$

Nudo H:

$$\sum V = 0 \rightarrow 40 + \frac{N_{HF}}{\sqrt{2}} - 141,62 \cdot \frac{2}{\sqrt{5}} = 0 \rightarrow \boxed{N_{HF} = 122,57 \text{ kN}}$$

$$\sum V = 0 \rightarrow -141,62 \cdot \frac{2}{\sqrt{5}} + N_{FC} + \frac{35,14}{\sqrt{10}} = 0 \rightarrow \boxed{N_{FC} = 115,56 \text{ kN}}$$

b) $N_{HF} = 122,57 \text{ kN}$ (Tracción máxima) $\rightarrow \frac{N_{HF}}{\pi \phi^2 / 4} \leq 140 \text{ MPa} \rightarrow \phi \geq \sqrt{\frac{4 N_{HF}}{\pi \cdot 140 \text{ MPa}}} = 33,39 \text{ mm} \rightarrow \phi = 34 \text{ mm}$

$N_{CH} = -141,62 \text{ kN}$ (Compresión máxima) $\rightarrow \frac{N_{CH}}{\pi l^2} \leq 140 \text{ MPa} \Rightarrow l \geq \sqrt{\frac{N_{CH}}{140 \text{ MPa}}} = 31,80 \text{ mm} \rightarrow l = 32 \text{ mm}$