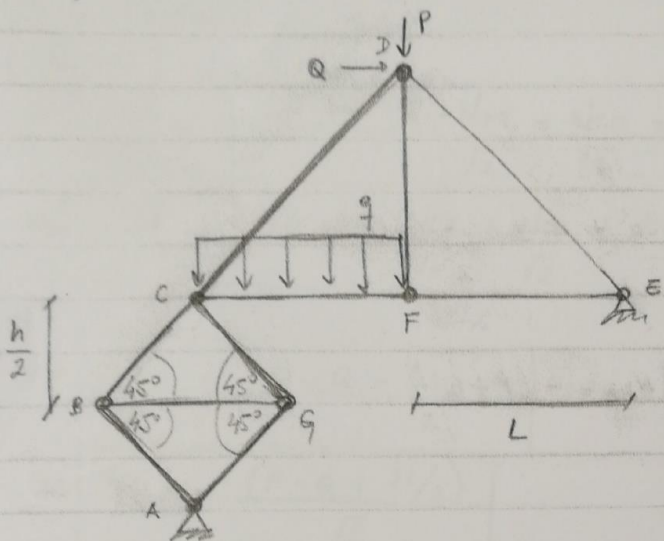
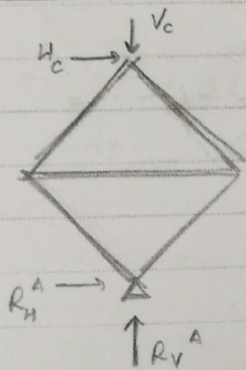


Ejercicio 1. 1er Parcial 2019. R1



- Datos
- Q
 - P
 - q
 - L
 - h
 - Radm

Reacciones



$$\sum M_A = 0 \Rightarrow H_c \cdot h = 0 \Rightarrow H_c = 0.$$

$$\Rightarrow \boxed{R_{HA} = 0}$$

Equilibrio Global.

$$\sum H = 0 \Rightarrow R_{HE} + Q = 0 \Rightarrow \boxed{R_{HE} = Q \leftarrow}$$

$$\sum V = 0 \Rightarrow R_{VA} + R_{VE} = P + qL$$

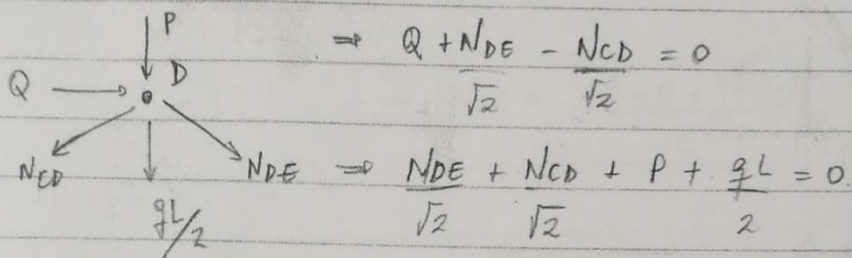
$$\sum M_A = 0 \Rightarrow P \cdot L + Q \cdot (L+h) + qL^2/2 = R_{VE} \cdot 2L + R_{HE} \cdot h$$

$$\Rightarrow \boxed{R_{VE} = \frac{P}{2} + \frac{Q}{2} + \frac{qL}{4}}$$

$$\Rightarrow \boxed{R_{VA} = \frac{P}{2} + \frac{3qL}{4} - \frac{Q}{2}}$$

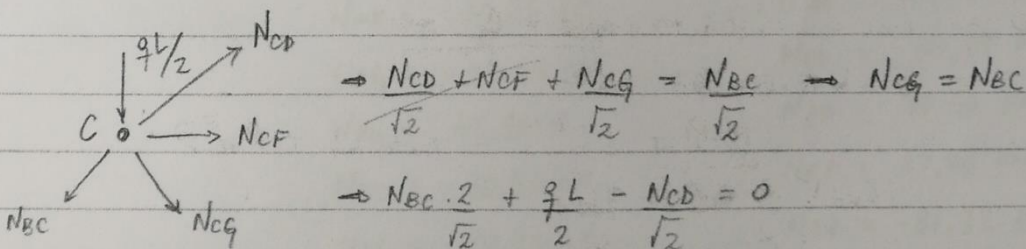
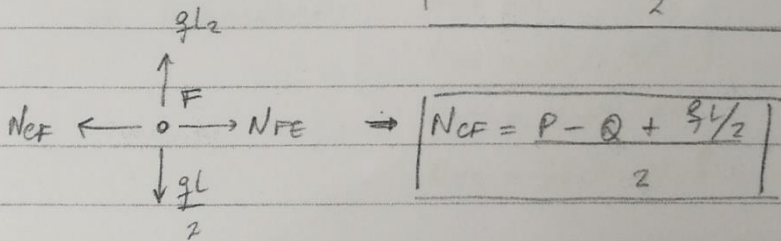
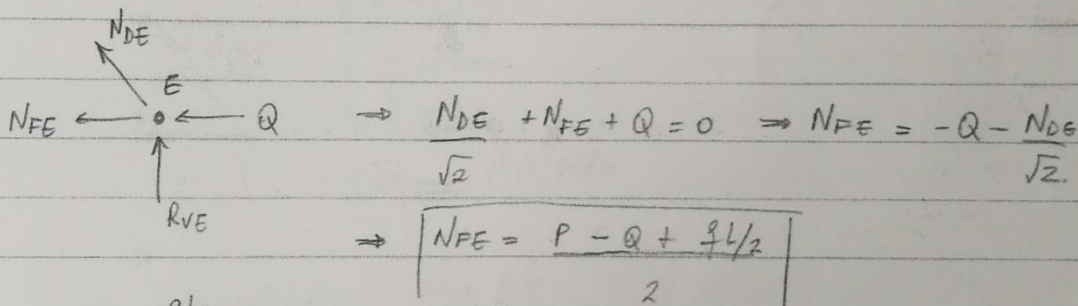
Directas

$$\boxed{N_{DF} = \frac{3L}{2}}$$

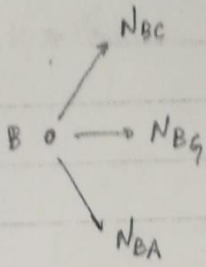


$$\rightarrow \frac{2N_{DE}}{\sqrt{2}} = -P - Q - \frac{3L}{2} \Rightarrow \boxed{N_{DE} = -\frac{(P+Q+3L/2)}{\sqrt{2}}}$$

$$\rightarrow \boxed{N_{CD} = -\frac{(P-Q+3L/2)}{\sqrt{2}}}$$



$$\Rightarrow \boxed{N_{BC} = N_{CG} = \left(-\frac{(P-Q+3L/2)}{2} - \frac{3L}{2} \right) \cdot \frac{1}{\sqrt{2}} = -\frac{(P-Q+3L/2)}{2\sqrt{2}}}$$



$$\rightarrow N_{BC} = N_{BA}$$

$$\rightarrow \frac{2N_{BC} + N_{BG}}{\sqrt{2}} = 0 \rightarrow N_{BG} = -\sqrt{2}N_{BC}$$

$$\rightarrow \boxed{N_{BG} = \frac{(P - Q + 3qL/2)}{2}}$$

$$\boxed{N_{BA} = N_{AG} = -\frac{(P - Q + 3qL/2)}{2\sqrt{2}}}$$

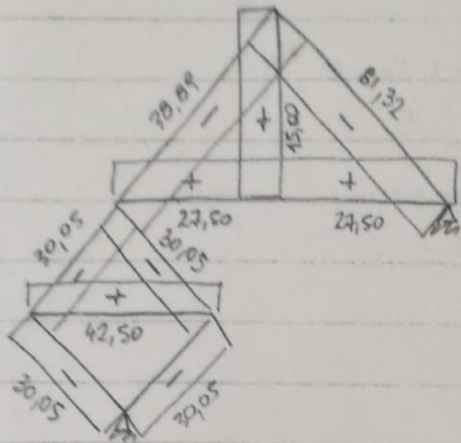
- \rightarrow Datos: $Q = 30 \text{ kN}$
 $P = 70 \text{ kN}$
 $q = 20 \text{ kN/m}$
 $L = 1,5 \text{ m}$
 $h = 2 \text{ m}$
 $\sigma_{adm} = 140 \text{ MPa}$

- \rightarrow Reacciones: $R_{HA} = 0$
 $R_{VA} = 42,5 \text{ kN} \uparrow$
 $R_{HE} = 30 \text{ kN} \leftarrow$
 $R_{VE} = 57,5 \text{ kN} \uparrow$

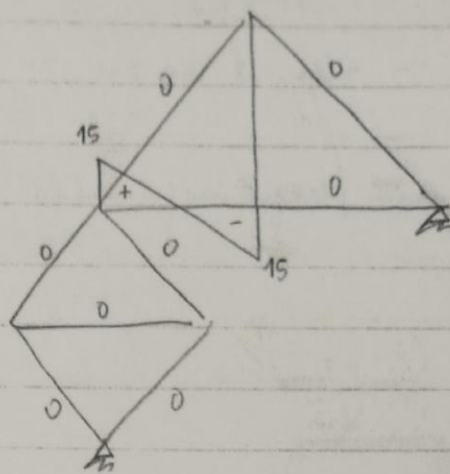
- \rightarrow Directas: $N_{AB} = -30,05 \text{ kN}$ $N_{CF} = 27,50 \text{ kN}$
 $N_{AG} = -30,05 \text{ kN}$ $N_{CD} = -38,89 \text{ kN}$
 $N_{BG} = 42,50 \text{ kN}$ $N_{DF} = 15,00 \text{ kN}$
 $N_{BC} = -30,05 \text{ kN}$ $N_{EF} = 27,50 \text{ kN}$
 $N_{CG} = -30,05 \text{ kN}$ $N_{ED} = -81,32 \text{ kN}$

Diagramas

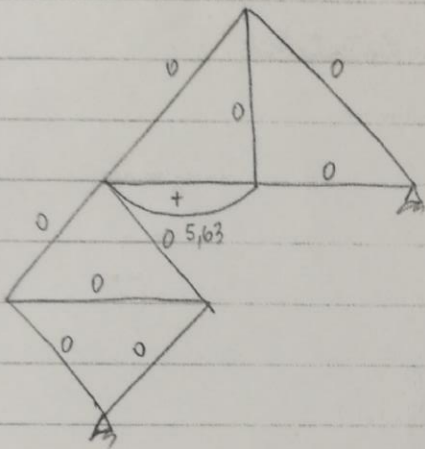
(N)



(V)



(M)



Dimensionado

Barra DE

$$N_{DE} = -81,32 \text{ KN}$$

$$|N| < \sigma_{adm}$$

A

$$\Rightarrow A > 5,8 \text{ cm}^2$$

$$\Rightarrow \text{PNI 80}$$

Barra CF

$$N_{CF} = 27,50 \text{ KN}$$

$$M_{CF} = 5,63 \text{ KNm}$$

$$|N| + |M| < \sigma_{adm}$$

A W

⇒ Sin considerar directa:

$$W > 40,21 \text{ cm}^3$$

$$\Rightarrow \text{PNI 120 } (W = 54,7 \text{ cm}^3; A = 14,2 \text{ cm}^2)$$

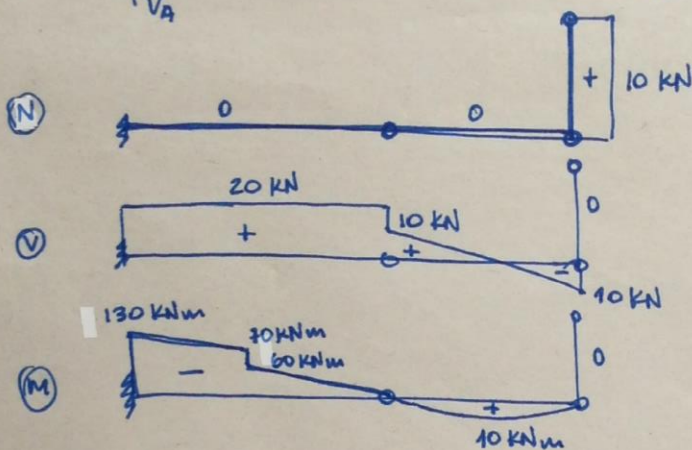
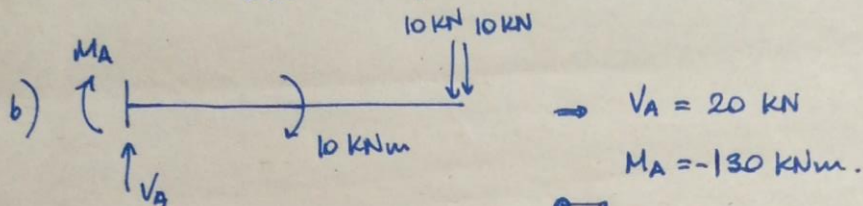
$$\Rightarrow \sigma = 122,3 \text{ MPa} < 140 \text{ MPa} \checkmark$$

Dimensionar tubos interiores de barra CF → PNT 120

Ejercicio 2

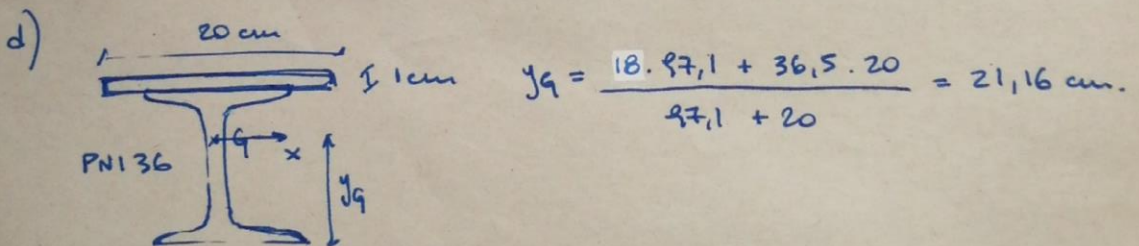
$$a) \quad N_{DE} = \frac{5 \text{ kN/m} \cdot a}{2} \quad \left. \begin{array}{l} \Delta L_{DE} = 5 \cdot 10^{-4} \text{ m} \\ \Delta L_{DE} = \frac{NL}{EA} \end{array} \right\} \frac{5 \text{ kN/m} \cdot a \cdot 3 \text{ m}}{2 \cdot 210 \cdot 10^6 \frac{\text{KN}}{\text{m}^2} \cdot 2,86 \cdot 10^{-4} \text{ m}^2} = 5 \cdot 10^{-4} \text{ m}$$

$$\rightarrow \boxed{a = 4,00 \text{ m}}$$



c) $|M_{\max}| = 130 \text{ kNm}$

$$\frac{M}{W} < 140 \text{ MPa} \Rightarrow W > 928,57 \text{ cm}^3 \Rightarrow \boxed{\text{PNI 36}}$$



$$I_x = 19610 + 97,1(21,16 - 18)^2 + \frac{20 \cdot 1^3}{12} + 20(36,5 - 21,16)^2$$

$$I_x = 25287,58 \text{ cm}^4$$

$$\Rightarrow W_{\text{sup}} = 1596,44 \text{ cm}^3$$

$$\Rightarrow W_{\text{inf}} = 1195,07 \text{ cm}^3$$

$$\frac{|M|}{W} < \sigma_{\text{adm}} \Rightarrow |M| < 167,31 \text{ kNm}$$

$$|M_A| = |M_{\max}| = P \cdot 6 \text{ m} + 10 \text{ kNm} + 10 \text{ kN} \cdot 6 \text{ m} < 167,31 \text{ kNm}$$

$$\Rightarrow \boxed{P < 16,2 \text{ kN}}$$