

$$a) \sum M_A = 0 \rightarrow \frac{10 \text{ kN}}{m} \cdot 4L \cdot 2L + 10 \text{ kN} \cdot 4L - 15 \text{ kN} \cdot L = R_4 \cdot 4L$$

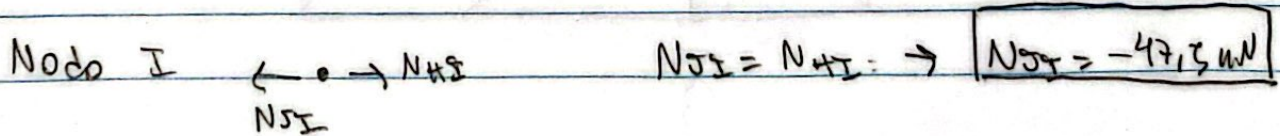
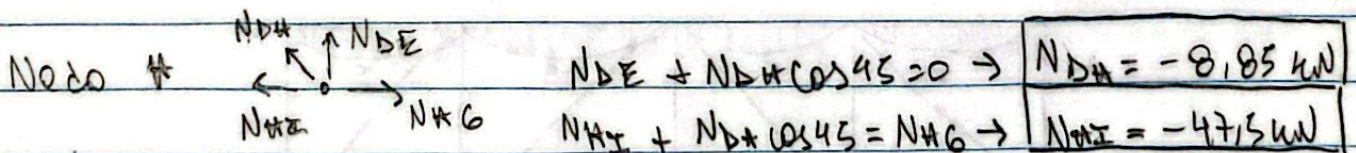
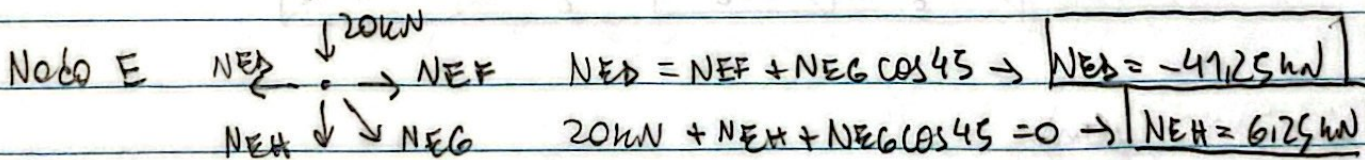
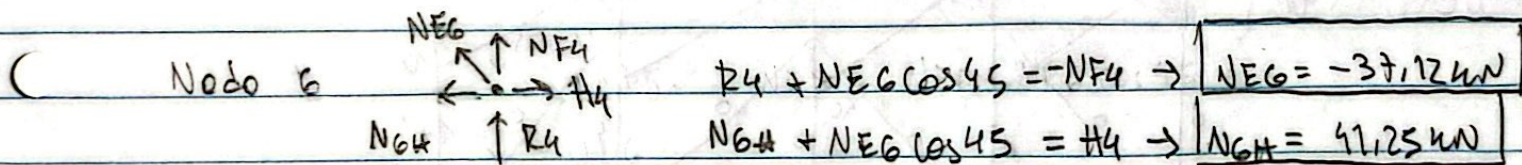
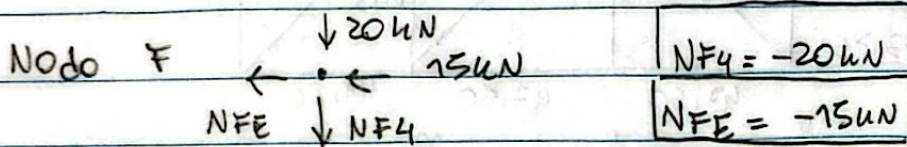
$$\rightarrow R_4 = 46,25 \text{ kN}$$

$$\sum F_v = 0 \quad \frac{10 \text{ kN}}{m} \cdot 4L + 10 \text{ kN} - R_4 = R_1$$

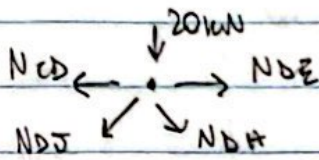
$$\rightarrow R_1 = 43,75 \text{ kN}$$

$$\sum F_H = 0 \quad H_4 = W = 15 \text{ kN}$$

b) Cordon superior analizo q como cargas puntuales en cada nodo de valor $qL/2$ en los extremos y $2 \times \frac{qL}{2}$ en los nodos centrales.



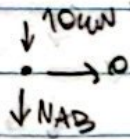
NODO D



$$20 + N_{DA} \cos 45 + N_{DJ} \cos 45 = 0 \rightarrow N_{DJ} = -19,45 \text{ kN}$$

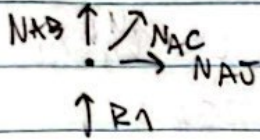
$$N_{CD} + N_{DJ} \cos 45 = N_{DE} + N_{DA} \cos 45 \rightarrow N_{CD} = -33,75 \text{ kN}$$

NODO B



$$N_{AB} = -10 \text{ kN}$$

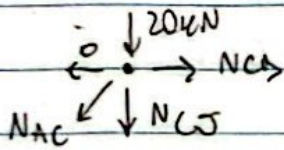
NODO A



$$R_1 + N_{AB} + N_{AC} \cos 45 = 0 \rightarrow N_{AC} = -47,73 \text{ kN}$$

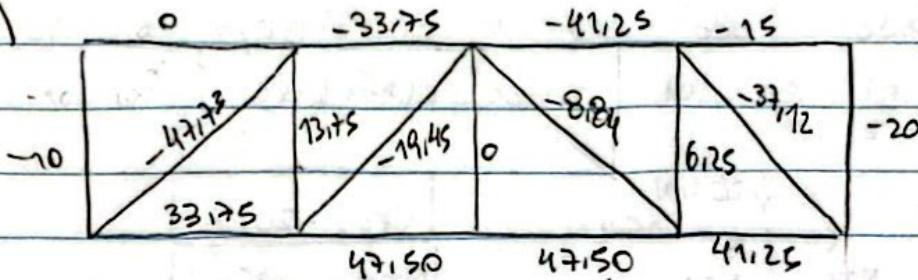
$$N_{AC} \cos 45 + N_{AJ} = 0 \rightarrow N_{AJ} = 33,75 \text{ kN}$$

NODO C

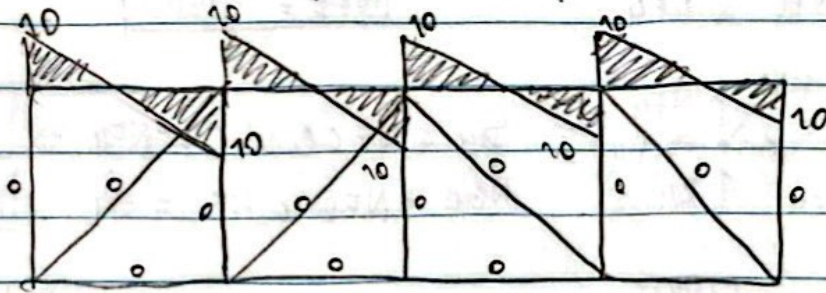


$$20 + N_{AC} \cos 45 + N_{CS} = 0 \rightarrow N_{CS} = 13,75 \text{ kN}$$

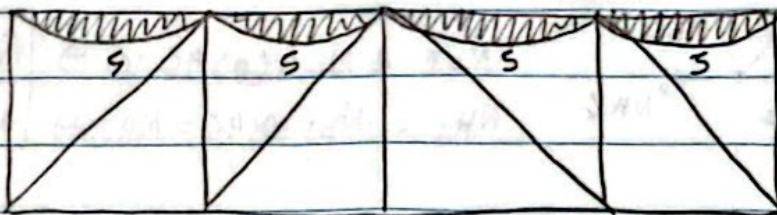
DIRECTA (kN)



CORTE (kN)



MOMENTO (kNm)



c) → CORDÓN SUPERIOR

$$N = -41,25 \text{ kN}$$

$$M = 5 \text{ kNm}$$

$$\sigma = \frac{N}{A} + \frac{M}{W}$$

PRUEBO CON $L = 60 \text{ cm}$ $\sigma = 150 \text{ MPa} > \sigma_{adm}$

$L = 65 \text{ cm}$ $\sigma = 119 \text{ MPa} \leq \sigma_{adm}$

$L = 70 \text{ cm}$ $\sigma = 96 \text{ MPa} \leq \sigma_{adm}$

Dimensiono con $L = 65 \text{ cm}$ por ser menor la sección

(
→ CORDÓN INFERIOR

$$N = 47,50 \text{ kN}$$

$$M = 0$$

$$\sigma = \frac{N}{A}$$

PRUEBO CON $L = 30$ $\sigma = 53 \text{ MPa} \leq \sigma_{adm}$

$L = 20$ $\sigma = 119 \text{ MPa} \leq \sigma_{adm}$

$L = 15$ $\sigma = 211 \text{ MPa} > \sigma_{adm}$

Dimensiono con $L = 20 \text{ cm}$

(
d) $N = 43,75 \text{ kN}$ CTE

$$U_1 = -\frac{43,75 \text{ kN} \cdot 0,175 \text{ m}}{210 \text{ GPa} \times 60 \text{ cm}^2} - \frac{43,75 \text{ kN} \cdot 0,175 \text{ m}}{210 \text{ GPa} \times 30 \text{ cm}^2} = 0,0781 \text{ mm}$$

$$U = \epsilon L = \frac{\sigma L}{E} = \frac{NL}{AE}$$