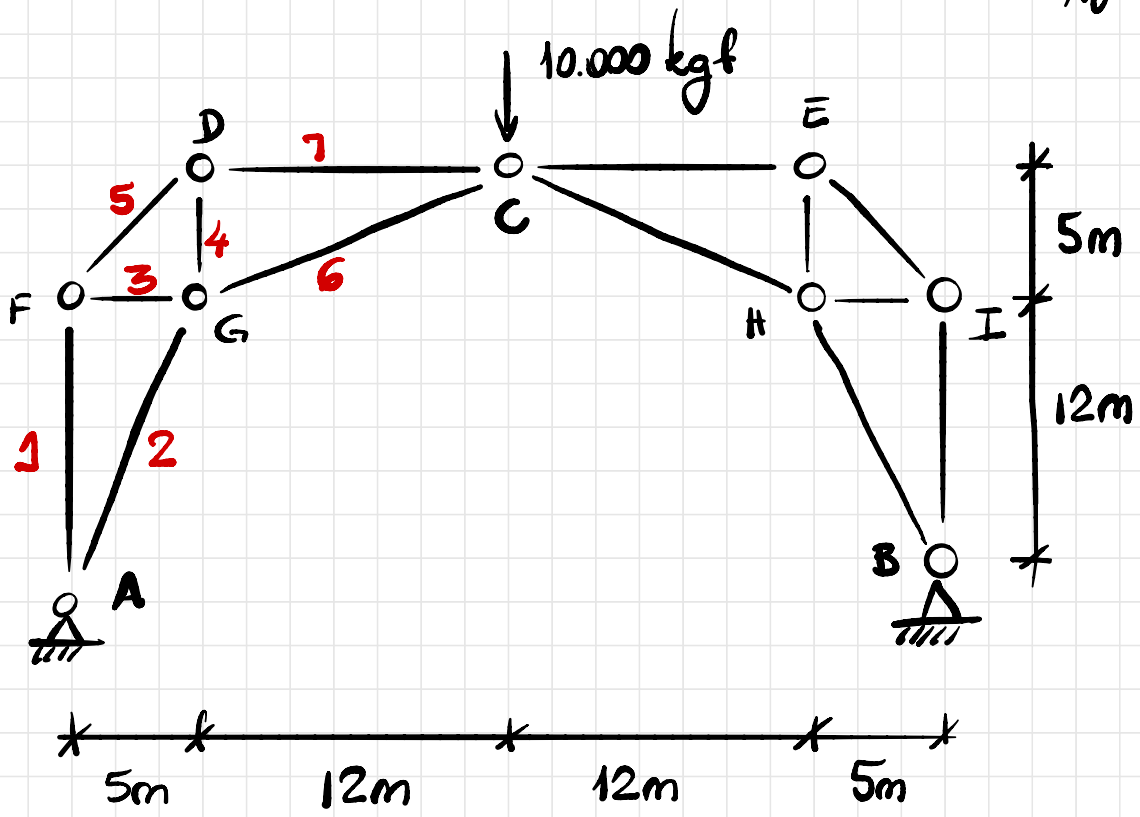
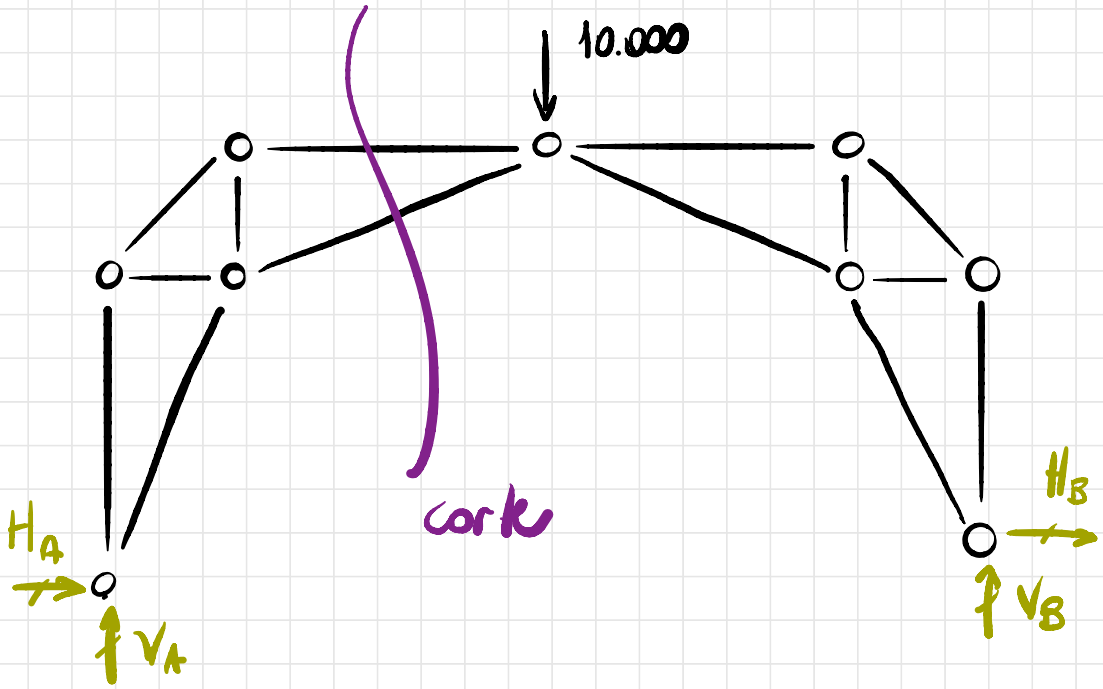
Exercício 32, Problemas de Resistência dos Materiais, pg-11



Determinar as normais nas treliças numeradas.

- treliça isostática
  - 4 reações vinculares
  - 14 barras
  - 9 nós $\Rightarrow$ 18 equações l.i. de equilíbrio.



$$\sum F_H = 0 : H_A + H_B = 0$$

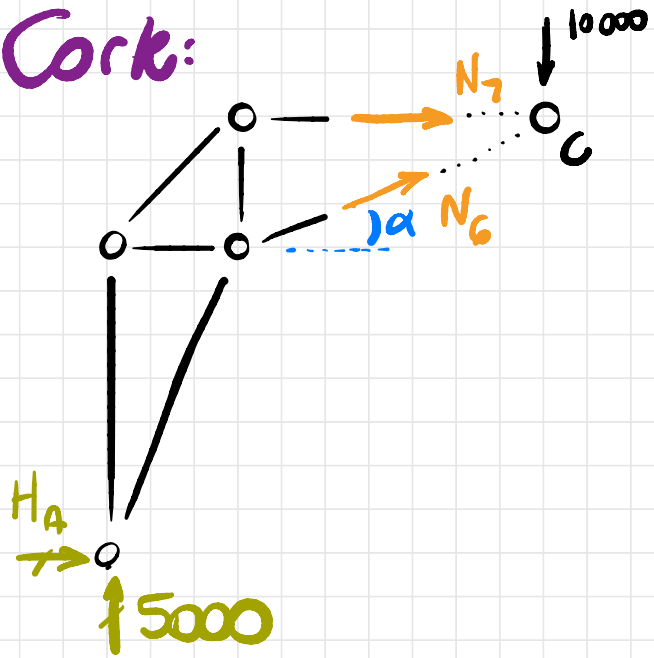
$$\sum F_V = 0 : V_A + V_B = 10.000$$

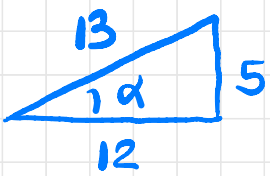
$$(+) \sum M_A = 0 : -10.000 \cdot 17 + V_B \cdot 34 = 0$$

$$\boxed{V_B = 5000 \text{ kgf}}$$

$$\boxed{V_A = 5000 \text{ kgf}}$$

Cork:





$\sin\alpha = 5/13$

$\cos\alpha = 12/13$

$$\sum F_H = 0: \quad H_A + N_7 + N_6\cos\alpha = 0$$

$$\sum F_V = 0: \quad 5000 + N_6\sin\alpha = 0$$

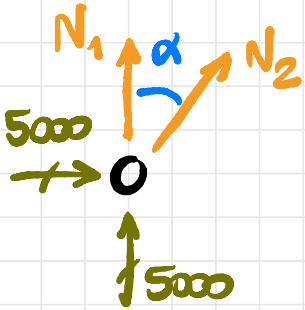
$$N_6 = -\frac{5000}{\sin\alpha} \Rightarrow \boxed{N_6 = -13000\ kgf}$$

$$\circlearrowleft + \sum M_C = 0: \quad H_A \cdot 17 - 5000 \cdot 17 = 0$$

$$\boxed{H_A = 5000\ kgf}$$

$$N_7 = -H_A - N_6\cos\alpha = -5000 + 12000 \Rightarrow \boxed{N_7 = 7000\ kgf}$$

Nó A:



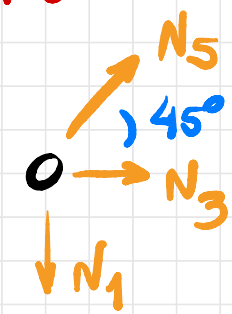
$$\sum F_H = 0: \; 5000 + N_2 \sin\alpha = 0$$

$$\boxed{N_2 = -13000\ kgf}$$

$$\sum F_V = 0: \; 5000 + N_1 + N_2 \cos\alpha = 0$$

$$N_1 = -5000 - N_2 \cos\alpha \Rightarrow \boxed{N_1 = 7000\ kgf}$$

Nó F:



$$\sum F_H = 0: \; N_5 \cos 45° + N_3 = 0$$

$$\sum F_V = 0: \; -N_1 + N_5 \sin 45° = 0$$

$$\boxed{N_5 = 7000\sqrt{2}\ kgf}$$

$$N_3 = -N_5 \cos 45° \Rightarrow \boxed{N_3 = -7000\ kgf}$$

Nó D:

$$\sum F_H = 0 : -N_5 \operatorname{sen} 45° + N_7 = 0$$

$$-7000\sqrt{2} \cdot \frac{1}{\sqrt{2}} + 7000 = 0$$

$$\sum F_V = 0 : -N_5 \cos 45° - N_4 = 0$$

$$N_4 = -N_5 \cos 45° \Rightarrow \boxed{N_4 = -7000\ kgf}$$

barra	N [kgf]
1	7000
2	-13000
3	-7000
4	-7000
5	$7000\sqrt{2}$
6	-13000
7	7000