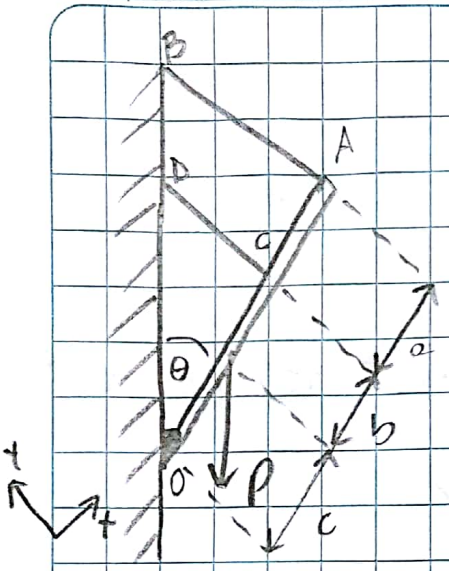
Pauta Prueba Corta 1

Fecha:



$A_{sec} = 4{,}84$ [cm]

$AOB = 30°$

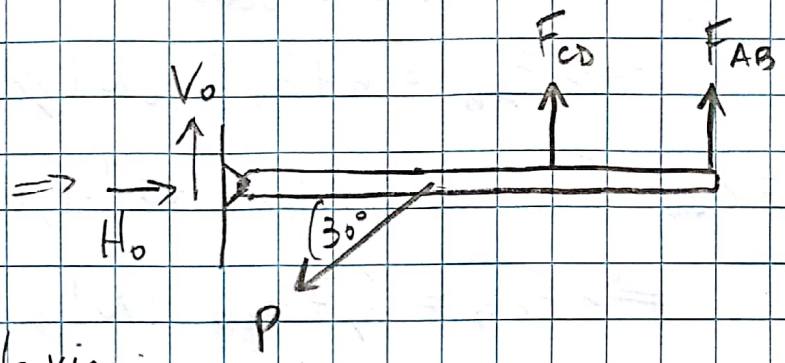
$a = 0{,}61$ [m]

$b = 0{,}305$ [m]

$c = 0{,}914$ [m]

$E = 0{,}84 \cdot 10^6$ [kg/cm²]

$\varepsilon_{AB} = 1/6000$



Equilibrio en la viga:

$$\sum F_x = 0 \Rightarrow H_0 - P\cos 30° = 0 \Rightarrow H_0 = P\cos 30°$$

$$\sum F_y = 0 \Rightarrow F_{AB} + F_{CD} + V_0 - P\,\text{sen}\,30° = 0$$

$$\sum M_0 = 0 \Rightarrow F_{AB}(a+b+c) + F_{CD}(b+c) - P\,\text{sen}\,30° \cdot c = 0$$

Deformación

AB]

$$l_{AB} = (a+b+c)\,tg\ 30° = 1{,}05597\ [m]$$

$$\Rightarrow \Delta l_{AB} = \varepsilon\, l_{AB} = \frac{1}{6000} \cdot 1{,}05597 = 1{,}76 \cdot 10^{-4}\ [m]$$

CD] Asumiendo viga OA rígida

$$\frac{\Delta l_{AB}}{a+b+c} = \frac{\Delta l_{CD}}{b+c} \Rightarrow \Delta l_{CD} = \Delta l_{AB}\left(\frac{b+c}{a+b+c}\right) = 1{,}17 \cdot 10^{-4}$$

$$l_{CD} = (b+c)\cdot tg\ 30° = 0{,}70379\ [m]$$

misma deformación

$$\Rightarrow \varepsilon_{CD} = \frac{\Delta l_{CD}}{l_{CD}} = \frac{1{,}17 \cdot 10^{-4}}{0{,}70379} = 1{,}67 \cdot 10^{-4}$$

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Fecha:

Fuerzas en los tirantes:

$$\sigma = \varepsilon E \quad \Rightarrow F = \varepsilon E A$$
$$\sigma = \frac{F}{A}$$

$$F_{AB} = \varepsilon_{AB} \cdot E_{AB} \cdot A_{AB} = \frac{1}{6000} \cdot 0{,}84 \cdot 10^6 \cdot 10^4 \cdot 4{,}84 \cdot 10^{-4}$$

$$\Rightarrow F_{AB} = 677{,}6 \ [N] //$$

$$F_{CD} = \varepsilon_{CD} \cdot E_{CD} \cdot A_{CD} = 1{,}67 \cdot 10^{-4} \cdot 0{,}84 \cdot 10^6 \cdot 4{,}84$$

$$\Rightarrow F_{CD} = 677{,}6 \ [N] //$$

Con esto, se despeja P a partir de las ecuaciones de equilibrio:

$$F_{AB}(a+b+c) + F_{CD}(b+c) + P \operatorname{sen} 30 \cdot c = 0$$

$$\Rightarrow P = 4.519{,}31 \ [N] //$$

$$\Rightarrow V_0 = 904{,}455 \ [N] //$$

$$\Rightarrow H_0 = 3913{,}84 \ [N] //$$