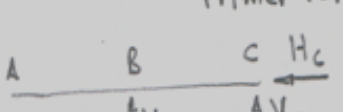
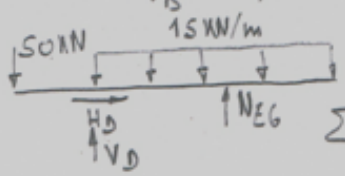
Primer Parcial 2015 EJ 1 Solución



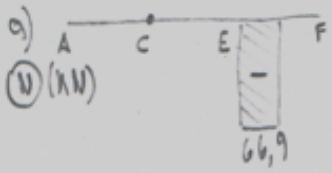
$\Sigma M_B = 0 \rightarrow \boxed{V_C = 0}$; $\Sigma hor = 0 \rightarrow \boxed{H_C = 0}$; $\Sigma V_{\uparrow} = 0 \rightarrow \boxed{V_B = 0}$

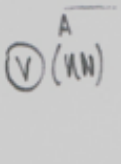


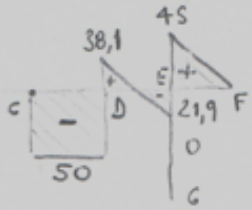
$\Sigma hor = 0 \rightarrow \boxed{H_D = 0}$; $\Sigma M_D = 0 \rightarrow 4 N_{EG} - 7 \times 15 \times 7/2 + 2 \times 50 = 0 \rightarrow \boxed{N_{EG} = 66,9\,kN}$

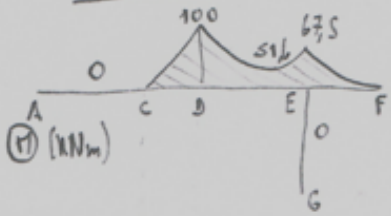
$\Sigma V_{\uparrow} = 0 \rightarrow 50 + 7 \times 15 - 66,9 = V_D \rightarrow \boxed{V_D = 88,1\,kN}$

a)







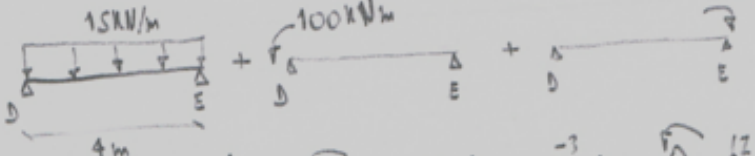


b) $\sigma_{adm} = 100\,MPa$, $M_{max} = 100\,kNm$, $\sigma_{adm} \geq M_{max}/W$ $\Rightarrow W \geq 1000\,cm^3$ $\Rightarrow$ IPN 136 ($W = 1090\,cm^3$)

c)

d) $E = 210\,GPa$; $I_{IPN136} = 19610\,cm^4$

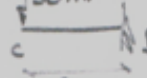
d) i) $\delta_C^{(1)}$:



$\theta_D = \frac{q L^3}{24 EI} = 9,7 \times 10^{-4}\,rad + \theta_D = \frac{100\,kNm \cdot L}{3EI} = 3,2 \times 10^{-3}\,rad + \theta_D = \frac{67,5\,kNm \cdot L}{6EI} = 1,1 \times 10^{-3}\,rad$

$\theta_{D\,TOT} = 3,4 \times 10^{-3}\,rad \rightarrow \boxed{\downarrow \delta_C^{(1)} = \theta_{D\,TOT} \cdot 200\,cm = 0,67\,cm \downarrow}$

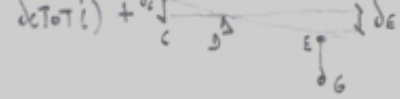
$\delta_C^{(2)}$:



$\delta_C^{(2)} = \frac{PL^3}{3EI} = 0,32\,cm \downarrow$

$\delta_{C\,TOT} = 0,67 + 0,32 \rightarrow \boxed{\downarrow \delta_{C\,TOT} = 0,99\,cm}$

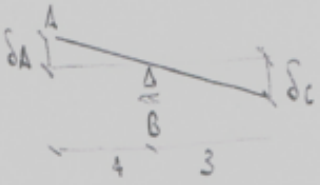
d) ii) $\delta_{C\,TOT}$ i) + δ_C:



Barra EG: Largo = 6m, $E = 10\,GPa$, $A = 0,01\,m^2$

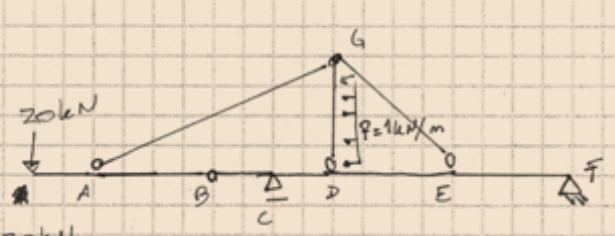
$\rightarrow \delta_E = N_{EG} \left(\frac{1}{EA} \right)_{EG} = 0,4\,cm \rightarrow \delta_C = \frac{0,4\,cm \cdot 2}{4} = 0,2\,cm \downarrow$ Semejanza

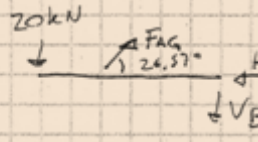
$\delta_{C\,TOT} = 0,99\,cm - 0,2\,cm \rightarrow \boxed{\downarrow \delta_{C\,TOT} = 0,79\,cm}$



$\downarrow \delta_A = 0,79\,cm \cdot 4/3 \rightarrow \boxed{\downarrow \delta_A = 1,05\,cm}$

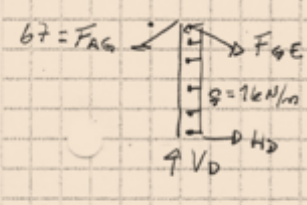
ESERCICIO 2





$V_B = 7/2 = 10kN$ $\quad F_{AG}\,sen(26,57) = V_B + 20kN \rightarrow F_{AG} = 67kN$

$H_B = F_{AG}\cos(26,57) = 60kN$

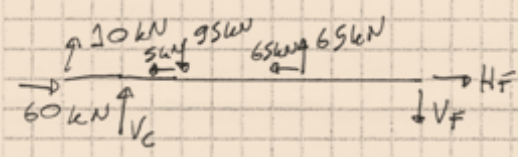


$\Sigma M_D = 0 = F_{AG}\cdot\cos(26,57)\cdot 10m + 1kN/m\cdot 10m\cdot 5m - F_{GE}\frac{\sqrt{2}}{2}\cdot 10m$

$\rightarrow F_{GE} = 91,9kN$

$V_D = 67kN\cdot sen(26,57) + 91,9kN\frac{\sqrt{2}}{2} = 95kN$

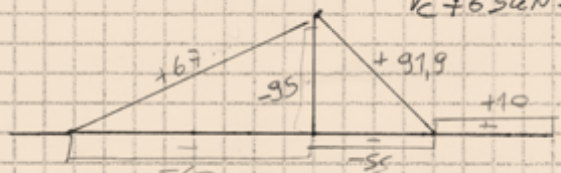
$H_D = 91,9\frac{\sqrt{2}}{2} + 1\frac{kN}{m}\cdot 10m - 67kN\cdot\cos(26,57) = 9kN$

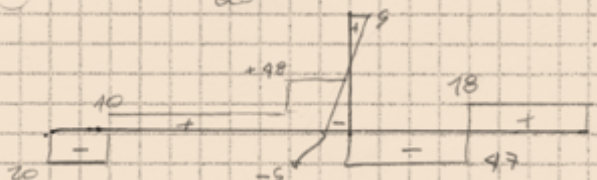


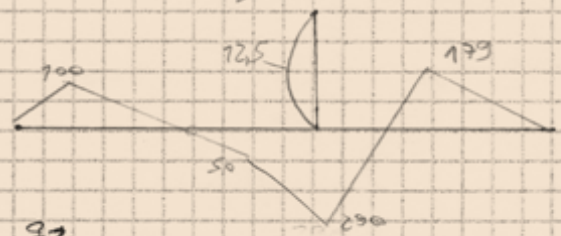
$H_F = 65kN + 9kN - 60kN = 10kN$

$\Sigma M_C = 0 = 10kN\cdot 5m + 95kN\cdot 5m - 65kN\cdot 15m - V_F\cdot 25m \rightarrow \boxed{V_F = 18kN}$

$V_C + 65kN + 10kN = 95kN + 18kN \rightarrow \boxed{V_C = 38kN}$







c) $F_{GE} = 91,9kN$

$A \geq \frac{91,9kN}{10kN/cm^2} = 9,1cm^2$

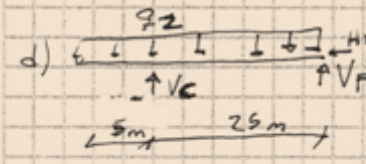
$\phi \geq 3,42cm$

d) $\vec{\delta}_C = \frac{N_D\cdot L_D}{EA} + \frac{N_{DE}\cdot L_{DE}}{EA} + \frac{N_{EF}\cdot L_{EF}}{EA}$

$A = 147cm^2 \quad EA = 3087\times 10^3 kN$

$\delta_C = \frac{-60kN\cdot 5m + 55kN\cdot 10m + 10kN\cdot 10m}{3087000kN} = 0,024$

$\delta_C = 0,024cm$ HACIA LA DERECHA (→)



d) $\Sigma M_C = 0 = V_F'\cdot 25m - q_2\cdot 30m\cdot 10m \rightarrow V_F' = 12q_2 \quad 12q_2 + 18kN = 0$

$\boxed{q_2 = 1,5kN/m}$