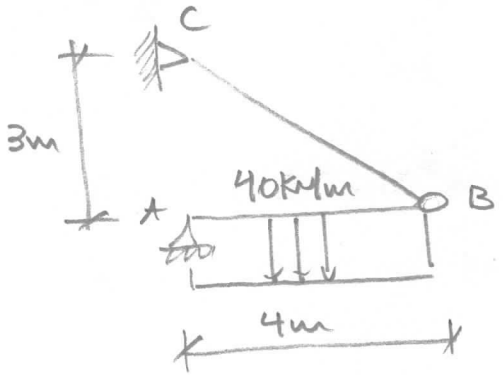
B2T4N1O531 — 0,6 PONTOS

TODAS AS BARRAS $E = 25\,GPa$

BARRA AB $b = 12cm$ $h = 30cm$

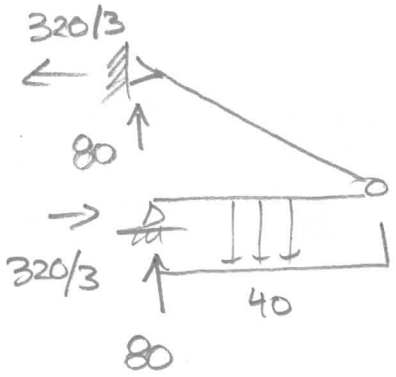
BARRA BC diâmetro $= 4cm$



Q01) DEFLEXÃO B DEVIDO FLEXÃO

Q02) DEFLEXÃO B DEVIDO AXIAIS

CARREG. REAL



$\circlearrowleft \sum M_B^{\rightarrow A} = 0 \quad V_A \times 4 - 40 \times 4 \times 2 = 0$

$V_A = 1/4\,(40 \times 4 \times 2) = 80\,kN \uparrow$

$\uparrow \sum V = 0 \quad V_C = 80\,kN \uparrow$

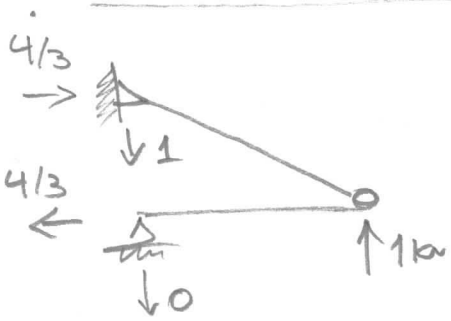
$\circlearrowleft \sum M_B^{\rightarrow C} = 0 \quad H_C \times 3 + 80 \times 4 = 0$

$H_C = 1/3 \times (-320) = -320/3\,kN$

$M_{AB}(x) = 80x - 40x^2/2 \qquad M_{CB}(x) = 0$

$N_{AB}(x) = -320/3 \qquad N_{CB}(x) = \sqrt{80^2 + \left(\frac{320}{3}\right)^2} = +\frac{400}{3}$

CARREG VIRTUAL



$\circlearrowleft \sum M_A = 0 \quad H_C \times 3 + 1 \times 4 = 0$

$H_C = -4/3\,kN$

$\sum F_H = 0 \quad H_A = 4/3\,kN$

$\circlearrowleft \sum M_B^{\rightarrow A} = 0 \quad V_C \times 4 + 4/3 \times 3 = 0$

$V_C = -4/4 = -1\,kN \downarrow 0$

$\bar{N}_{AB}(x) = 0 \qquad \bar{N}_{CB}(x) = 0$

$\bar{N}_{AB}(x) = +4/3 \qquad \bar{N}_{CB}(x) = \sqrt{1^2 + (4/3)^2} = 5/3\ (-)\ \text{COMP.}$

$$\delta_{B_N} = \int_0^4 \frac{-320/3 \cdot 4/3}{EA_{AB}}\,dx + \int_0^5 \frac{400/3\,(-5/3)}{EA_{BC}}\,dx$$

$$EA_{AB} = 25\times10^{6}\ kN/m^2 \times 0{,}12m \times 0{,}30m = 900000\ kN$$

$$EA_{BC} = 25\times10^{6}\ kN/m^2 \times \frac{\pi\times(0{,}04m)^2}{4} = 31416\ kN$$

$$\delta_{B_N} = \frac{-5120/3}{900000} + \frac{-8000/9}{31416} = -3{,}59999\times10^{-2}\ m$$

$$\delta_{B_N} = -36{,}000\ mm\ //\quad (Q02)$$

$$\delta_{B_M} = 0\ //\quad (Q01)$$