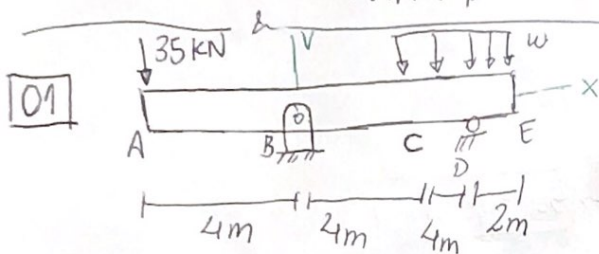
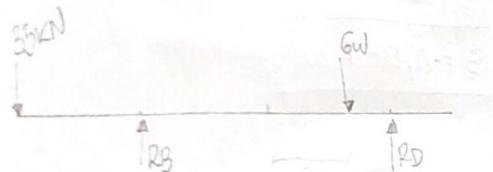


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REAÇÕES DE APOIO



$$\sum F_x = 0 \Rightarrow -35 - 6 \cdot 80 + R_B + R_D = 0$$

$$R_B + R_D = 515 \Rightarrow R_B + 402,5 = 515$$

$$\Rightarrow R_B = 112,5 \text{ kN}$$

$$\sum M_B = 0 \Rightarrow 35 \cdot 4 + R_D \cdot 8 - 6w \cdot 7 = 0 \Rightarrow R_D \cdot 8 = 3220 \Rightarrow R_D = 402,5 \text{ kN}$$

$$V_A = ?$$

$$\theta_D = ?$$

* MÉTODO DA SUPERPOSIÇÃO.

$$I_z = 351 \cdot 10^6 \text{ mm}^4 = 351 \cdot 10^{-6} \text{ m}^4 \quad \left. \begin{array}{l} EI_z = 7,02 \\ \cdot 10^4 \\ \text{ kN/m}^2 \end{array} \right\}$$

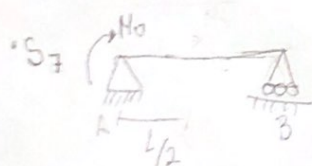
$$E = 200 \text{ GPa} = 200 \cdot 10^6 \text{ kN/m}^2$$

$$w = 80 \text{ kN/m}$$

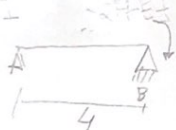
* USANDO A TABELA DE DEFLEXÕES E INCLINAÇÕES

$$E_1: \quad V_B = \frac{PL^3}{3EI}; \quad \theta_B = \frac{PL^2}{2EI} \Rightarrow \text{PARA AB:}$$

$$V_A = \frac{-35 \cdot 4^3}{3 \cdot EI_z} \Rightarrow V_A = -0,0106 \text{ m}$$

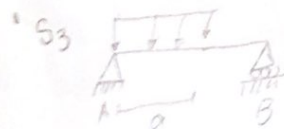


$$\theta_A = \frac{MoL}{3EI} \Rightarrow \text{PARA AB: } \theta_B = \frac{(35 \cdot 4) \cdot 8}{3 \cdot EI_z} \Rightarrow \theta_B = 0,053 \text{ rad}$$

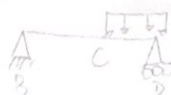


$$\theta_B = \frac{140 \cdot 8}{24 EI_z} \Rightarrow \theta_B =$$

$$* V_A = -4 \cdot \theta_B \Rightarrow V_A = -0,0212 \text{ m}$$



$$\theta_B = \frac{wa^2}{24EI} (2L^2 - a^2) \Rightarrow \text{PARA CD:}$$



$$\theta_B = \frac{80 \cdot 4^2 (2 \cdot 8^2 - 4^2)}{24 \cdot 8 \cdot EI_z}$$

$$\theta_B = 0,0106 \text{ rad}$$

$$* V_A = 4 \cdot \theta_B \Rightarrow V_A = 0,0424 \text{ m}$$

$$* S_7: \quad \theta_B = \frac{MoL}{6EI} \Rightarrow \text{PARA AB: } \theta_B = \frac{160 \cdot 8}{6EI_z} \Rightarrow \theta_B = 0,003 \text{ rad}$$

$$\Rightarrow * V_A = -4 \cdot \theta_B \Rightarrow V_A = -0,012 \text{ m}$$

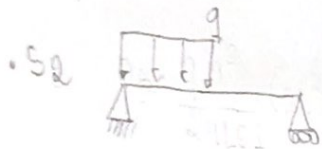
* Pela superposição, o valor de $V_A = -0,0106 - 0,0212 + 0,0424 - 0,012$

$$\Rightarrow V_A = -0,0114 \text{ m} = -1,14 \text{ mm}$$

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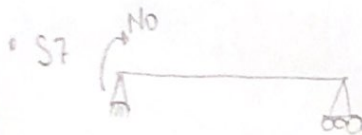
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ROTAÇÃO EM D.



PARA CD

$$\theta_A = \frac{3qL^3}{128EI} = \frac{3 \cdot 80 \cdot 8^3}{128 \cdot EI_2} \Rightarrow \theta_{CD} = 0,0137 \text{ rad}$$

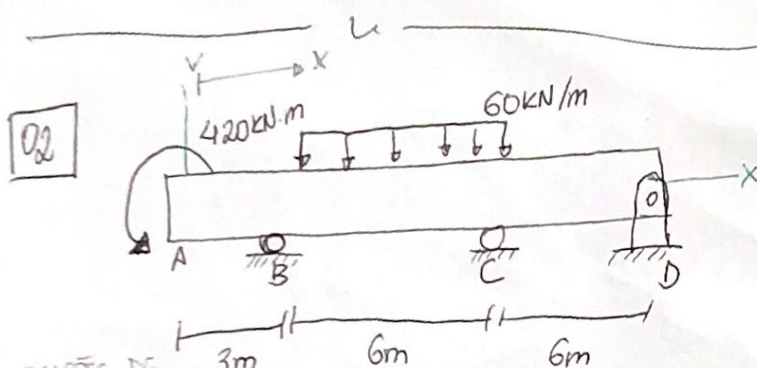


$$\theta_A = \frac{M_0 L}{3EI} = \frac{-160 \cdot 8}{3 \cdot EI_2} \Rightarrow \theta = -0,0061 \text{ rad}$$

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$$\theta_{CD} = 0,0137 - 0,0061 = 0,0076 \text{ rad}$$

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Quais as reações nos apoios.

* MÉTODO DAS FORÇAS

$$I_{BC} = 2EI_z$$

$$I_{AB} = I_{CD} = EI_z$$

REAÇÕES DE APOIO:

$$\sum F_x = 0: R_B + R_C + R_D - 360 = 0$$

$$\sum M_A = 0: 420 - 360 \cdot 3 + R_C \cdot 6 + R_D \cdot 12 = 0 \rightarrow 6R_C + 12R_D = 660$$

2) - $\delta_B(x) = ?$

* E_G:



$$\delta_B = \frac{M_0 L^2}{2EI}$$

$$\delta_B = \frac{M_0 L}{EI} \rightarrow \text{PARA AB}$$