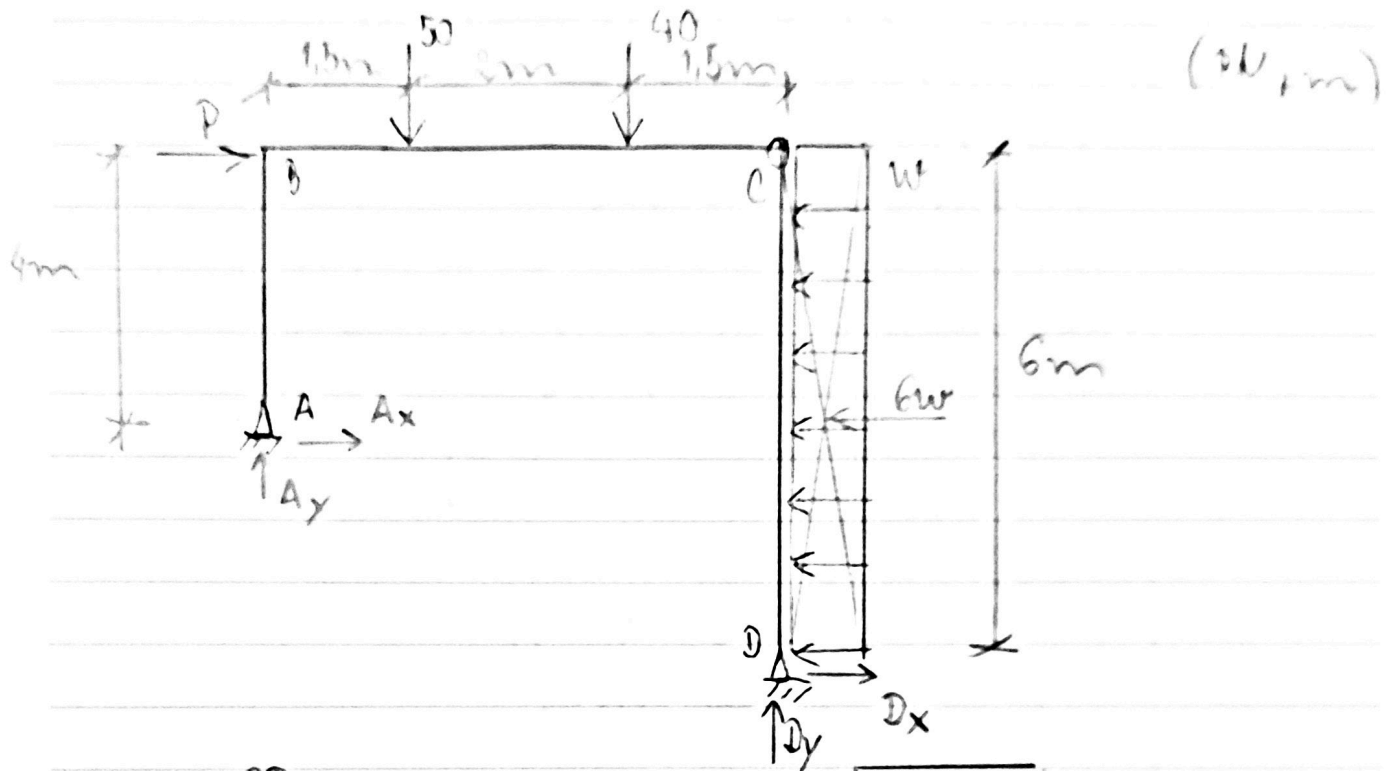


Prova MAC 015

1ª Questão



$$M_C^{CD} = 0 \Rightarrow 6D_x = 18w \Rightarrow \boxed{D_x = 3w}$$

$$\sum F_H = 0 \Rightarrow A_x + D_x = 6w - P \Rightarrow \boxed{A_x = 3w - P}$$

$$\sum M_A = 0 \Rightarrow \begin{matrix} 5D_y & + & 2D_x & + & 6w & = & 40 \times 3.5 & + & 50 \times 1.5 & + & 4P \end{matrix}$$

$\curvearrowright \quad \quad \quad \curvearrowright \quad \quad \quad \curvearrowright \quad \quad \quad \curvearrowright \quad \quad \quad \curvearrowright \quad \quad \quad \curvearrowright$

$$5D_y = 215 + 4P - 6w - 6w = 215 + 4P - 12w$$

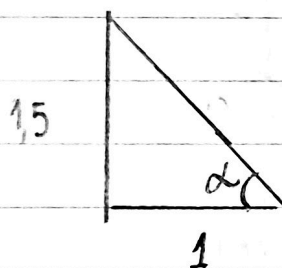
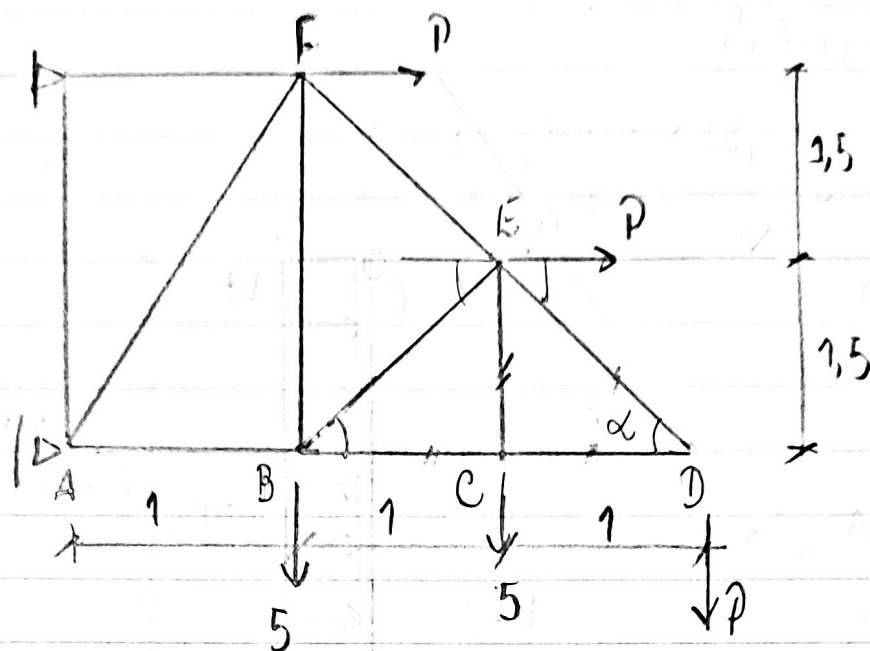
$$\boxed{D_y = 43 + \frac{4P}{5} - \frac{12w}{5}}$$

$$\sum F_V = 0 \Rightarrow A_y + D_y = 90$$

$$\boxed{A_y = 147 - \frac{4P}{5} + \frac{12w}{5}}$$

2ª Questão

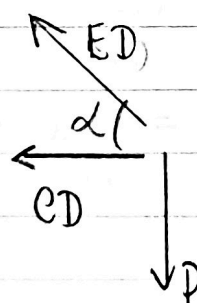
(kN, m)



$$\cos \alpha = 0,5547$$

$$\sin \alpha = 0,832$$

Nó D



$$ED \sin \alpha = P \quad ED = 1,2018P$$

$$ED \cos \alpha + CD = 0$$

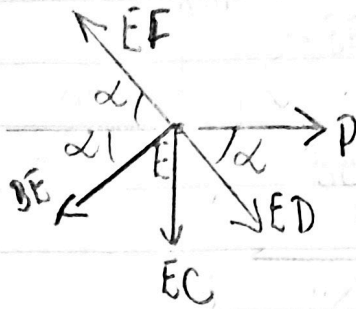
$$CD = -0,6667P$$

Nó E

$$BC = -0,6667P$$

$$EC = 5 \text{ kN}$$

Nº E



$$\sum F_H = 0 \Rightarrow P + ED \cos \alpha = BE \cos \alpha + EF \cos \alpha$$

$$P + 1,2018 P \cos \alpha = BE \cos \alpha + EF \cos \alpha$$

$$P + 0,6667 P = BE \cos \alpha + EF \cos \alpha$$

$$BE \cos \alpha + EF \cos \alpha = +1,6667 P$$

$$\sum F_V = 0 \Rightarrow EF \sin \alpha = EC + BE \sin \alpha + ED \sin \alpha$$

$$EF \sin \alpha = 5 + BE \sin \alpha + P$$

$$BE \sin \alpha - EF \sin \alpha = -5 - P$$

$$\begin{cases} BE + EF = +3,004 P & \times 0,832 \\ 0,832 BE - 0,832 EF = -5 - P \\ 0,832 BE + 0,832 EF = +2,5 P \end{cases}$$

$$1,664 BE = -5 + 1,5 P$$

$$BE = -3,004 + 0,9014 P$$

Respostas:

$$ED = 1,2018 P$$

$$CD = -0,6667 P$$

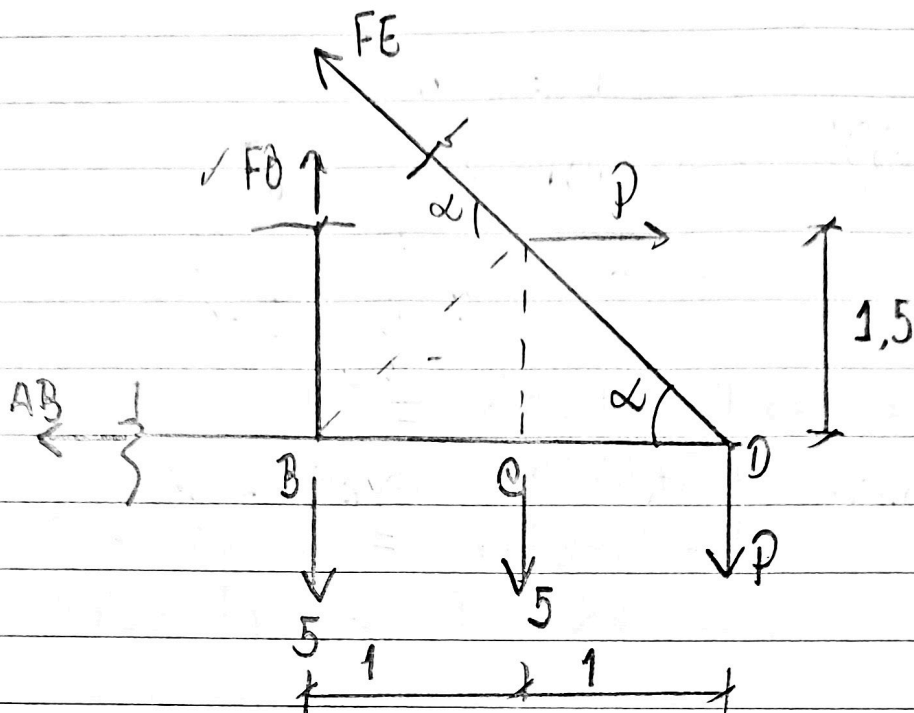
$$BC = -0,6667 P$$

$$EC = 5 \text{ kN}$$

$$BE = -3,004 + 0,9014 P$$

3ª Questão

(RN, m)



$$\sum M_B = 0 \Rightarrow \underbrace{2F_B}_{\curvearrowright} + \underbrace{1,5D}_{\curvearrowright} = \underbrace{5 \times 2}_{\curvearrowleft} + \underbrace{5 \times 1}_{\curvearrowleft} = 15$$

$$2F_B = 15 - 1,5D \Rightarrow F_B = 7,5 - 0,75D$$

$$\sum M_D = 0 \Rightarrow \underbrace{FE \sin \alpha}_{\curvearrowright} + \underbrace{FE \cos \alpha \times 1,5}_{\curvearrowright} = \underbrace{1,5P}_{\curvearrowleft} + \underbrace{2P}_{\curvearrowleft} + \underbrace{5}_{\curvearrowleft}$$

$$FE = \frac{3,5P + 5}{1,6641}$$

$$\sum F_H = 0 \Rightarrow AB = -FE \cos \alpha + P$$

$$AB = -\frac{P}{6} - \frac{5}{3}$$

Respostas :

$$F_B = 7,5 - 0,75D$$

$$FE = 2,1032P + 3,0046$$

$$AB = -\frac{P}{6} - \frac{5}{3}$$