

Exercício 1

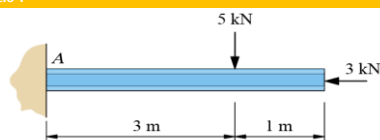


Diagrama de Corpo Livre:

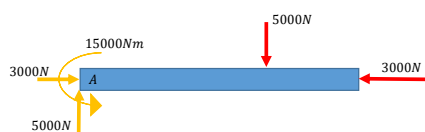


Equilíbrio de Forças:

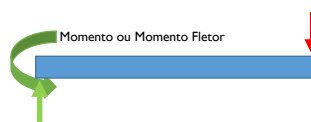
$$\begin{aligned}\sum F_h &= 0 & +\rightarrow & \\ F_x - 3000 &= 0 \\ F_x &= 3000N\end{aligned}\quad \begin{aligned}\sum F_v &= 0 & +\uparrow & \\ +F_y - 5000 &= 0 \\ F_y &= 5000N\end{aligned}$$

Equilíbrio de Momentos e Torques:

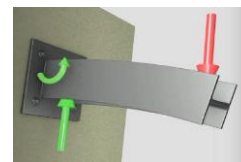
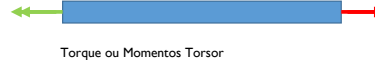
$$\begin{aligned}\sum M_A &= 0 & +\curvearrowright & \\ +M - 5000 \cdot 3 &= 0 \\ M &= 15000Nm\end{aligned}\quad \begin{aligned}\sum T &= 0 & +\rightarrow & \\ +T &= 0Nm\end{aligned}$$



Flexão



Torção



Exercício 2

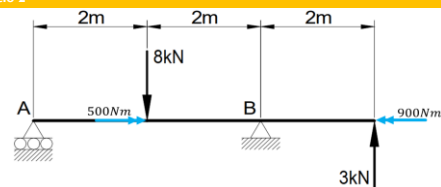
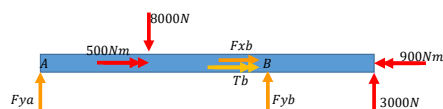


Diagrama de Corpo Livre:



Equilíbrio de Forças:

$$\begin{aligned}\sum F_h &= 0 & +\rightarrow & \\ +F_{xb} &= 0 \\ F_{xb} &= 0N\end{aligned}\quad \begin{aligned}\sum F_v &= 0 & +\uparrow & \\ +F_{ya} - 8000 + F_{yb} + 3000 &= 0 \\ F_{ya} + F_{yb} &= 5000N\end{aligned}\quad \text{Equação 1}$$

Equilíbrio de Momentos:

$$\begin{aligned}\sum M_B &= 0 & +\curvearrowright & \\ +F_{ya} \cdot 4 - 8000 \cdot 2 - 3000 \cdot 2 &= 0 \\ F_{ya} &= 5500N\end{aligned}\quad \begin{aligned}\text{Substituir } F_{ya} \text{ na Equação 1:} \\ 5500 + F_{yb} &= 5000 \\ F_{yb} &= -500N\end{aligned}$$

Equilíbrio de Torques:

$$\begin{aligned}\sum T &= 0 & +\rightarrow & \\ 500 + T_b - 900 &= 0 \\ T_b &= 400Nm\end{aligned}$$

Exercício 3

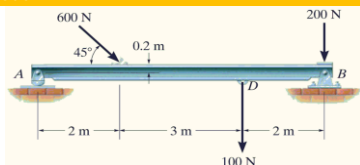
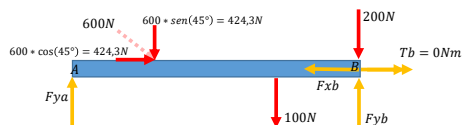


Diagrama de Corpo Livre:



Equilíbrio de Forças:

$$\begin{aligned}\sum F_h &= 0 & +\rightarrow & \\ +424,3 - F_{xb} &= 0 \\ F_{xb} &= 424,3N\end{aligned}\quad \begin{aligned}\sum F_v &= 0 & +\uparrow & \\ +F_{ya} - 424,3 - 100 - 200 + F_{yb} &= 0 \\ F_{ya} + F_{yb} &= 724,3N\end{aligned}\quad \text{Equação 1}$$

Equilíbrio de Momentos:

$$\begin{aligned}\sum M_B &= 0 & +\curvearrowright & \\ +F_{ya} \cdot 7 - 424,3 \cdot 5 + 424,3 \cdot 0,2 - 100 \cdot 2 &= 0 \\ F_{ya} &= 319,5N\end{aligned}\quad \begin{aligned}\text{Substituir } F_{ya} \text{ na Equação 1} \\ 319,5 + F_{yb} &= 724,3 \\ F_{yb} &= 403,8N\end{aligned}$$