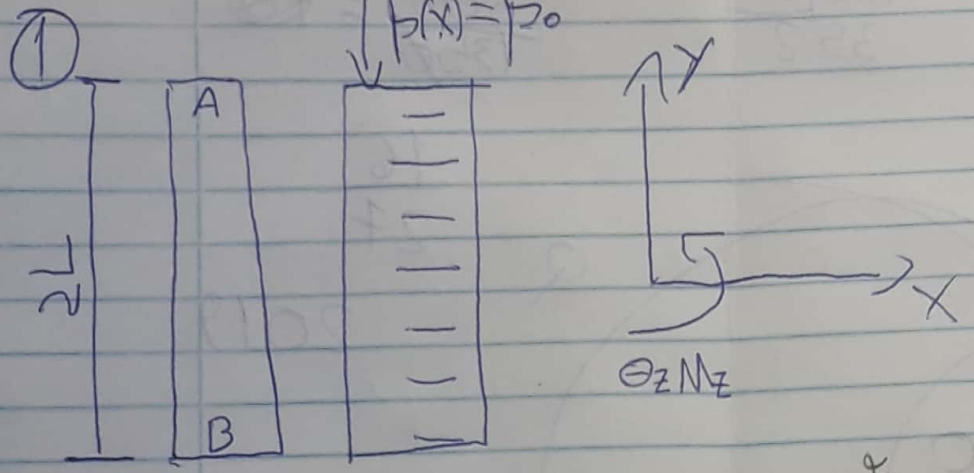
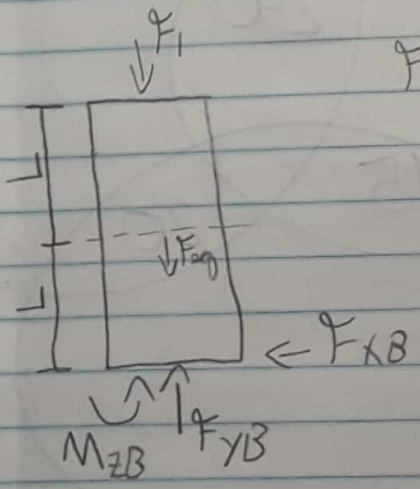
Ex. Recuperação - Parcial - 01



L = 2 m

$p_0 = 5000$ N/m

$F_1 = 8000$ N



$F_{eq} = 2L p_0$

Em X: $\sum F_x = 0$

$F_{xB} = 0$

Em Y: $\sum F_y = 0$

$F_{yB} - F_{eq} - F_1 = 0$

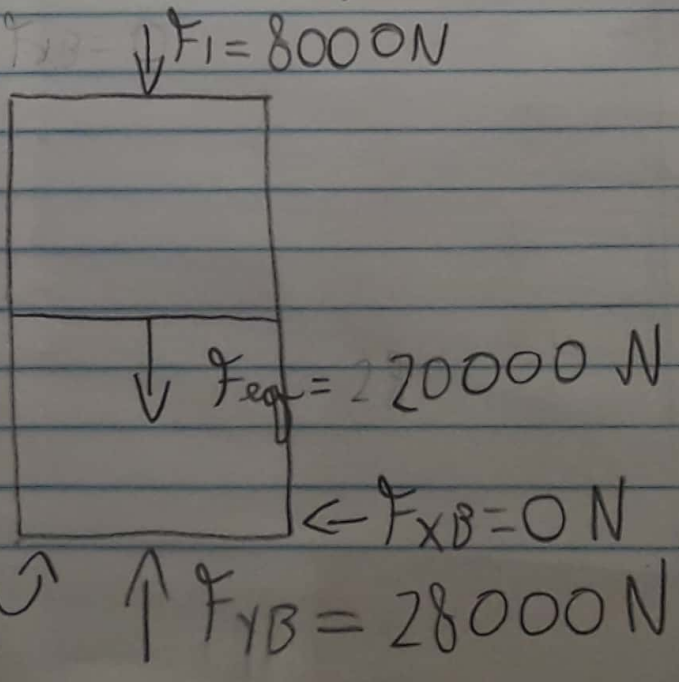
$F_{yB} = F_1 + p_0 . 2L$

$F_{yB} = F_1 + p_0 . 2L = 8000 + 2.2.5000$

Em Z: $\sum M_z = 0$

$M_{zB} = 0$

$F_{yB} = 28000$ N

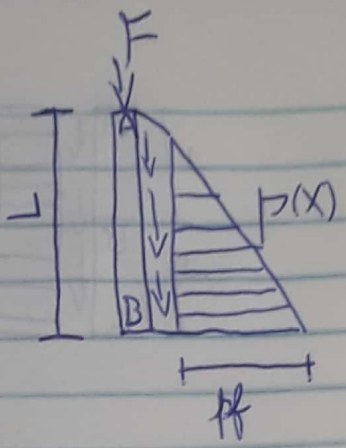


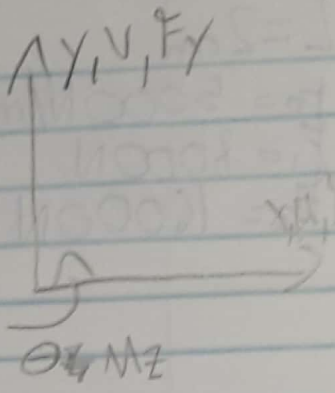
Ex_Resposta_Axial_02

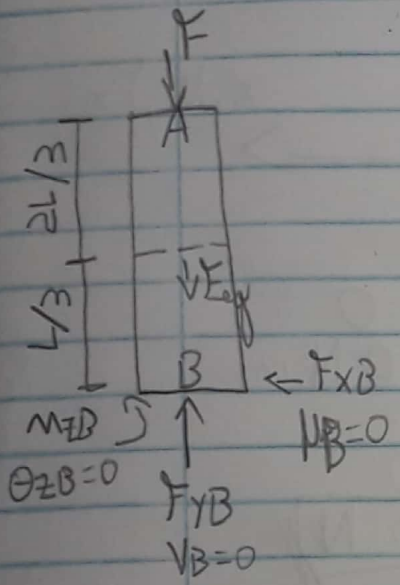
② $L = 3m$

$F = 2000N$

$p_f = 1000N/m$







$F_{eq} = \frac{1}{2} L p_f = \frac{1}{2} \cdot 3 \cdot 1000 \Rightarrow \boxed{F_{eq} = 1500N}$

Em X: $\sum F_x = 0 \rightarrow \boxed{F_{xB} = 0}$

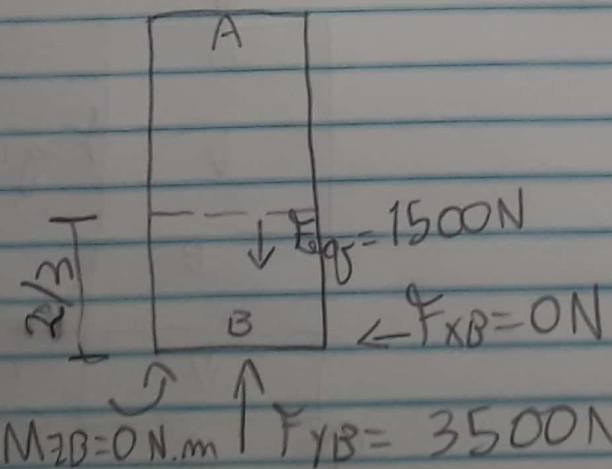
Em Y: $\sum F_y = 0$

$F_{yB} - F_{eq} - F = 0$

$F_{yB} = F_{eq} + F = 1500 + 2000$

$\boxed{F_{yB} = 3500\ N}$

Em Z: $\sum M_z = 0$ $\boxed{M_z = 0\ N.m}$



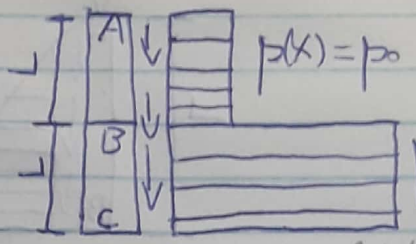
Ex_ReCapa_Axial_04

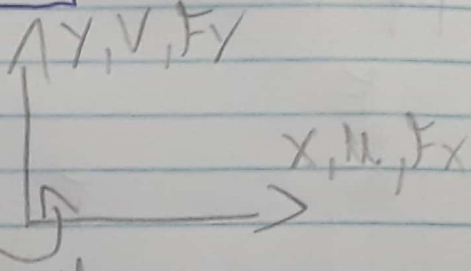
$L = 2\,m$

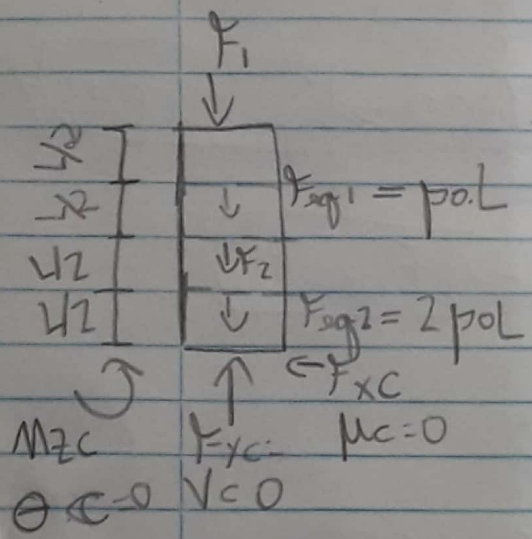
$p_0 = 5000\,N/m$

$F_1 = 8000\,N$

$F_2 = 16000\,N$







$\Sigma m_z \Rightarrow \Sigma M_{zc} = 0$

$M_{zc} = 0\ N.m$

$\Sigma m_x \Rightarrow \Sigma F_x = 0$

$\boxed{F_{xc} = 0\ N}$

$\Sigma m_y \Rightarrow \Sigma F_y = 0$

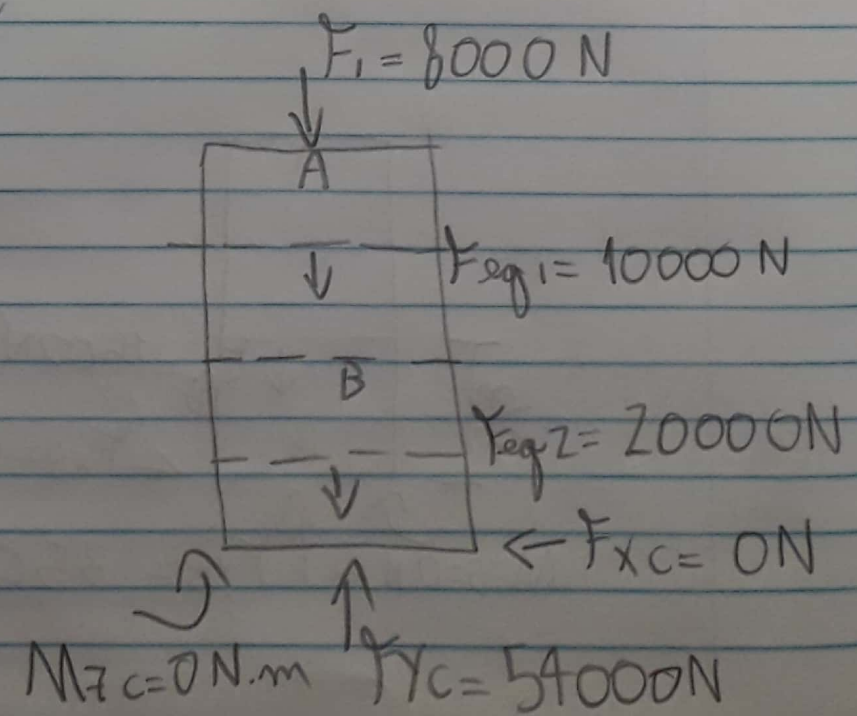
$F_{yc} = F_1 + F_2 + F_{eq1} + F_{eq2}$

$F_{eq1} = 5000 \cdot 2 = 10000\ N$

$F_{eq2} = 2 \cdot 2 \cdot 5000 = 20000\ N$

$F_{yc} = 8000 + 16000 + 20000 + 10000$

$\boxed{F_{yc} = 54000\ N}$

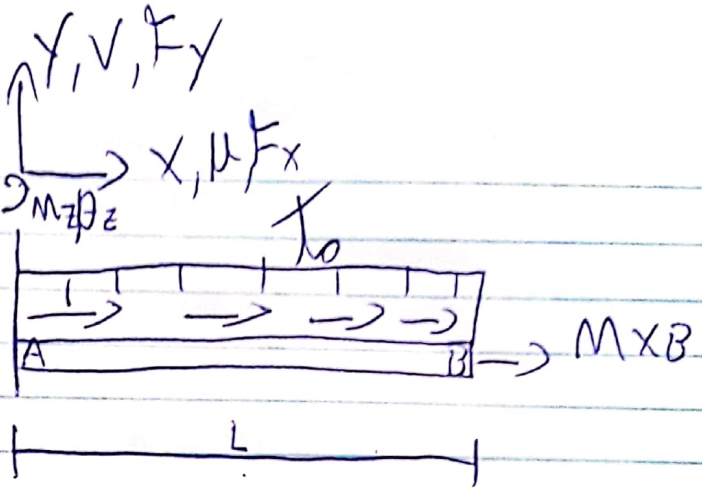


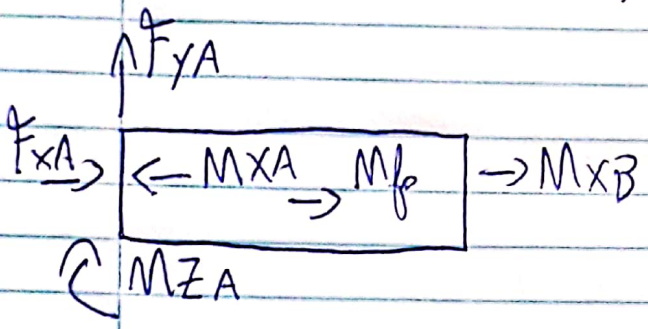
Ex_Recíproco_Torção_01

$L = 1\ m$

$t_0 = 1500\ N.m/m$

$M_{XB} = 2000\ N.m$





~~$\Sigma m_Z : \Sigma F_y =$~~

$\Sigma m_Z : \Sigma M_Z = 0$

$M_{ZA} = 0\ N.m$

$\Sigma m_Y : \Sigma F_y = 0$

$F_{ya} = 0\ N$

$\Sigma m_X : \Sigma F_x = 0$

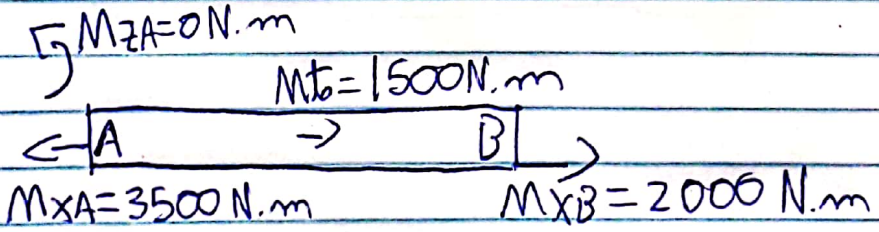
$F_{XA} = 0$

$\Sigma M_X = 0$

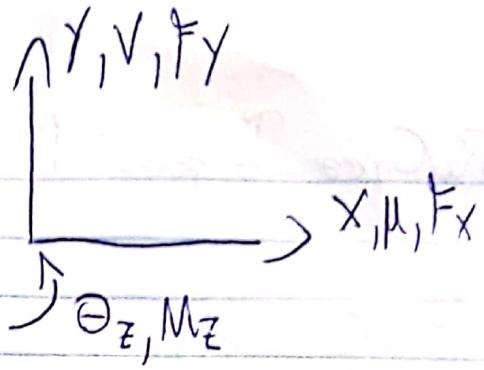
$M_{t_0} + M_{XB} - M_{XA} = 0$

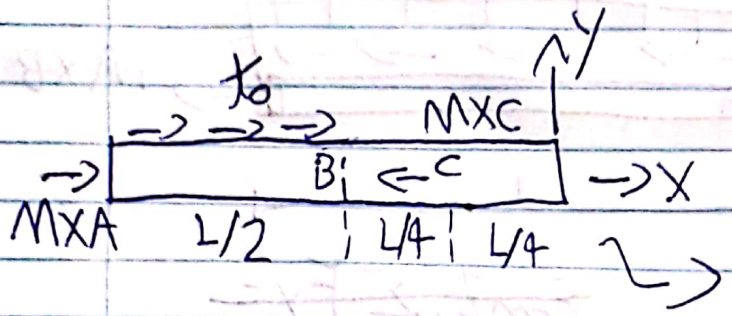
$M_{XA} = M_{t_0} + M_{XB} = 2000 + 1500$

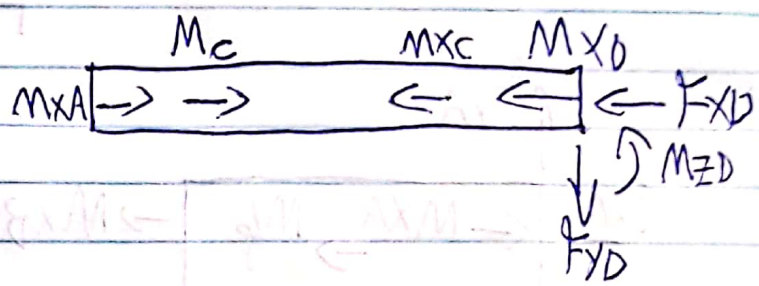
$M_{XA} = 3500\ N.m$



Ex_ReCapoio_Torção_03







Em Z: $\Sigma M_z = 0$

$M_{ZD} = 0\ N.m$

Em Y: $\Sigma F_y = 0$

$F_{YD} = 0\ N$

Em X: $\Sigma F_x = 0$

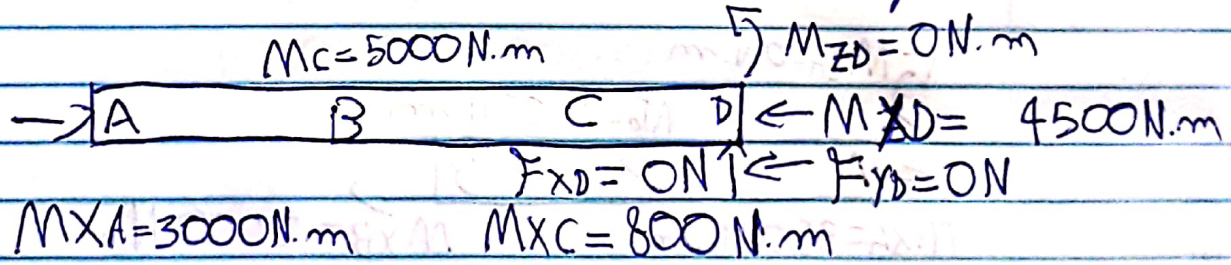
$F_{XD} = 0\ N$

$\Sigma M_X = 0$

$M_{XA} + M_C - M_{XC} - M_{XD} = 0$

$M_{XD} = M_{XA} - M_{XC} + \frac{to.L}{2}$

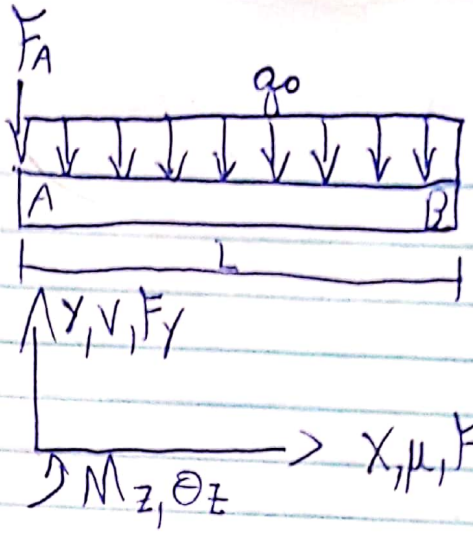
$M_{XD} = 4500\ N.m$



$M_{XA} = 3000\ N.m$

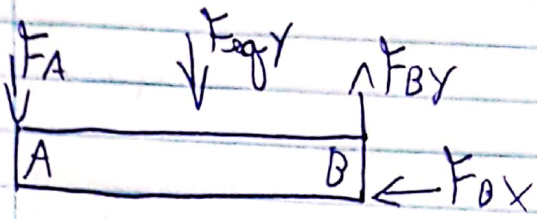
$M_{XC} = 800\ N.m$

Exc_Recapeio_Flexão_01



$L = 3\,m \quad F_A = 15000\,N$

$q_0 = 8000\,N/m$



Em X: $\Sigma F_X = 0 \rightarrow \boxed{F_{BX} = 0\,N}$

Em Y: $\Sigma F_Y = 0 \rightarrow -F_A - F_{eqY} + F_{BY} = 0$

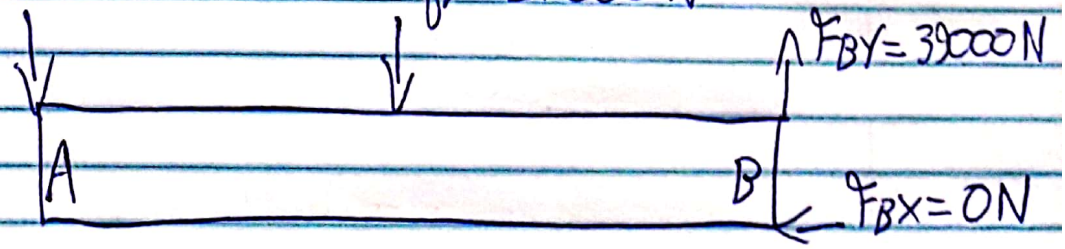
$F_{BY} = F_A + q.L = 15000 + 24000 \rightarrow \boxed{F_{BY} = 39000\,N}$

Em Z: $\Sigma M_Z = 0 \rightarrow L.F_A + \frac{L}{2}.F_{eqY} + M_{ZB} = 0$

$M_{ZB} = -L.F_A - \frac{L}{2}.F_{eqY} = -81000\,N.m$

$\boxed{M_{ZB} = -81000\,N.m}$

$F_A = 15000\,N \qquad F_{eqY} = 24000\,N$



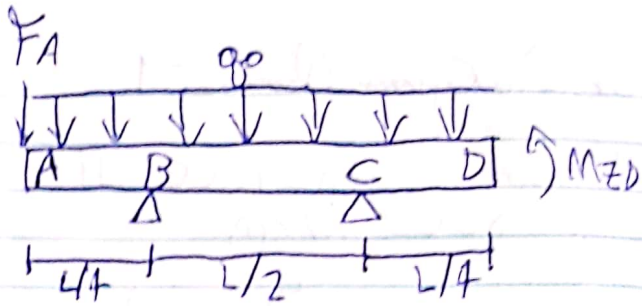
~~$M_{ZB} = 81000N$~~

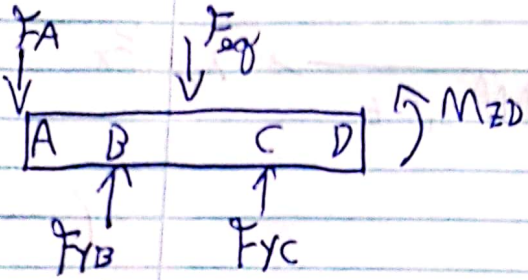
$M_{ZB} = 81000\,N.m$

Exc - Reações - Flexão - 05

$L = 3m \quad q_p = 8000\ N/m$

$F_A = 12000\ N \quad M_{ZD} = 15000\ N.m$





Em X: $\sum F_X = 0 \rightarrow \boxed{F_{XC} = 0\ N}$

Em Y: $\sum F_Y = 0$

$-F_A + F_{YB} - F_{eq} + F_{YC} = 0$

$F_{YC} = F_A + F_{eq} - F_{YB}$

Em Z: $\sum M_Z = 0$

$M_{ZD} = F_{YC} \cdot \frac{L}{4} - F_{eqY} \cdot \frac{L}{2} + F_{YB} \cdot \frac{3L}{4} - F_A \cdot L$

$F_{YC} = 4\left(\frac{M_{ZD}}{L} + q \cdot \frac{L}{2} - F_{YB} \cdot \frac{3}{4} + F_A\right) = 4\left(\frac{15000}{3} + \frac{8000.3}{2}\right)$

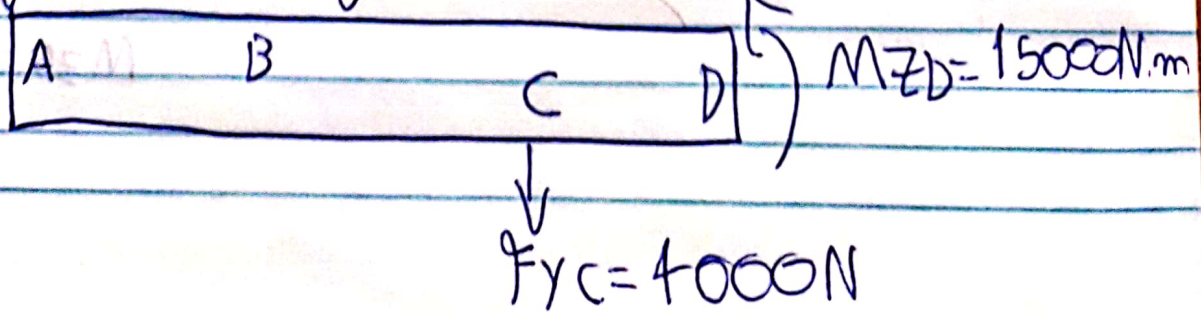
$F_A + F_{eq} - F_{YB} = 4\left(\frac{M_{ZD}}{2} + q \cdot \frac{L}{2} - F_{YB} \cdot \frac{3}{4} + F_A\right)$

$12000 + 8000.3 - F_{YB} = 4\left(\frac{15000}{3} + \frac{8000.3}{2} - \frac{F_{YB}.3}{4} + 12000\right)$

$\boxed{F_{YB} = 40000\ N}$ $\quad F_{YC} = 12000 - 40000 + 3.8000$

$\boxed{F_{YC} = -4000\ N}$

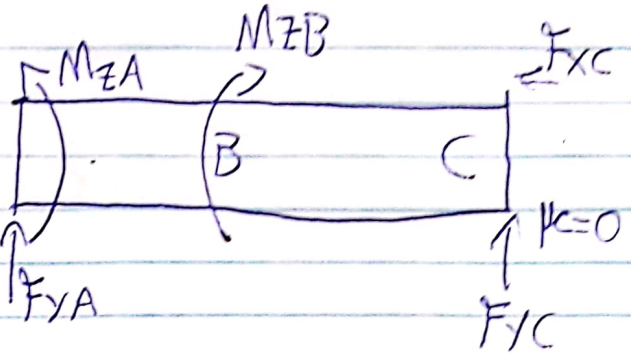
$F_A = 12000N \quad F_{eq} = 24000N$



$F_{YC} = 4000N$

Ex_ReCurso_Eixão_02

L=2m MBA= 5000N.m



Em X: $\sum F_x = 0 \rightarrow \boxed{F_{xc} = 0N}$

Em Y: $\sum F_y = 0 \rightarrow F_{yA} + F_{yc} = 0$

Em Z: $\sum M_z = 0 \rightarrow \boxed{M_{zA} = 0\ N.m}$
Ponto A

$-M_{zB} + F_{yc} \cdot L = 0 \rightarrow F_{yc} = \frac{M_{zB}}{L} = \frac{M_{BA}}{L} = \frac{5000}{2}$

$\boxed{F_{yc} = 2500N}$

$\rightarrow F_{yA} = -F_{yc} \rightarrow \boxed{F_{yA} = -2500N}$