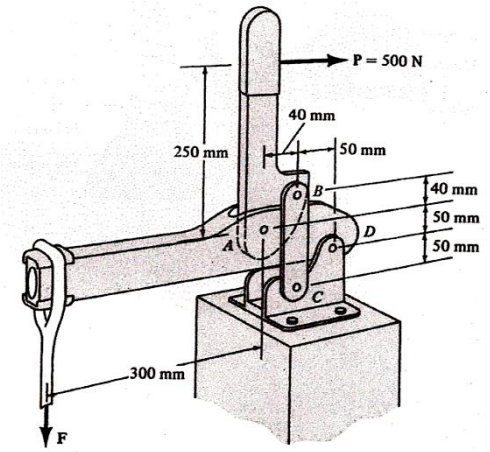
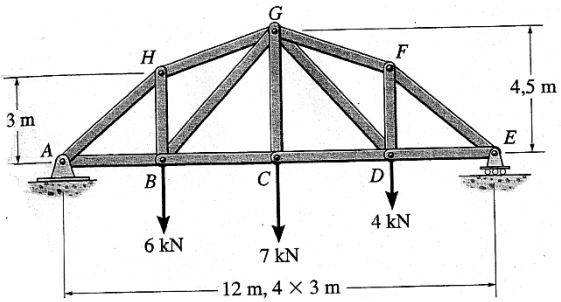
UFF – INSTITUTO DE FÍSICA
Tópicos de Física I – GFI 00.012
Prof. Cary Cassiano
2ª VE – 24/05/2012 – Turma O5

Nome: GABARITO

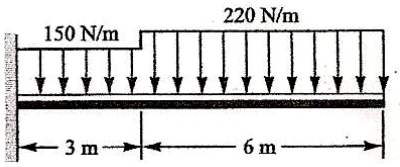
1. (2,5p) Se uma força *P* = 500 N é aplicada perpendicularmente ao punho do mecanismo, determine o módulo da força **F** para que haja equilíbrio.



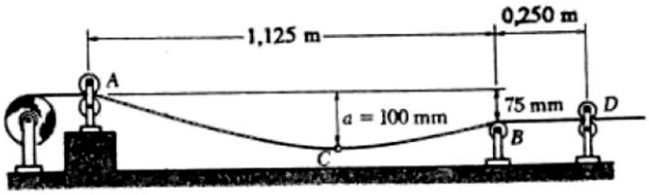
2. (2,5p) Determine as forças nos elementos *BG* e *HG* da treliça e indique se eles estão sob efeito de tração ou compressão.



3. (2,5p) Para a viga e carregamento mostrados, trace os diagramas da força cortante e do momento de flexão.



4. (2,5p) Antes de entrar em uma impressora à direita do ponto D, uma folha contínua de papel, com massa de 0,30 quilogramas por unidade de comprimento, passa sobre os rolos em A e B. Supondo que a curva formada pela folha seja parabólica, determine: (a) a posição do ponto mais baixo C; (b) a tração máxima na folha.



FORMULÁRIO:

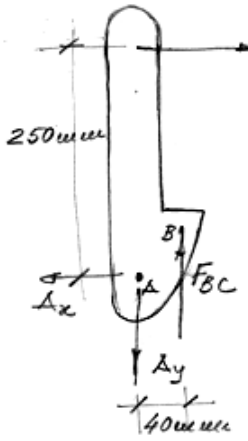
$$T = \sqrt{T_0^2 + \omega^2 \cdot x^2}$$

$$y = \frac{\omega}{2T_0} x^2$$

$$s_{A,B} = x_{A,B}\left[1 + \frac{2}{3}\left(\frac{y_{A,B}}{x_{A,B}}\right)^2\right]$$

g = 9,81 m/s²

1. (2,5p)



$\circlearrowleft^{+} \Sigma M_A = 0$

$F_{BC} \times 40 = 500 \times 250$

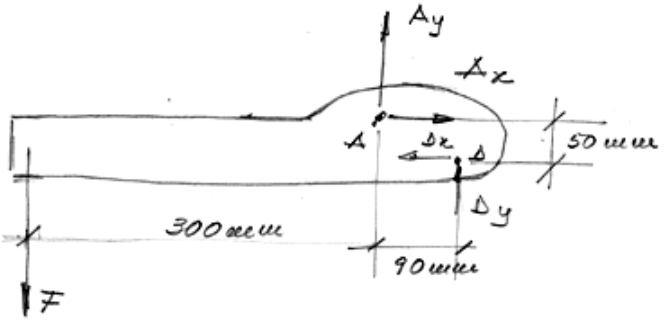
$F_{BC} = 3125N\ (T)$

$\Sigma F_y = 0$

$A_y = F_{BC}$ $\quad A_y = 3125N$

$\Sigma F_x = 0$

$A_x = P$ $\quad A_x = 500N$

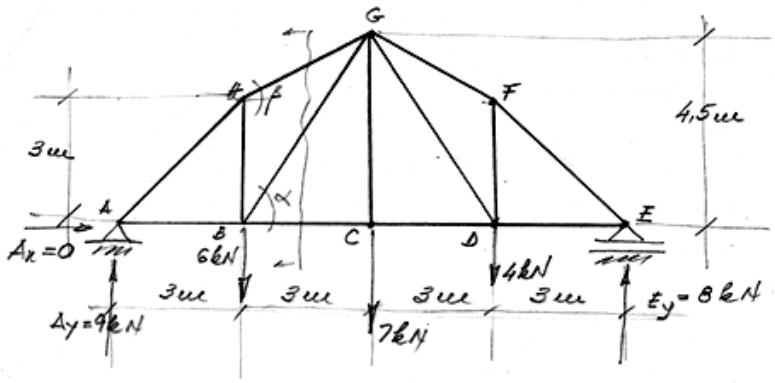


$\circlearrowleft^{+} \Sigma M_D = 0$

$F \times 390 - A_x \times 50 - A_y \times 90 = 0$

$F = 785,26\ N$

2. (2,5p)



$(+\Sigma M_E = 0$

$A_y \times 12 - 6\times 9 - 7\times 6 - 4\times 3 = 0$

$A_y = 9kN\uparrow$ 0,25

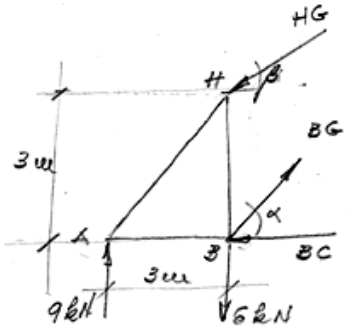
$+\uparrow \Sigma F_y = 0$

$A_y + E_y = 17$

$E_y = 8kN\uparrow$ 0,25

$tg\beta = \frac{1,5}{3}$ $\beta = 26,57°$

$tg\alpha = \frac{4,5}{3}$ $\alpha = 56,31°$



$(+\Sigma M_B = 0$

$HG\cos\beta \times 3 - 9\times 3 = 0$

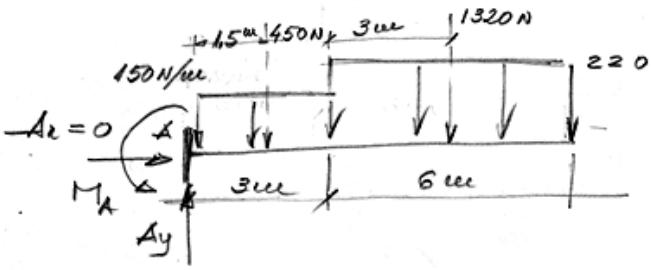
$HG = 10,06\ kN\ (C)$ 0,75

$+\uparrow \Sigma F_y = 0$

$9 - HG\sin\beta + BG\sin\alpha - 6 = 0$

$BG = 1,80\ kN\ (T)$ 0,75

3. (2,5p)



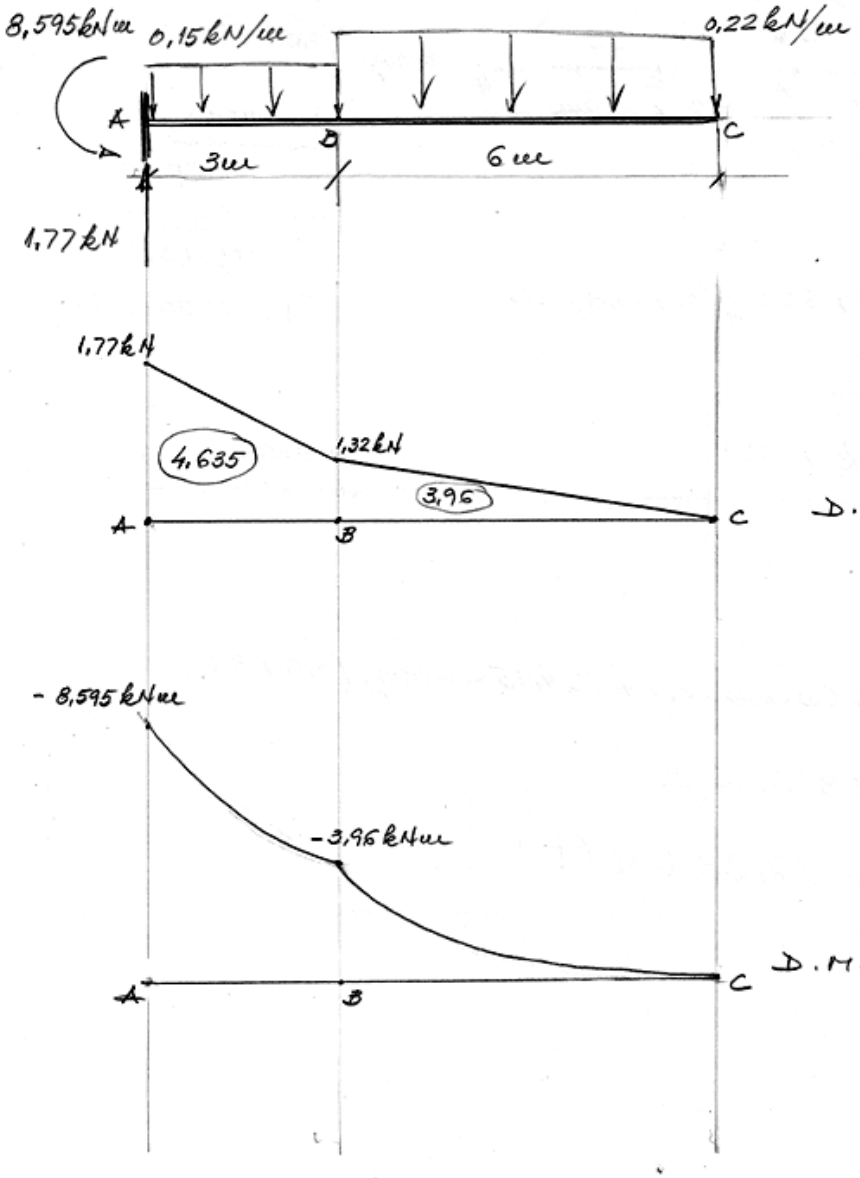
$\uparrow \Sigma F_y = 0$

$A_y = 1770\,N \uparrow$

$\Sigma M_A = 0$

$M_A - 450 \times 1{,}5 - 1320 \times 6 = 0$

$M_A = 8595\,N\,m$ ↻



$M_A = -8{,}595\,kN\,m$

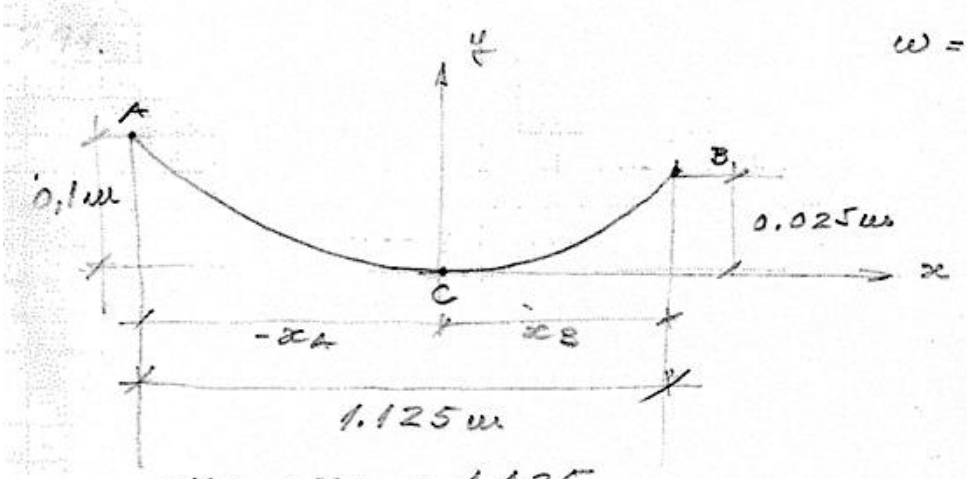
$M_B - M_A = 4{,}635$

$M_B = -3{,}96\,kN.m$

$M_C - M_B = 3{,}96$

$M_C = 0$

4. (2,5p)



$\omega = 0{,}3g\ N/m$

$-x_A + x_B = 1{,}125$

$x_A = x_B - 1{,}125$

PONTO A -

$y_A = \frac{\omega x_A^2}{2T_0}$ $\qquad 0{,}1 = \frac{0{,}3g(x_B - 1{,}125)^2}{2T_0}$ $\qquad (1)$

PONTO B $\quad y_B = \frac{\omega x_B^2}{2T_0}$ $\qquad 0{,}025 = \frac{0{,}3g\,(x_B)^2}{2T_0}$ $\qquad (2)$

$\frac{(2)}{(1)} \Rightarrow \quad 0{,}25 = \frac{x_B^2}{(x_B - 1{,}125)^2}$

$0{,}25(x_B - 1{,}125)^2 = x_B^2$ $\qquad 0{,}75x_B^2 + 0{,}56x_B - 0{,}32 = 0$

$x_B = 0{,}375\ m$

$0{,}025 = \frac{0{,}3g \cdot 0{,}375^2}{2T_0}$ $\qquad T_0 = 8{,}277\ N$

$T_{max} = \sqrt{T_0^2 + \omega^2 x_A^2}$

$T_{max} = \sqrt{8{,}277^2 + (0{,}3g)^2 \cdot 0{,}75^2}$

$T_{max} = 8{,}57\ N$