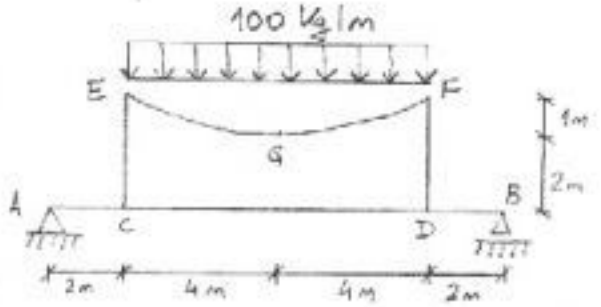
RESISTENCIA DE MATERIALES 1-N — PLAN 97

SOLUCIÓN EXAMEN JULIO 2009 — 30/07/2009

EJERCICIO 1



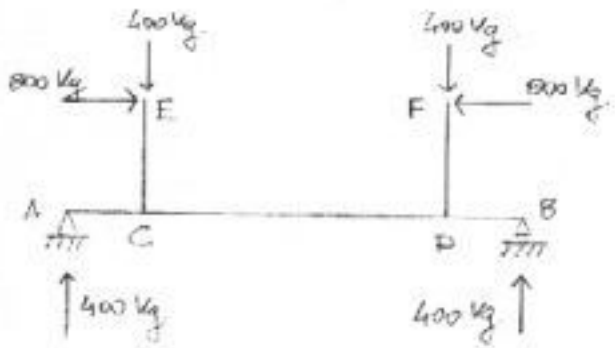
$$f_G = \frac{P L^2}{8H} \Rightarrow H = \frac{P L^2}{8 f_G} = \frac{100\ 8^2}{8 \cdot 1} = 800$$

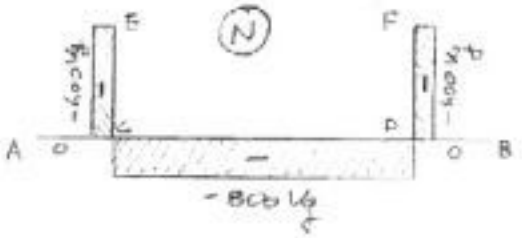
$$\Rightarrow \underline{H = 800\ Kg}$$

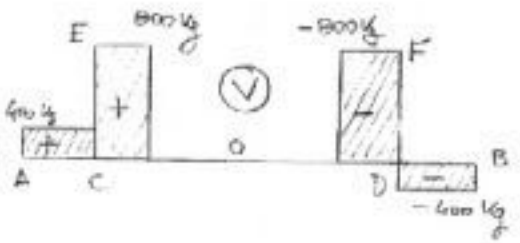
$$V_E = V_F = \frac{100\ 8}{2} = 400\ Kg$$

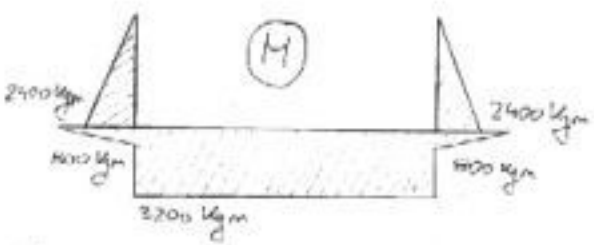
$$\Rightarrow T_{max} = \sqrt{800^2 + 400^2} = 894{,}4\ Kg$$

$$\Rightarrow \boxed{T_{max} = 894{,}4\ Kg}$$ Se produce en los anclajes E y F





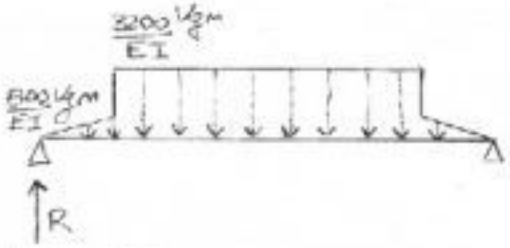




$$\sigma = \frac{M}{WJ} \leq 1400\ \frac{Kg}{cm^2} \Rightarrow WJ \geq \frac{3200\ 100}{1400} = 228{,}6\ cm^3$$

$$\Rightarrow$$ Se adopta un $\underline{PNI\ 22}$

Verificación de la flecha - por analogía ↓ MOHR



$$R = \frac{1}{2}\left[\frac{800}{EI} 2 + 3200\ 8\right] = \frac{13600}{EI}\ Kg\,m^2$$

$$M = \frac{13600}{EI} 6 - \frac{800}{EI}\frac{2}{2}\left(\frac{2}{3}+4\right) - \frac{3200}{EI} 4 \cdot 2 = \frac{52267}{EI}\ Kg\,m^3$$

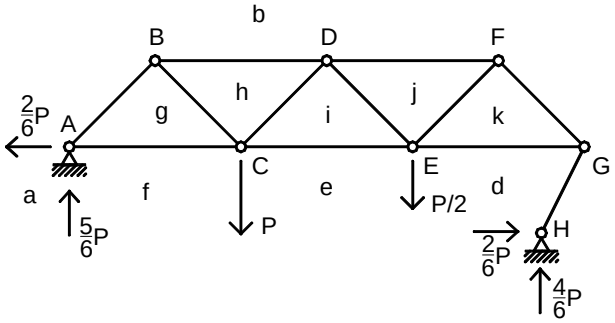
$$\Rightarrow f \leq \frac{L}{250} = \frac{1200}{250} = 4{,}8\ cm = \frac{52267\ Kg\ 100^3}{EI}$$

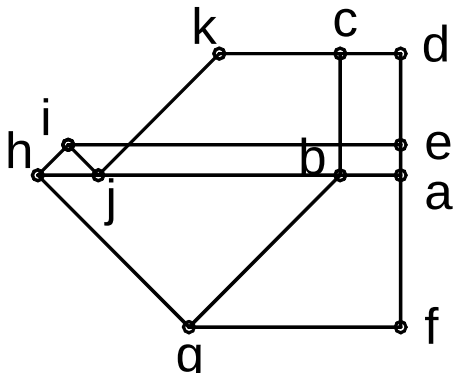
$$\Rightarrow \underline{I \geq \frac{52267 \cdot 100^3}{2100000 \cdot 4{,}8} = 5185\ cm^4}$$

$$\Rightarrow$$ Se adopta un PNI 26

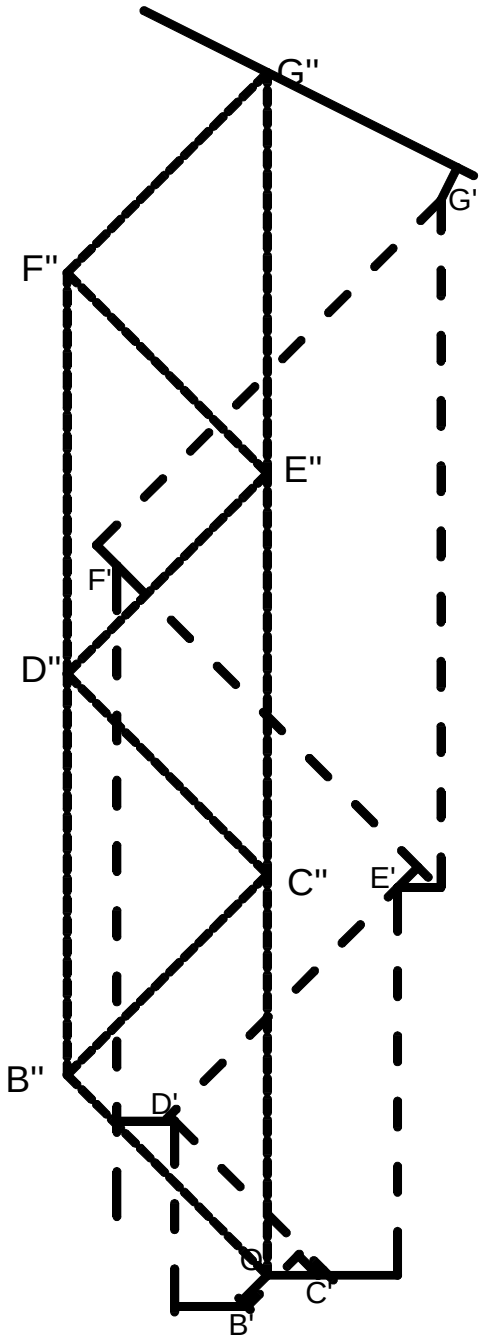
Solución Examen de Resistencia de Materiales 1 (P97) - 30/07/2009

Ejercicio 2



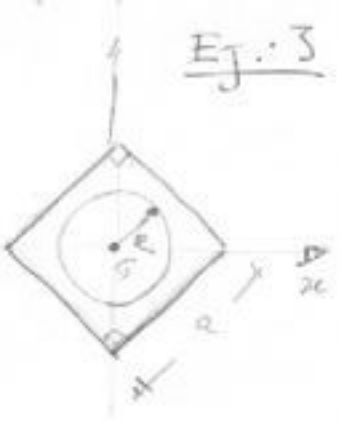


Barra	Fuerza	signo	largo	Δl
AB	1,18	comp	1,41	1,67
AC	1,17	tracc	2,00	2,34
BC	1,18	tracc	1,41	1,67
CD	0,24	tracc	1,41	0,34
BD	1,67	comp	2,00	3,34
CE	1,83	tracc	2,00	3,66
DE	0,24	comp	1,41	0,34
DF	1,33	comp	2,00	2,66
EF	0,94	tracc	1,41	1,33
EG	1	tracc	2,00	2,00
FG	0,94	comp	1,41	1,33
HG	0.75	comp	2.24	1.68



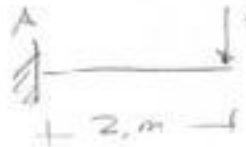
Punto	δx	δy
A	0	0
B	8,3	-10,7
C	2,3	-18,4
D	5,0000	-20,6
E	6	-19,1
F	2,3	-13,5
G	8	-5,9

Ej.: 3



Cuadrado circulo: todos los ejes baricéntricos son principales y con = inercia

$$I_{\diamond} = \frac{a^4}{12} - \frac{\pi R^4}{4} = \frac{0.8a^4}{12} \Rightarrow R = 0{,}38a$$



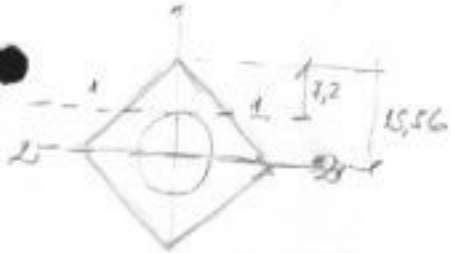
$$\sigma_{max} = \frac{M}{W} = \frac{200 \times 500{,}\times a\sqrt{2}/2}{0.8a^4/12} = 100\ kg/cm^2 \Rightarrow a = 22cm$$

M_{max} en A $= 2P$

$I = 15617\ cm^4$

$\Omega = 266{,}2\ cm^2$

$R = 8{,}36m$

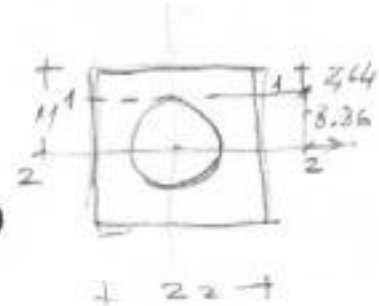


$$\tau = \frac{V\Omega}{Ib}$$

$$\tau_{11} = \frac{500}{15617 \times 14{,}4} \times 7{,}2^2 \left(15{,}56 - 7{,}2\tfrac{1}{3}\right) = 1{,}2\ kg/cm^2$$

$b_1 = 7{,}2 \times 2 = 14{,}4cm$ $\quad b_2 = 22\sqrt{2} - 8{,}36 \times 2 = 14{,}4$

$$\tau_{22} = \frac{500}{15.617 \times 14{,}4} \times \left[15{,}56^2 \cdot \frac{15{,}56}{3} - \frac{\pi \cdot 8.36^2}{2} \times \frac{4}{3\pi} \times 8{,}36\right] = 1{,}9\ kg/cm^2$$

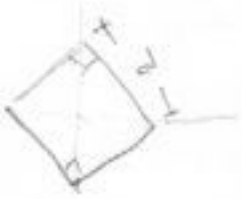


$$\sigma = \frac{P \times 200 \times 11}{15617} = 100\ kg/cm^2 \Rightarrow P_{max} = 710\ kg$$

$b_1 = 22cm$ $\quad b_2 = 22 - 8{,}36 \times 2 = 5{,}28cm$

$$\tau_{11} = \frac{710}{15617 \times 22} \times 22 \times 2{,}64 \times (11 - 1{,}32) = 1{,}2\ kg/cm^2$$

$$\tau_{22} = \frac{710}{15617 \times 5{,}28} \left(22 \times 11 \times 5{,}5 - \frac{\pi \times 8{,}36^2}{2} \cdot \frac{4}{3\pi} 8{,}36\right] = 8{,}1\ kg/cm^2$$



$$d^2 = 266{,}2cm^2 \Rightarrow d = 16{,}3cm$$

$$\sigma_1 = \frac{P \times 200 \times 16.3\sqrt{2}/2}{16{,}3^4/12} = 100\ kg/cm^2 \Rightarrow P = 255\ kg$$