

Datos:
 $E = 210 \cdot 10^6 \text{ Pa}$
 $V = 0.3$
 $L = (A/100) + 4 = 4.48 \text{ m}$
 $A_{\text{area}} = 54.3 \text{ cm}^2$
 $M = 2490 \text{ m}^4 \text{ (HEB) } 160$
 $P = B/100 = 7.39$

1. Calculo de reacciones

Estabilidad $m: 7 \rightarrow R = 3 \rightarrow$ Isostática externa
 $b = 11 \rightarrow 2n - 3 = b$ Isostática interna
 $R = 3$

$$\sum F_x = 0 \rightarrow A_y - B_x = 0 \rightarrow A_y = B_x \rightarrow A_y = 14.78$$

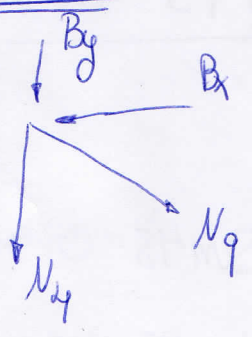
$$\sum F_y = 0 \rightarrow B_y + 2P + P = 0 \rightarrow B_y = -3P \rightarrow B_y = -3 \cdot 7.39 \rightarrow -22.17$$

$$\sum M_i = 0 \rightarrow B_x \cdot 2L - 2P \cdot L - P \cdot 2L \rightarrow B_x \cdot 2 \cdot 4.48 - 2 \cdot 7.39 \cdot 4.48 - 7.39 \cdot 2 \cdot 4.48$$

$$\rightarrow 8.96 B_x - 66.21 - 66.21 \rightarrow B_x = 14.78$$

2° Calculo de esfuerzos

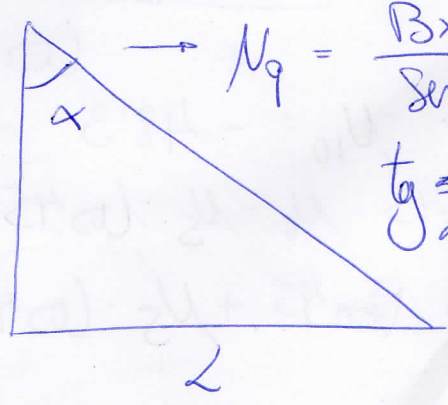
Nudo 2.



$$\sum F_x = 0 \rightarrow N_9 \cdot \text{Sen } 45^\circ - B_x = 0 \rightarrow$$

$$N_9 = \frac{B_x}{\text{Sen } 45} = \frac{14.78}{\text{Sen } 45} = 20.90$$

$$\text{tg } \frac{\alpha}{2} = \text{tg } 1 \rightarrow 45^\circ$$

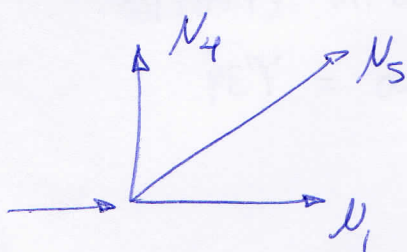


$$\sum F_y = 0 \rightarrow N_4 + B_y + N_9 \cdot \cos \alpha = 0 \rightarrow N_4 = -N_9 \cos \alpha - B_y$$

$$\rightarrow N_4 = -20'9 \cdot \cos 45 + 22'17 \rightarrow$$

$$\boxed{N_4 = 36'95}$$

Nudo 1



$$\tan \beta = \tan 45 \rightarrow 45^\circ$$

$$\sum F_x = 0 \rightarrow A_y + N_5 \cdot \cos \beta = 0 \rightarrow$$

$$\sum F_y = 0 \rightarrow N_4 + N_5 \cdot \sin \beta = 0$$

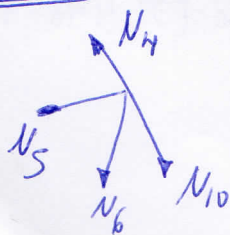
$$\rightarrow N_5 = \frac{N_4}{\sin \beta} = \frac{36'95}{\sin 45} = \boxed{52'25}$$

$$N_1 = -N_5 \cdot \cos \beta - A_y \rightarrow$$

$$\rightarrow -52'25 \cdot \cos 45 - 14'78 \rightarrow$$

$$\boxed{N_1 = -51'72}$$

Nudo 10



$$\sum F_x = 0 \rightarrow N_{10} \cdot \cos 45 + N_5 \cdot \sin 45 + N_4 \cdot \cos 45 = 0$$

$$\rightarrow N_{10} = \frac{-N_5 \sin 45 + N_4 \cdot \cos 45}{\cos 45} \rightarrow$$

$$\rightarrow \frac{-52'25 \cdot \sin 45 + 36'95 \cdot \cos 45}{\cos 45} \rightarrow$$

$$\rightarrow N_{10} = -48'3$$

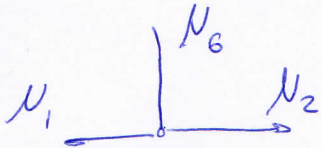
$$\sum F_y = 0 \rightarrow N_4 \cdot \sin 45 - N_6 - N_5 \cdot \cos 45 - N_{10} \cdot \sin 45 = 0 \rightarrow$$

$$\rightarrow N_6 = -N_4 \cdot \sin 45 + N_5 \cdot \cos 45 + N_{10} \cdot \sin 45 \rightarrow$$

$$N_6 = -36'95 \cdot \sin 45 + 52 \cdot \cos 45 - 48'3 \cdot \sin 45 \rightarrow$$

$$\rightarrow \boxed{N_6 = -23'33}$$

Nudo 3

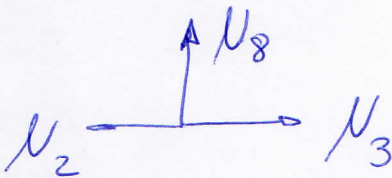


$$\sum F_x = 0 \rightarrow N_1 - N_2 = 0 \rightarrow$$

$$\rightarrow N_1 = N_2$$

$$\hookrightarrow N_1 = N_2 \rightarrow -51'72$$

Nudo 5

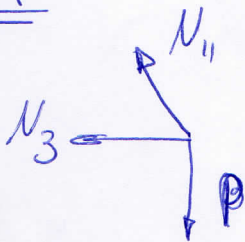


$$\sum F_x = 0 \rightarrow N_2 - N_3 = 0 \rightarrow$$

$$\hookrightarrow N_3 = N_2 \rightarrow -51'72$$

$$\sum F_y = 0 \rightarrow N_8 = 0$$

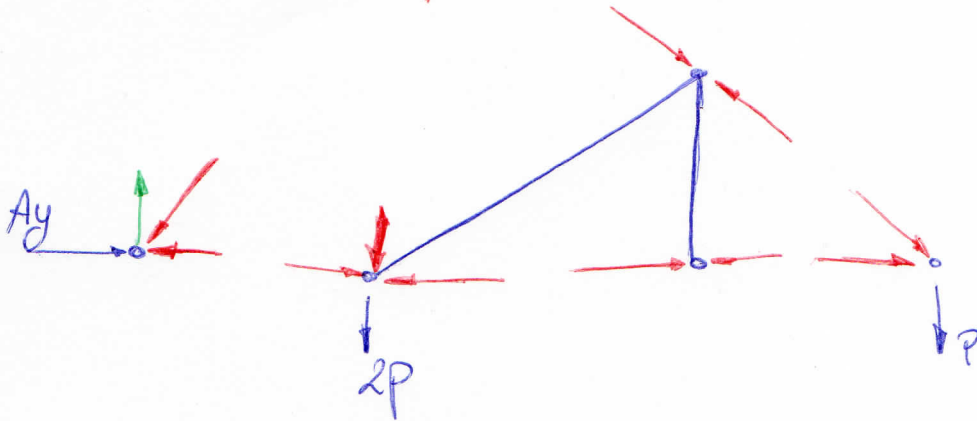
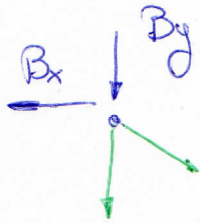
Nudo 7



$$\sum F_x = 0 \rightarrow N_3 + N_{11} \cdot \cos 45 \rightarrow$$

$$\rightarrow N_{11} = \frac{N_3}{\cos 45} = \frac{-51'72}{\cos 45} \rightarrow$$

$$\rightarrow \boxed{-73'1572}$$



Viga de nudo 1 a 7,

Barras 1	Barras 2	Barras 3
-51'72	-51'72	-51'72

Coger la de mayor esfuerzo, como todos son iguales la que resiste a 51'72

Viga de nudo 2 a 7

Barras 4	Barras 10	Barras 11
20'9	-48'3	-73'15

Coger el de mayor esfuerzo, ~~como~~ -73'15 la de los tres ~~que~~ que reporten ese esfuerzo

Viga de nudo 2 a 1 Viga de nudo 4 a 3 Viga de nudo 6 a 5

36'95	-28'33	0
todos de esfuerzo reportado 36'95		-4-