

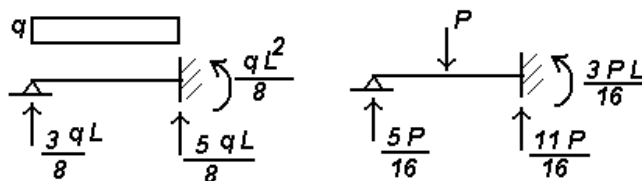
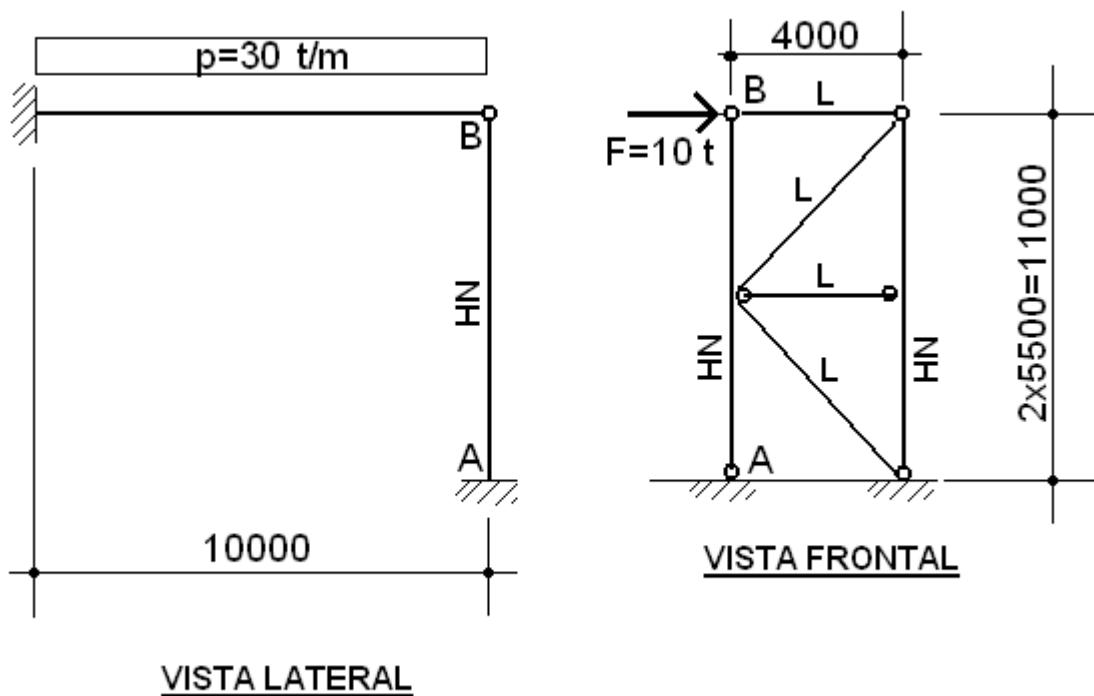
EJERCICIO N°3**Prof. A. Verdugo / Aux. P. Correa**

1.- Para la estructura de la figura se pide:

- Reconocer la columna más solicitada y diseñarla utilizando perfil tipo HN.
- Reconocer el arriostramiento más solicitado y diseñarlo usando perfil tipo L.

Considerar:

- Pandeo global según Método de Tensiones Admisibles (ASD) Norma AISC-2005
- Esbelteces mínimas (limitación caso estático)
- Acero A42-27ES.
- Indicar claramente la orientación del perfil.
- Diseño con factor de utilización F.U. > 0.8, si es posible.
- Dimensiones en mm



Ejercicio 3 2005 Primavera

Datos

$$\text{tonf} := 1000 \cdot \text{kgf}$$

$$f_y := 2.7 \cdot \frac{\text{tonf}}{\text{cm}^2}$$

$$E := 2100 \cdot \frac{\text{tonf}}{\text{cm}^2}$$

Solicitaciones

$$P_{uL} := \frac{10 \cdot \text{tonf}}{\cos\left(\text{atan}\left(\frac{5.5 \cdot \text{m}}{4 \cdot \text{m}}\right)\right)}$$

$$P_{uL} = 17 \text{ tonf}$$

$$P_{uIN} := \frac{3}{8} \cdot 30 \cdot \frac{\text{tonf}}{\text{m}} \cdot 10 \cdot \text{m} + \left(10 \cdot \text{tonf} \cdot \frac{11 \cdot \text{m}}{4 \cdot \text{m}} - P_{uL} \cdot \sin\left(\text{atan}\left(\frac{5.5 \cdot \text{m}}{4 \cdot \text{m}}\right)\right)\right)$$

$$P_{uIN} = 126.25 \text{ tonf}$$

Ángulo

$$K := 1$$

$$\Omega_c := 1.67$$

$$L := \sqrt{5.5^2 + 4^2} \cdot \text{m}$$

$$L = 6.801 \text{ m}$$

Mínimos

$$A_{\min} := \frac{\Omega_c \cdot P_{uL}}{f_y}$$

$$A_{\min} = 10.516 \text{ cm}^2$$

$$r_{\min} := \frac{K \cdot L}{200}$$

$$r_{\min} = 3.4 \text{ cm}$$

Elegimos el perfil L20x41.4

$$A := 52.8 \cdot \text{cm}^2$$

$$r_v := 3.82 \cdot \text{cm}$$

$$\lambda := \frac{K \cdot L}{r_v}$$

$$\lambda = 178.03$$

$$4.71 \sqrt{\frac{E}{f_y}} = 131.356$$

$$F_e := \frac{\pi^2 \cdot E}{\lambda^2}$$

$$F_e = 0.654 \frac{\text{tonf}}{\text{cm}^2}$$

$$F_{cr} := \begin{cases} \frac{f_y}{F_e} \cdot f_y & \text{if } \lambda \leq 4.71 \sqrt{\frac{E}{f_y}} \\ 0.877 \cdot F_e & \text{if } \lambda > 4.71 \sqrt{\frac{E}{f_y}} \end{cases} \quad F_{cr} = 0.574 \frac{\text{tonf}}{\text{cm}^2}$$

$$P_n := A \cdot F_{cr} \quad P_n = 30.281 \text{ tonf}$$

$$FU := \frac{\frac{P_u L}{P_n}}{\Omega_c} \quad FU = 0.938$$

COLUMNA

$$\begin{array}{llll} \Omega_c := 1.67 & L_x := 11 \cdot \text{m} & \text{Largo plano X} & K_x := 0.7 \\ & L_y := 5.5 \cdot \text{m} & \text{Largo plano Y} & K_y := 1 \end{array}$$

Mínimos

$$A_{\min} := \frac{\Omega_c \cdot P_{uIN}}{f_y} \quad A_{\min} = 78.088 \text{ cm}^2$$

$$r_{\min x} := \frac{K_x \cdot L_x}{200} \quad r_{\min x} = 3.85 \text{ cm}$$

$$r_{\min y} := \frac{K_y \cdot L_y}{200} \quad r_{\min y} = 2.75 \text{ cm}$$

Elegimos el perfil IN35x85.4

$$A := 109 \cdot \text{cm}^2 \quad r_x := 15.6 \cdot \text{cm} \quad r_y := 6.56 \cdot \text{cm}$$

$$\lambda_x := \frac{K_x \cdot L_x}{r_x} \quad \lambda_x = 49.359$$

$$\lambda_y := \frac{K_y \cdot L_y}{r_y} \quad \lambda_y = 83.841$$

$$\lambda := \max(\lambda_x, \lambda_y)$$

$$4.71\sqrt{\frac{E}{f_y}} = 131.356 \qquad F_e := \frac{\pi^2 \cdot E}{\lambda^2} \qquad F_e = 2.949 \frac{\text{tonf}}{\text{cm}^2}$$

$$F_{cr} := \left| \begin{array}{l} \frac{f_y}{F_e} \\ 0.658 \cdot \frac{f_y}{F_e} \text{ if } \lambda \leq 4.71 \sqrt{\frac{E}{f_y}} \\ 0.877 \cdot F_e \text{ if } \lambda > 4.71 \sqrt{\frac{E}{f_y}} \end{array} \right. \qquad F_{cr} = 1.84 \frac{\text{tonf}}{\text{cm}^2}$$

$$P_n := A \cdot F_{cr} \qquad P_n = 30.281 \text{ tonf}$$

$$FU := \frac{Pu_{IN}}{\frac{P_n}{\Omega_c}} \qquad FU = 1.05$$