



*ARQ. JOSE LISANDRO LOPEZ ALFARO*

*NOMBRE DEL TEMA: METODOS ENERGETICOS*

*PARCIAL: II*

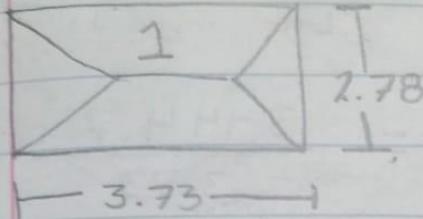
*NOMBRE DE LA MATERIA: ANALISIS DE ESTRUCTURAS*

*ARQ. PEDRO ALBERTO GARCIA LOPEZ*

*NOMBRE DE LA LICENCIATURA: ARQUITECTURA*

*5 CUATRIMESTRE*

## CUANTIFICACIÓN



$$\textcircled{1} H_1 \frac{(L+L+L+L)}{170} + 0.04$$

$$H_1 = \frac{(2.78 + 2.78 + 3.73 + 3.73)}{170} + 0.04$$

$$H = 0.116 \rightarrow 0.25$$

$\textcircled{2}$  Azotea

$$L_1 = 665 \text{ kg/cm}^2$$

$\textcircled{3}$  Area

$$\text{Area } 1 = \frac{b \cdot h}{2}$$

$$A_1 = \frac{3.73 \cdot 2.78}{2} = 5.18 \text{ m}^2$$

$$A_2 = \frac{bM + bm \cdot h}{2}$$

$$A_2 = \frac{3.73 + 2.78 \cdot (1.3)}{2} = 3.67$$

$$\textcircled{4} \text{ Peso de aera } \frac{PL \cdot AT}{La}$$

$$P_1 = \frac{5.18 \cdot 665}{3.73} = \frac{3444.7}{3.73} = 923.51$$

$$P_2 = \frac{3.67 \cdot 665}{3.73} = \frac{2440.55}{3.73} = 654.30$$

$$\textcircled{5} \text{ Carga } w$$

$$P_1 + P_2 + PP$$

$$PP = H = L/2 \quad H = 3.73/2 = 0.31 \text{ m}$$

$$B = 0.5 \cdot H \rightarrow 0.5 \cdot 0.31 = 0.155 \text{ m}$$

$$P = 2.4 \text{ m}$$

$$H \cdot B \cdot P = 0.31 \cdot 0.155 \cdot 2.4 = 0.0095$$

$$923.51 + 654.30 / 1000 = 1.577$$

$$1.577 + 0.0095 = 1.5865$$

Datos:

Altura: 0.31

Base: 0.81

Longitud: 3.73

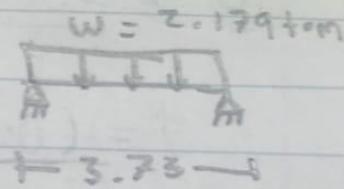
$D = 36 \text{ cm}$

$F''C = 136 \text{ kg/cm}^2$

$F'C = 200 \text{ kg/cm}^2$

$F_y = 4.200 \text{ kg/cm}^2$

$FR = 0.90$



$$\textcircled{7} M = \frac{w(L)^2}{8} = \frac{2.179 (3.73)^2}{8} = 3.78 \text{ t}\cdot\text{m}$$

$\textcircled{8}$  Momento Ultimo

$$M_u = M \cdot 1.3 \times 10^5 = 3.78 \cdot (1.3 \times 10^5) = 491,400$$

$$\textcircled{9} q = \sqrt{-\frac{M_u}{FR \cdot B \cdot D^2 \cdot F''C}} \cdot 2 + 1$$

$$q = \sqrt{-\frac{491,400}{(0.90) \cdot 6811 \cdot (36)^2 \cdot 136}} \cdot 2 + 1$$

$$q = 0.9609$$

$$\textcircled{10} \rho = \frac{(-9 + 1) \cdot F'' C}{F_y}$$

$$\rho = \frac{(0.9609 + 1) \cdot 136}{4,200}$$

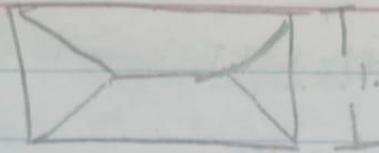
$$\rho = 0.0634$$

$$\textcircled{11} A_s = \rho \cdot B \cdot D$$

$$A_s = 0.0634 \cdot 0.81 \cdot 36$$

$$A_s = \underline{1.8487}$$

3.73



1.85

$$\textcircled{1} H_1 \frac{(L+L+L+L)}{170} + 0.04$$

$$H_1 = \frac{(3.73 + 1.85 + 3.73 + 1.85)}{170}$$

$$H_1 = 0.10$$

② Azotea

$$Losa = 610$$

③ Area

$$Area_1 = \frac{b \cdot h}{2}$$

$$A_1 = \frac{3.73 \cdot 1.85}{2} = 3.45 \text{ m}^2$$

$$A_2 = \frac{b_m + b_n \cdot h}{2}$$

$$A_2 = 3.62 \text{ m}^2$$

④ Peso Area  $\frac{PL \cdot AT}{L_a}$

$$P_1 = \frac{3.45 \cdot 610}{3.73} = 564.20$$

$$P_2 = \frac{3.62 \cdot 610}{3.73} = 592.01$$

⑤ Carga w  $P_1 + P_2 + P_P$

$$P_P = H = \frac{L}{12} \rightarrow \frac{3.73}{12} = 0.31$$

$$B = 0.5 \cdot H \rightarrow 0.5 \cdot 0.31 = .15$$

$$H \cdot B \cdot \rho = .31 \cdot .15 \cdot 2.4 = 1.116$$

$$\frac{564.20 + 592.01}{1000} = 1.156$$

$$1.156 + 1.116 \rightarrow 1.267$$

Datos:

$$\text{Altura} = .31$$

$$\text{Base} = .15$$

$$\text{longitud} = 3.73$$

$$D = 36 \text{ cm}$$

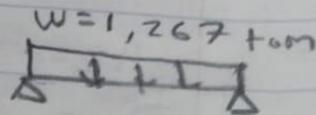
$$F''C = 136 \text{ kg/cm}^2$$

$$F'C = 200 \text{ kg/cm}^2$$

$$F_Y = 4,200 \text{ kg/cm}^2$$

$$F_R = .90$$

$$\textcircled{7} \frac{w(L)^2}{8}$$



$$M = \frac{1.267 \cdot (3.73)^2}{8} = 2.20$$

⑧ Momento ultima

$$M_u = M \cdot 1.3 \times 10^5$$

$$M_u = 2.20 \cdot 1.3 \times 10^5 = 286,000$$

$$\textcircled{9} \quad q = \sqrt{-\frac{M_u}{F_r \cdot B \cdot D^2 \cdot F''c} \cdot 2 + 1}$$

$$q = \sqrt{-\frac{286,000}{(.90) \cdot (.15) \cdot (36^2) \cdot (136)} \cdot 2 + 1}$$

$$q = 0.8715$$

$$\textcircled{10} \quad \rho = \frac{(-q + 1) \cdot F''c}{F_y}$$

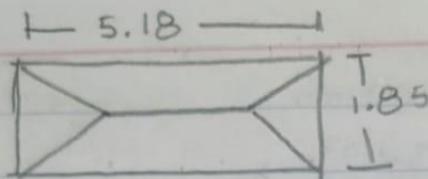
$$\rho = \frac{(0.8715 + 1) \cdot 136}{4,200}$$

$$\rho = 0.06060$$

$$\textcircled{11} \quad A_s = \rho \cdot B \cdot D$$

$$A_s = 0.06060 \cdot (.15) \cdot (36)$$

$$A_s = 0.3272$$



$$\textcircled{1} H_1 = \frac{(L+L+L+L)}{170} + 0.04$$

$$H_1 = 0.12$$

② Azotea

$$\text{Losa} = 658 \text{ kg/cm}^2$$

③ Area

$$\text{Area}_1 = \frac{b \cdot h}{2} = \frac{5.18 \cdot 1.85}{2} \rightarrow 4.79 \text{ m}^2$$

$$\text{Area}_2 = \frac{b_m \cdot b_m \cdot h}{2} = \frac{5.18 + 1.85 \cdot 0.3}{2} \rightarrow 3.79 \text{ m}^2$$

$$\textcircled{4} \text{Peso Area } \frac{P_L \cdot A_T}{L_a}$$

$$P_1 = \frac{4.79 \cdot 658}{5.18} \rightarrow 608.45$$

$$P_2 = \frac{3.79 \cdot 658}{5.18} \rightarrow 481.43$$

⑤ carga w  $P_1 + P_2 + PP$

$$PP = H = L/12 = 5.18/12 \rightarrow .43$$

$$B = 0.5 \cdot H \rightarrow 0.5 \cdot .43 \rightarrow .21$$

$$H \cdot B \cdot P = .43 \cdot .21 \cdot 2.4 \rightarrow .216$$

$$608.45 + 481.43 / 1000 \rightarrow 1.089$$

$$1.089 + .216 \rightarrow 1.305$$

Datos:

Altura: .43

Base: .21

longitud: 5.18

D: 36

F''C: 136 kg/cm<sup>2</sup>

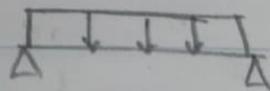
F'C: 200 kg/cm<sup>2</sup>

F<sub>y</sub>: 4,200 kg/cm<sup>2</sup>

FR: .90

$$\textcircled{7} \frac{W(L)^2}{8}$$

$$W = 1.305 \text{ t.m}$$



$$M = \frac{1.305 \cdot (5.18)^2}{8} = 4.37$$

⑧ Momento Ultimo

$$M_u = M \cdot 1.3 \times 10^5$$

$$M_u = 4.37 \cdot 1.3 \times 10^5 \rightarrow 568,100 \text{ Kg}\cdot\text{m}$$

$$\textcircled{9} \quad q = \sqrt{\frac{-M_u}{F_R \cdot B \cdot D^2 \cdot F''C}} \cdot 2 + 1$$

$$q = \sqrt{\frac{-568,100}{(-90) \cdot 6.211 \cdot (36)^2 \cdot 136}} \cdot 2 + 1$$

$$q = 0.8117$$

$$\textcircled{10} \quad \rho = \frac{(-q + 1) \cdot F''C}{F_Y}$$

$$\rho = \frac{(-0.8117 + 1) \cdot 1136}{4,200} \rightarrow 0.05866$$

$$\textcircled{11} \quad A_s = \rho \cdot B \cdot D$$

$$A_s = 0.05866 \cdot 21 \cdot 36 \rightarrow 0.4434$$