



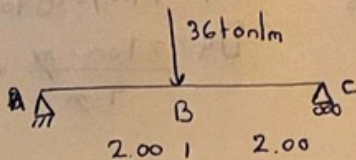
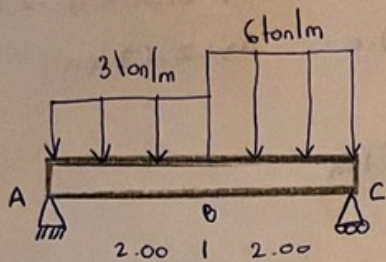
**UNIVERSIDAD
DEL SURESTE**

LICENCIATURA EN
ARQUITECTURA

ANALISIS DE ESTRUCTURAS

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**5to Cuatrimestre
Group A-19**



$$F_x = 0$$

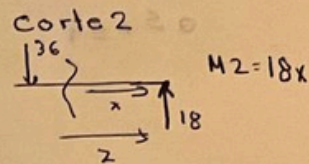
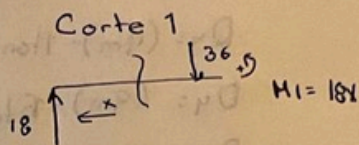
$$C_y = (4m) - 36 \text{ ton/m} (2m) = 0$$

$$C_y = (4m) - 72 \text{ ton-m}$$

$$C_y = \frac{72 \text{ ton-m}}{4m} = 18 \text{ ton}$$

$$A_y = -36 \text{ ton} + 18 \text{ ton} = -18 \text{ ton}$$

$$A_y = 18 \text{ ton}$$



~ Sistema Virtual ~

$$C_y = (4m) - 1 \text{ ton} (2m)$$

$$C_y = (4m) - 2 \text{ ton-m}$$

$$C_y = -\frac{2 \text{ ton-m}}{4m} = +0.5 \text{ ton}$$

$$A_y = -1 + 0.5 = -0.5$$

$$A_y = 0.5 \text{ ton}$$

$$C_1 = 0.5x$$

$$C_2 = 0.5x$$

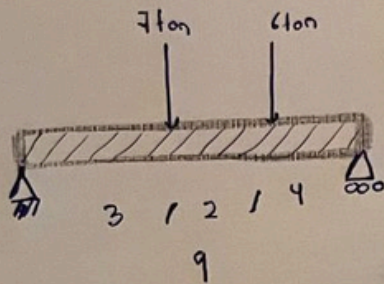
$$\Delta_{VB} \int_0^2 \frac{(18x)(0.5x) dx}{EI} \int_0^2 \frac{(9x^2) dx}{EI}$$

$$\frac{1}{EI} \left[\frac{9x^3}{3} \right]_0^2 = \frac{9(2)^3}{EI} = \frac{9(0)^3}{EI} = \frac{9(0)}{EI} = \frac{72 \text{ ton/m}^3}{EI}$$

$$\Delta_{VB} \int_0^2 \frac{(18x)(0.5x) dx}{EI} \int_0^2 \frac{(9x^2) dx}{EI} = \frac{1}{EI} \left(\frac{9x^{2+1}}{2+1} \right) \int_0^2 dx = \frac{1}{EI} \left[\frac{9x^3}{3} \right]_0^2$$

$$\frac{9(2)^3}{EI} = \frac{9(0)^3}{EI} = \frac{9(0)}{EI} = \frac{72 \text{ ton/m}^3}{EI}$$

$$\frac{72 \text{ ton/m}^3}{EI} + \frac{72 \text{ ton/m}^3}{EI} = \frac{144 \text{ ton/m}^3}{EI}$$



$$F_x = 0$$

$$D_y = (9m) - 6\text{ton}(5m) = 0$$

$$D_y = (9m) - 30\text{ton}\cdot\text{m}$$

$$D_y = \frac{30\text{ton}\cdot\text{m}}{9\text{m}} = 3.33\text{ton}$$

$$A_y = -6\text{ton} + 3.33 = -2.67$$

$$A_y = 2.67\text{ton}$$

$$M_1 = 2.67x \quad M_2 = 3.33x$$

$$0 \leq x \leq 3$$

$$0 \leq x \leq 4$$

~ Sistema virtual

$$D_y = (9m) - 1\text{ton}(5m)$$

$$A_y = -1\text{ton} + 0.55\text{ton} = -0.45$$

$$D_y = (9m) - 6\text{ton}\cdot\text{m}$$

$$A_y = \underline{0.45\text{ton}}$$

$$D_y = \frac{5\text{ton}\cdot\text{m}}{9\text{m}} = 0.55\text{ton}$$

$$C_1 = 0.45\text{ton}$$

$$C_2 = 0.55\text{ton}$$

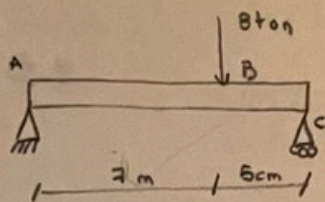
$$\Delta U_B = \int_0^5 \frac{(2.67x)(0.45x)}{EI} dx \Big|_0^5 = \frac{1}{EI} \left[\frac{1.201x^2}{2} \right]_0^5 = \frac{1}{EI} \left[\frac{1.201}{2} \right] \Big|_0^5$$

$$dx = \frac{1}{EI} \left[\frac{1.201x^3}{3} \right]_0^5 = \frac{1.201x^3}{EI} = \frac{1.201(5)^3}{EI} = \frac{1.20(125)}{EI} = \frac{150.125\text{ton/m}^3}{EI}$$

$$\Delta U_B = \int_0^4 \frac{(3.33x)(0.55x)}{EI} dx \Big|_0^4 = \frac{1}{EI} \left[\frac{1.831x^2}{2} \right]_0^4 = \frac{1}{EI} \left[\frac{1.831}{2} \right] \Big|_0^4$$

$$\frac{1}{EI} \left[\frac{1.831x^2}{3} \right]_0^4 = \frac{1.831x^3}{EI} = \frac{1.831(4)^3}{EI} = \frac{1.831(64)}{EI} = \frac{117.184\text{ton/m}^3}{EI}$$

$$\frac{150.125\text{ton/m}^3}{EI} + \frac{117.184\text{ton/m}^3}{EI} = \frac{267.309\text{ton/m}^3}{EI}$$



SR

M. =

Real

$$\begin{aligned} \sum M_0 &= 0 \\ \sum F_x &= 0 \\ \sum F_y &= 0 \end{aligned}$$

$$C_y (12m) - 8 \text{ ton} (7m) =$$

$$C_y (12m) - 56 = 0$$

$$C_y = \frac{56}{12} = 4.66m$$

$$C_y = 3.5m$$

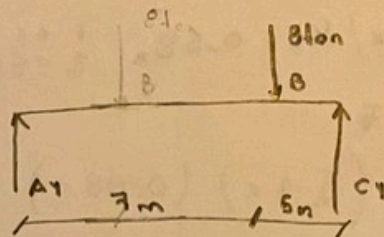
$$A_1 = -8 + 4.6 = -3.4m$$

SR-

$$M_1 = 3.4x \quad M_2 = 4.66x$$

SU

$$m_1 = 9.4x$$

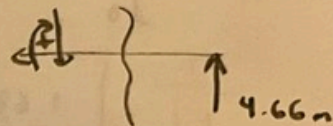
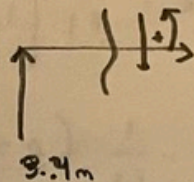


Corte 1

Corte 2

$$m_1 = 3.4x$$

$$m_2 = 4.66x$$



$$0 \leq x \leq 7m$$

$$0 \leq x \leq 5m$$

vectorial

$$C_y (12m) - 1 \text{ ton} (7m) =$$

$$C_y (12m) - 7 (7m) =$$

$$C_y (7/12)$$

$$C_y = \underline{0.58m}$$

$$A_1 = -7 + 0.58$$

$$A_1 = -4.2m$$

S.R

$$M_1 = 3.4x \quad M_2 = 4.66x \quad \begin{matrix} 1.0 \leq x \leq 7 \\ 2.0 \leq x \leq 5 \end{matrix}$$

S.V

$$M_1 = 0.48x \quad M_2 = 0.58x \quad \begin{matrix} 1.0 \leq x \leq 7 \\ 2.0 \leq x \leq 5 \end{matrix}$$

$$\frac{1}{EI} \int_0^7 (3.4x)(0.48x) dx + \int_0^5 (4.66x)(0.58x) dx$$

$$\frac{1}{EI} \int_0^7 (1.632x) dx = \frac{1}{EI} \left[1.632 \frac{x^{2+1}}{2+1} \right]_0^7 =$$

$$\frac{1}{EI} \left[\frac{1.632x^3}{3} \right]_0^7 = \frac{1}{EI} \left(\frac{0.544x^3}{1} \right) \Big|_0^7 = \frac{0.544x^3}{EI}$$

$$\frac{0.544(7)^3}{EI} = \frac{(0.544(49))^3}{EI} = \frac{186.592}{EI}$$

$$\frac{1}{EI} \int_0^5 (2.70) dx = \frac{1}{EI} \left[2.70 \frac{x^{1+1}}{1+1} \right]_0^5 =$$

$$\frac{1}{EI} \left[\frac{2.70x^2}{2} \right]_0^5 = \frac{1}{EI} \left(\frac{0.9x^2}{1} \right) \Big|_0^5 = \frac{0.9}{EI}$$

$$\frac{0.9(5)^2}{EI} = \frac{0.9(125)}{EI} = \frac{112.5}{EI}$$

$$186.592 + 112.5 = 299.092 \text{ } \frac{100}{m^2}$$