



# RESISTENCIA DE MATERIALES DE CONSTRUCCION

ESFUERZO Y DEFORMACION



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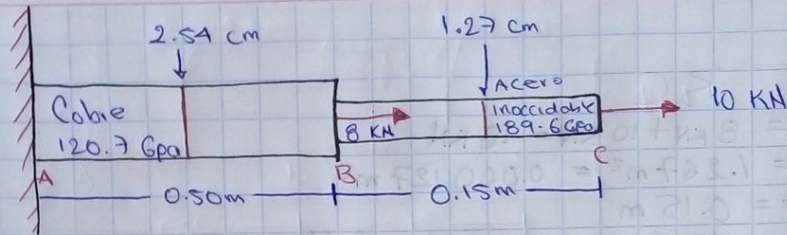
**4° CUATRIMESTRE**

**LAR- LICENCIATURA EN ARQUITECTURA "A"**

**COMITAN DE DOMINGUEZ CHIAPAS NOVIEMBRE 2021**

# EJERCICIO 1

## ESFUERZO Y DEFORMACION



AB

$$P = 8 \text{ kN}$$

$$A = 0.000507 \text{ m}^2$$

$$L = 0.50 \text{ m}$$

$$E = 120.7 \text{ GPa} \rightarrow 1.207 \times 10^{11} \text{ N/m}^2$$

$$\delta = \frac{PL}{AE}$$

$$\delta = \frac{8 \text{ kN} (0.50 \text{ m})}{0.000507 \text{ m}^2 (1.207 \times 10^{11} \text{ N/m}^2)}$$

$$\delta = \frac{4 \text{ kN} \cdot \text{m}}{61,799,900 \text{ m}^2 \cdot \text{N/m}^2}$$

$$\delta = 6.53649242 \times 10^{-8} \text{ m}$$

BC

$$P = 8 \text{ kN} + 10 \text{ kN} = 18 \text{ kN}$$

$$A = 1.267 \text{ m}^2 = 0.000127 \text{ m}^2$$

$$L = 0.15 \text{ m}$$

$$E = 189.6 \text{ GPa} = 1.896 \times 10^{11} \text{ N/m}^2$$

$$\delta = \frac{PL}{AE}$$

$$\delta = \frac{18 \text{ kN} (0.15 \text{ m})}{0.000127 \text{ m}^2 (1.896 \times 10^{11} \text{ N/m}^2)}$$

$$\delta = \frac{2.7 \text{ kN} \cdot \text{m}}{24,079,200 \text{ m}^2 \cdot \text{N/m}^2}$$

$$\delta = 1.121 \times 10^{-7} \text{ m}$$

$$+ \delta_{AB} = 6.537 \times 10^{-8} \text{ m}$$

$$\delta_{BC} = 1.121 \times 10^{-7} \text{ m}$$

$$= 1.7747 \times 10^{-7} \text{ m}$$

$$\text{Flexión B} = 1.121 \times 10^{-7} \text{ m}$$

## EJERCICIO 2

2

Diagram showing a composite bar with three sections: AB (top), BC (middle), and CD (bottom). The bar is subjected to forces and has different material properties and dimensions for each section.

Section AB:  $P = 10 \text{ kN}$ ,  $A = 4.657 \times 10^{-3} \text{ m}^2 \rightarrow 0.00466 \text{ m}^2$ ,  $L_F = 1.80 \text{ m}$ ,  $E = 103.4 \text{ Gpa} \rightarrow 1.034 \times 10^{11} \text{ N/m}^2$

$$\delta = \frac{PL_F}{AE}$$

$$\delta = \frac{10 \text{ kN} (1.80 \text{ m})}{0.00466 \text{ m}^2 (1.034 \times 10^{11} \text{ N/m}^2)}$$

$$\delta = \frac{18 \text{ kN} \cdot \text{m}}{481844000 \text{ m}^2 \cdot \text{N/m}^2}$$

$$\delta = 3.735 \times 10^{-8}$$

BC

$P = 10 \text{ kN} - 60 \text{ kN} \rightarrow -50 \text{ kN}$

$A = 0.0323 \text{ m}^2$

$L_F = 1.30 \text{ m}$

$E = 206.8 \text{ Gpa} \rightarrow 2.068 \times 10^{11} \text{ N/m}^2$

$$\delta = \frac{PL_F}{AE}$$

$$\delta = \frac{-50 \text{ kN} (1.30 \text{ m})}{0.0323 \text{ m}^2 (2.068 \times 10^{11} \text{ N/m}^2)}$$

$$\delta = \frac{-65 \text{ kN} \cdot \text{m}}{6679640000 \text{ m}^2 \cdot \text{N/m}^2}$$

$$\delta = -9.737 \times 10^{-9}$$

CD

$$P = 10 \text{ kN} - 60 \text{ kN} - 98 \text{ kN} \rightarrow -148 \text{ kN}$$

$$A = 0.000283 \text{ m}^2$$

$$L = 0.25 \text{ m}$$

$$E = 206.8 \text{ GPa} \rightarrow 2.068 \times 10^{11} \text{ N/m}^2$$

$$\int \frac{PL}{AE} =$$

$$\int \frac{-148 \text{ kN} (0.25 \text{ m})}{0.000283 \text{ m}^2 (2.068 \times 10^{11} \text{ N/m}^2)}$$

$$\int \frac{-37 \text{ kN} \cdot \text{m}}{58524400 \text{ m}^2 \cdot \text{N/m}^2}$$

$$\int = -6.322 \times 10^{-07}$$

$$AB \quad 3.735 \times 10^{-08}$$

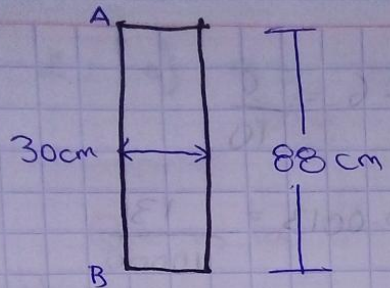
$$BC \quad -9.731 \times 10^{-09}$$

$$CD \quad -6.322 \times 10^{-07}$$

$$-6.04581 \times 10^{-07}$$

$$B = -9.731 \times 10^{-09}$$

### EJERCICIO 3



Concreto  
Aarmado = 1.0

$$P = -25 \text{ KN}$$

$$A = 0.070 \text{ m}^2$$

$$L = 88 \text{ cm} \rightarrow 0.88 \text{ m}$$

$$E = 210 \text{ kg/cm}^2 \rightarrow 300000 \text{ kg/cm}^2$$

$$\int \frac{PL}{AE}$$

$$\int \frac{-25 \text{ KN} (0.88 \text{ m})}{0.070 \text{ m}^2 (300000)}$$

$$\int \frac{-22 \text{ KN}\cdot\text{m}}{21000}$$

$$\int = -1.0477 \times 10^{-3}$$