# Pauta Control N°1

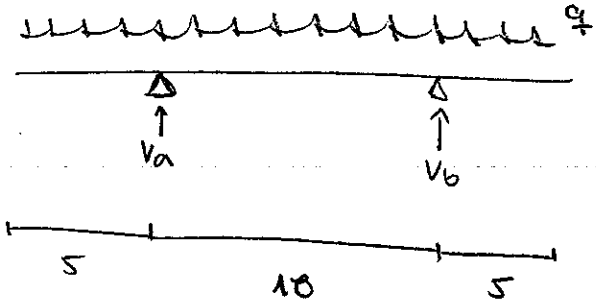
## Pregunta 1.

$q_L = 25$ kN/m

$f_c = 25$ MPa

$f_y = 420$ MPa

1)

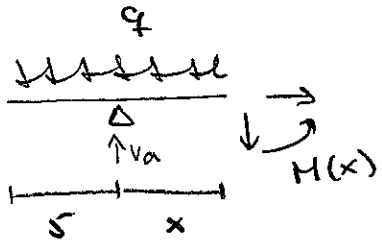



$L = 20$ m

$V_a = V_b \Rightarrow 2V_a = q \cdot L$

$V_a = \frac{q \cdot L}{2} \Rightarrow V_a = 14 \cdot q$

- Para obtener el momento.




$M(x) + q \cdot \frac{(x+5)^2}{2} = V_a \cdot x$

$M(x) = V_a \cdot x - \frac{q\,(x+5)^2}{2}$

2 ptos importantes $x = 0$

$x = 9$

$x = 0 \Rightarrow M(x) = -\frac{q \cdot 25}{2}$

$x = 9 \Rightarrow M(x) = 9 \cdot 14 \cdot q - 98 \cdot q = 28 \cdot q$

2) pp : $A = 100 \times 1500 + 600 \cdot 350$

$A_c = 360000\ mm^2 = 0,36\ m^2$

$\gamma = 25\ \frac{kN}{m^3}$

$q_0 = 9\ \frac{kN}{m}$

$$q_u = 1,4 \cdot q + 1,7 \cdot 25$$

$$q_u = 55,1 \ \frac{KN}{m}$$

ENTONCES LOS MOMENTOS SON:

1) EN EL CENTRO: $M = 28 \cdot q$

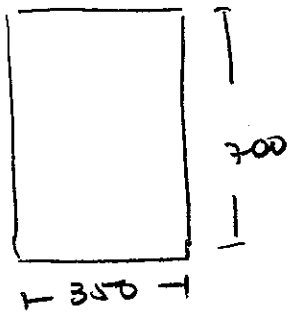
$$\boxed{M_u = 1543 \ KN \cdot m}$$

2) EN EL APOYO: $M = \frac{q \cdot 25}{2}$

$$\boxed{M_u = 689 \ KN \cdot m}$$

3) ARMADURA EN LOS APOYOS.

CONSIDERAMOS VIGA RECTANGULAR.




$$a = \frac{A_s \cdot f_y}{0,85 \cdot f'_c \cdot b}$$

$$A_s = \frac{M_u}{\phi \cdot f_y \left(d - \frac{a}{2}\right)}$$

SEA $d = 600$.

3.1) Sea $a = 300 \ mm$

$$A_s = \frac{689 \cdot 10^6}{0,9 \cdot 420 \left(600 - \frac{300}{2}\right)} = 4051 \ mm^2$$

$$a = \frac{4051 \cdot 420}{0,85 \cdot 25 \cdot 350} = 229 \ mm$$

3.2) $a = 229$ mm

$\Rightarrow A_s = 3754\ mm^2$

$\Rightarrow a = 212$ mm

3.3) $a = 212$ mm

$\Rightarrow A_s = 3690$

$\Rightarrow a = 208$ mm

3.4) $a = 208$ mm

$\Rightarrow A_s = 3675\ mm^2$

$a = 208$ mm ✓✓

4) ARMADURA EN EL CENTRO.

SUPONEMOS QUE ES VIGA NET CON $b = 1500$ mm

4.1) $a = h_f = 100$ $\quad d = 600$ $f_{y0}$

$$A_s = \frac{M_u}{\phi f_y \left(d - \frac{a}{2}\right)} = \frac{1543 \cdot 10^6}{0{,}9 \cdot 420 \left(600 - \frac{100}{2}\right)} = 7422\ mm^2$$

$$a = \frac{A_s \cdot f_y}{0{,}85\ f'_c \cdot b} = \frac{7422 \cdot 420}{0{,}85 \cdot 25 \cdot 1500} = 98\ mm^2 < 100$$ ✓

VIGA NET.

4.2) $a = 98\ mm^2$

$A_s = 7408\ mm^2$

$a = 98\ mm^2$ ✓✓