AM15-AB-B1 Parte 2/2

PROBLEMA B

PP EST. MET	$g_1 = 3\,kN/m$	$\gamma = 1,25$	
PP EQUIP.	$g_2 = 2\,kN/m$	$\gamma = 1,50$	
OCUPAÇÃO	$q_1 = 12\,kN/m$	$\gamma = 1,50$	$\psi_0 = 0,7$
VENTO ↓	$q_{v1} = 5\,kN/m$	$\gamma = 1,40$	$\psi_0 = 0,6$
VENTO ↑	$q_{v2} = -10\,kN/m$	$\gamma = 1,40$	$\psi_0 = 0,6$

COMB1 (q_1)

$$q_{sd1} = 1,25 \times 3\,kN/m + 1,50 \times 2\,kN/m + 1,5 \times 12\,kN/m + 1,4 \times 5\,kN/m \times 0,6$$

$$q_{sd1} = \boxed{28,95\,kN/m}$$

COMB2 (q_{v1})

$$q_{sd2} = 1,25 \times 3\,kN/m + 1,50 \times 2\,kN/m + 1,4 \times 5\,kN/m + 1,5 \times 12\,kN/m \times 0,7$$

$$q_{sd2} = \boxed{26,35\,kN/m}$$

COMB3 (q_{v2})

$$q_{sd3} = 1 \times 3\,kN/m + 1 \times 2\,kN/m - 1,4 \times 10\,kN/m = \boxed{-9\,kN/m}$$

$$M_{sd\,MÁX} = -q_{sd} \frac{L^2}{2}$$

$$M_{sd\,MÁX}(+) = +9\,kN/m \times \frac{(5m)^2}{2} = \boxed{112,5\,kN\,m}$$

$$M_{sd\,MÁX}(-) = -28,95\,kN/m \times \frac{(5m)^2}{2} = \boxed{-361,9\,kN\,m}$$

PROBLEMA C

$$I_x = \left(t_f \times b_f^3/12\right) \times 2 + h \times t_w^3/12 = \left(0{,}8 \times 35^3/12\right) \times 2 + 33{,}4 \times 1{,}25^3/12$$

$$I_x = \boxed{5722\ cm^4}$$

$$A_g = t_f \times b_f \times 2 + h \times t_w = 0{,}8 \times 35 \times 2 + 33{,}4 \times 1{,}25 = \boxed{97{,}75\ cm^2}$$

$$r_x = \sqrt{I_x/A} = \sqrt{\frac{5722}{97{,}75}} = \boxed{7{,}651\ cm}$$

→ FLAMBAGEM LOCAL:

- ELEMENTOS AA:

$$b/t_{AA} = 334/12{,}5 = 26{,}72 \qquad b/t_{lim} = 1{,}49\sqrt{\frac{20000}{35}} = 35{,}62$$

$$\boxed{Q_a = 1{,}0}$$

- ELEMENTOS AL:

$$b/t_{MESA} = 0{,}5 \times 350/8 = 21{,}88 \qquad k_c = \frac{4}{\sqrt{h/t_w}} = \frac{4}{\sqrt{26{,}72}} = 0{,}7738 < 0{,}76$$

$$\therefore\ k_c = 0{,}76$$

$$b/t_{lim} = 0{,}64\sqrt{\frac{20000}{35/0{,}76}} = 13{,}34 \quad \text{OCORRE FLAMB. AL}$$

GRUPO 5

$$b/t_{EST.} = 1{,}17\sqrt{\frac{20000}{35/0{,}76}} = 24{,}38 \quad \text{FLAMBAGEM INELÁSTICA}$$

$$Q_s = 1{,}415 - 0{,}65 \times 21{,}88\sqrt{\frac{35}{0{,}76 \times 20000}} = \boxed{0{,}7325}$$

$$\lambda_x = kL/r_{min} = \frac{1 \times 650\ cm}{7{,}651\ cm} = 84{,}96 < 200 \quad \text{OK!}$$

$$\lambda_0 = \lambda_z \sqrt{\frac{Q f_y}{\pi^2 E}} = 84{,}96 \sqrt{\frac{0{,}7325 \times 35}{\pi^2 \times 20000}}$$

$$\boxed{\lambda_0 = 0{,}9682}$$

$$\chi = 0{,}658^{0{,}9682^2} = \boxed{0{,}6755}$$

$$N_{crd} = Q \chi A_g f_y / \gamma_{a1}$$

$$N_{crd} = 0{,}7325 \times 0{,}6755 \times 97{,}75\,cm^2 \times 35\,kN/cm^2 / 1{,}1$$

$$\boxed{N_{crd} = 1539\,kN}$$

$$V_B = q_{sd} L/2 \qquad q_{sd\,máx} = \frac{2 N_{crd}}{L}$$

$$q_{sd\,máx} = 2 \times 1539\,kN / 10{,}5\,m = \boxed{293{,}1\,kN/m}$$