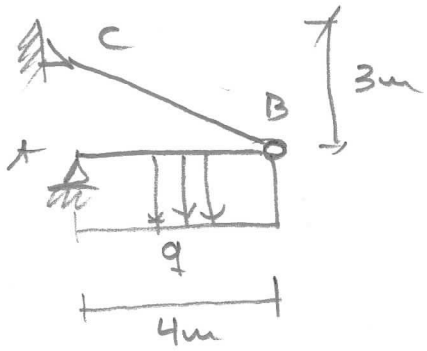
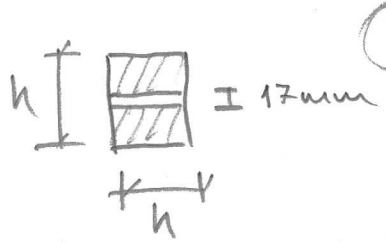
BITSMA0902C



- EDIF. RESIDENCIAL

- SEÇÃO TRANSVERSAL DAS BARRAS:



- CARGAS: q_1 (PESO PRÓPRIO): 6 kN/m
  q_2 (OCUPAÇÃO): 7 kN/m
  q_3 (VENTO): 15 kN/m

- MADEIRA DICOTILEDÔNEA C40.
  CARGAS DE LONGA DURAÇÃO;
  PEÇAS DE 1ª CATEGORIA;
  AMBIENTE CLASSE 3 DE UMIDADE;

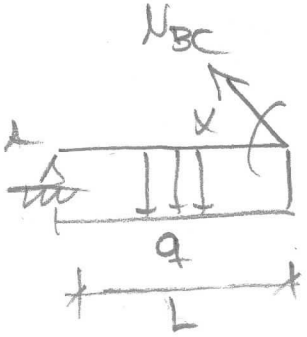
PEDE-SE:

Q01) f_{tod} [kN/cm²] Q02) $N_{sd_{BC}}$ MÁX. [kN]

Q03) MÍNIMA DIMENSÃO "h" PARA QUE A BARRA BC ATENDA VERIF. DE TRAÇÃO [MOD. DE 0,5 cm]

$$f_{tod} = (0,7 \times 0,8 \times 1,0)\left(\frac{40\ MPa}{0,77}\right)/1,8 = 16,162\ MPa$$

$$1,6162\ kN/cm^2 \quad \text{Q01}$$



$\cos\alpha = 4/5$ $\operatorname{sen}\alpha = 3/5$ $\Sigma M_A = 0$ ↺ (+)

$$N_{BC}\operatorname{sen}\alpha\, L - qL^2/2 = 0$$

$$N_{BC} = \frac{qL}{2\operatorname{sen}\alpha} = \frac{2q}{3/5} = 10/3\ q$$

$N_{BC\,q1} = 10/3\ m \times 6\ kN/m = 20\ kN$

$N_{BC\,q2} = 10/3\ m \times 7\ kN/m = 23,333\ kN$

$N_{BC\,q3} = 10/3\ m \times 15\ kN/m = 50\ kN$

$$\text{COMB1}(q1) = [1,4 \times 20] + 1,4 \times 23,333 + [1,4 \times 50 \times 0,4] = 88,667\ kN$$

$$\text{COMB2}(q2) = [1,4 \times 20] + 1,4 \times 50 \times 0,75 + [1,4 \times 23,333 \times 0,4] = 93,566\ kN \quad \text{Q02}$$

$\frac{N_{sd}}{A_{útil}} = f_{tod}$ $\quad A_{útil_{nec}} = N_{sd}/f_{tod}$

$A_{útil_{nec}} = 93{,}566\,kN / 1{,}6162\,kN/cm^2 = 57{,}893\,cm^2$

$A_{útil} = h^2 - 1{,}7h = 57{,}893$

$h^2 - 1{,}7h - 57{,}893 = 0$ $\quad \begin{cases} h' = -6{,}8061\,cm \\ h'' = +8{,}5061\,cm \rightsquigarrow 9\,cm \end{cases}$

$A_g = (9cm)^2 = 81\,cm^2$ ok!

$A_{furos} = 9cm \times 1{,}7cm = 15{,}3\,cm^2$

$\frac{15{,}3\,cm^2}{81\,cm^2} = 0{,}1888 > 0{,}10$ ok!

Resposta: 9cm // Q03