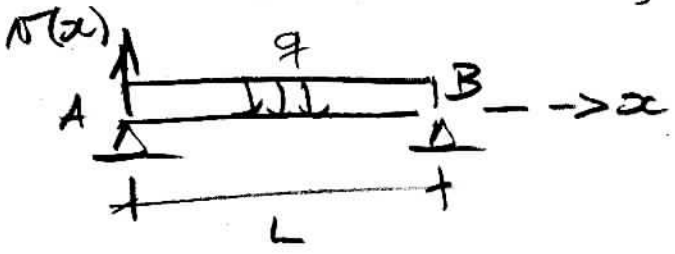
TE1-3.17

→ OBTER A EQUAÇÃO DA LINHA ELÁSTICA:



POR INSPEÇÃO:

$v(0) = 0 \qquad v(L) = 0$

$M(0) = 0 \qquad M(L) = 0$

$$M(x) = qL/2 \cdot x - q x^2/2$$

$$EI \frac{d^2v(x)}{dx^2} = M(x) = qL/2\, x - q x^2/2$$

$$EI \frac{dv(x)}{dx} = \theta(x) = qL/4\, x^2 - q x^3/6 + C_1$$

$$EI\, v(x) = qL x^3/12 - q x^4/24 + C_1 x + C_2$$

P/ $v(0) = 0 \rightarrow qL \cdot 0^3/12 - q \cdot 0^4/24 + C_1 \cdot 0 + C_2 = 0 \therefore C_2 = 0$

P/ $v(L) = 0 \rightarrow qL \cdot L^3/12 - qL^4/24 + C_1 \cdot L + 0 = 0$

$$C_1 = \left(qL^4/24 - qL^4/12\right) \times 1/L = -\frac{1}{24} qL^3$$

$$\boxed{v(x) = \frac{1}{EI}\left(\frac{qLx^3}{12} - \frac{qx^4}{24} - \frac{qL^3}{24} \cdot x\right)}$$

COMO A MÁXIMA DEFLEXÃO OCORRE NO MEIO DO VÃO ($x = L/2$)

$$v_{MÁX} = \frac{qL}{12}\left(L/2\right)^3 - \frac{q}{24}\left(\frac{L}{2}\right)^4 - \frac{qL^3}{24}\left(\frac{L}{2}\right)$$

$$= \frac{qL^4}{96} - \frac{qL^4}{384} - \frac{qL^4}{48} = \boxed{-5/384 \frac{qL^4}{EI}}$$