



# UNIVERSIDADE ESTADUAL DO PIAUÍ – UESPI

CENTRO DE TECNOLOGIA E URBANISMO - CTU

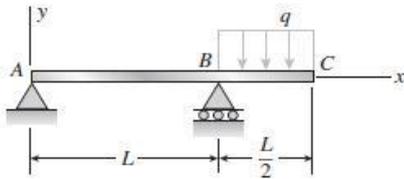
CURSO DE ENGENHARIA CIVIL

MECÂNICA DOS SÓLIDOS II – Lista de Exercícios nº 1 – Prof. Fernando Jufat

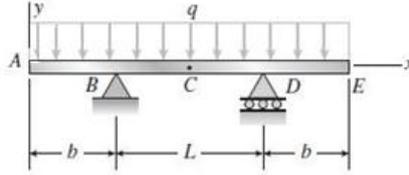
Para as vigas prismáticas a seguir, determine:

- a) a equação da linha elástica;  
b) as inclinações e deflexões indicadas.

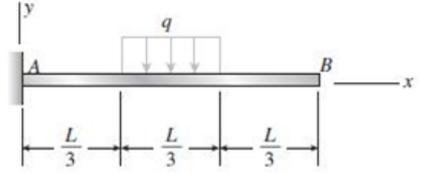
1)  $\delta_C$ ,  $\theta_A$  e  $\theta_C$



2)  $\delta_A$ ,  $\delta_C$ ,  $\theta_A$  e  $\theta_B$  com  $b = L/2$

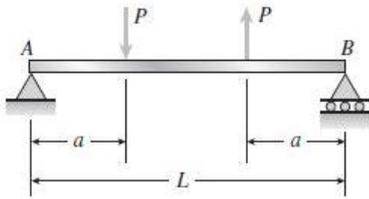


3)  $\delta_B$  e  $\theta_B$

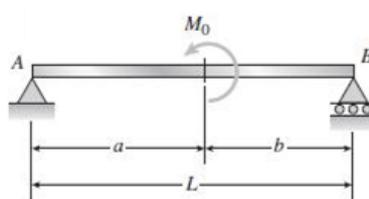


Para as estruturas a seguir, determine as inclinações e deflexões indicadas.

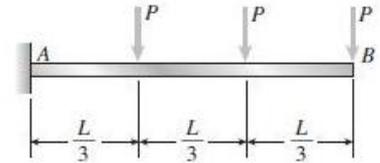
4)  $\delta_{CENTRO}$  e  $\theta_A$  com  $a = 1$  m e  $L = 5$  m.



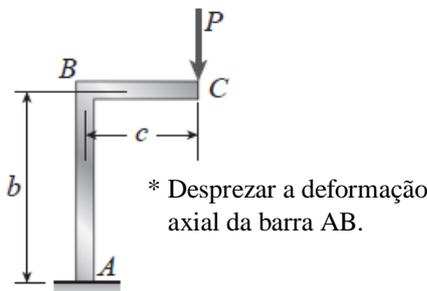
5)  $\delta_{M_0}$  e  $\theta_A$  com  $a = 3$  m e  $b = 2$  m.



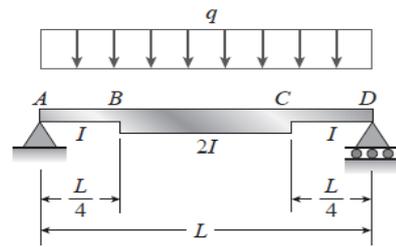
6)  $\delta_B$ ,  $\theta_B$



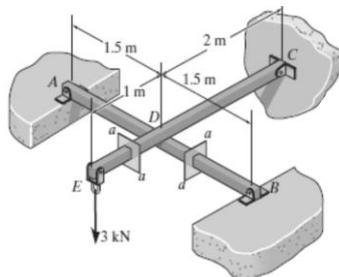
7)  $\delta_C$  e  $\theta_C$



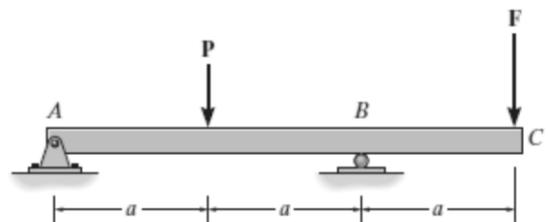
8)  $\delta_{CENTRO}$  e  $\theta_A$



9) Determine a deflexão na extremidade E da viga CDE, apoiada na viga ADB. Dado  $EI = 210,94$  kN.m<sup>2</sup>.



10) Determine o valor de F para que a deflexão em C seja nula.



## RESPOSTAS:

1)  $EI \cdot v = -\frac{qLx^3}{48} + \left(\frac{5qL}{48}(x-L)^3 - \frac{q}{24}(x-L)^4\right) + \frac{qL^3x}{48}$

$\delta_C = -\frac{11qL^4}{384EI}$      $\theta_A = +\frac{qL^3}{48EI}$      $\theta_C = -\frac{qL^3}{16EI}$

2)  $EI \cdot v = -\frac{qx^4}{24} + \left(\frac{qL}{6}\left(x - \frac{L}{2}\right)^3 + \frac{qL}{6}\left(x - \frac{3L}{2}\right)^3\right) + \frac{qL^3x}{24} - \frac{7qL^4}{384}$

$\delta_A = -\frac{7qL^4}{384}$      $\delta_C = +\frac{qL^4}{384EI}$      $\theta_A = +\frac{qL^3}{24EI}$      $\theta_B = +\frac{qL^3}{48EI}$

3)  $EI \cdot v = -\frac{qL^2x^2}{12} + \frac{qLx^3}{18} + \left(\frac{q}{24}\left(x - \frac{2L}{3}\right)^4 - \frac{q}{24}\left(x - \frac{L}{3}\right)^4\right)$

$\delta_B = -\frac{23qL^4}{648EI}$      $\theta_B = -\frac{7qL^3}{162EI}$

4)  $\delta_{CENTRO} = 0,0$  e  $\theta_A = -\frac{2P}{5EI}$

5)  $\delta_{M_0} = -\frac{2M_0}{5EI}$  e  $\theta_A = -\frac{13M_0}{30EI}$

6)  $\delta_B = -\frac{5PL^3}{9EI}$      $\theta_B = -\frac{14PL^2}{18EI}$

7)  $\delta_C(\text{vertical}) = -\frac{Pc^2}{EI}\left(b + \frac{c}{3}\right)$

$\delta_C(\text{horizontal}) = +\frac{Pcb^2}{2EI}$

$\theta_C = -\frac{Pc}{2EI}(2b + c)$

8)  $\delta_{CENTRO} = -\frac{31qL^4}{4096EI}$  e  $\theta_A = -\frac{7qL^3}{256EI}$

9)  $\delta_E = -3,222$  cm

10)  $F = \frac{P}{4}$