

UFF

Escola de Arquitetura e Urbanismo

TAR 00104 – Fundamentos para Modelagem dos Sistemas Estruturais

Turma A1 – 1º Semestre de 2016

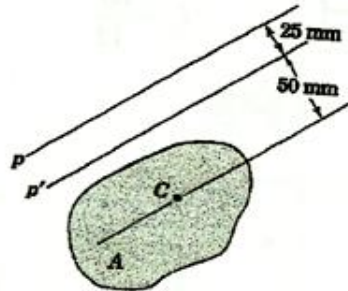
Fundamentos de Mecânica das Estruturas – Prof. Cary Cassiano

TESTE 05 – 27/07/2016

Nome: _____

GABARITO

1. Os momentos de inércia da área A em relação aos eixos paralelos p e p' diferem por $15 \times 10^6 \text{ mm}^4$. Calcule a área A que tem seu centróide em C .



$$I_p = \bar{I}_c + 75^2 \times A$$

$$I_{p'} = \bar{I}_c + 50^2 \times A$$

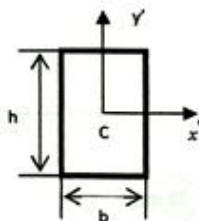
$$I_p - I_{p'} = 15 \times 10^6 \text{ mm}^4$$

$$(\bar{I}_c + 75^2 \times A) - (\bar{I}_c + 50^2 \times A) = 15 \times 10^6$$

$$A (75^2 - 50^2) = 15 \times 10^6$$

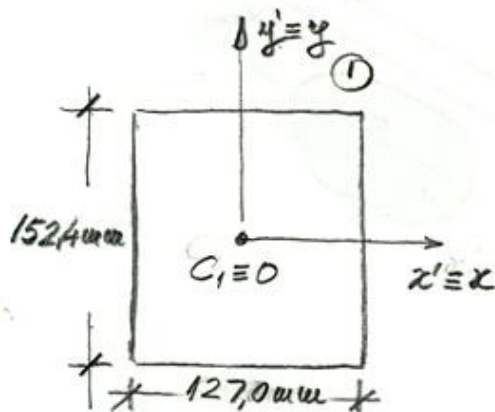
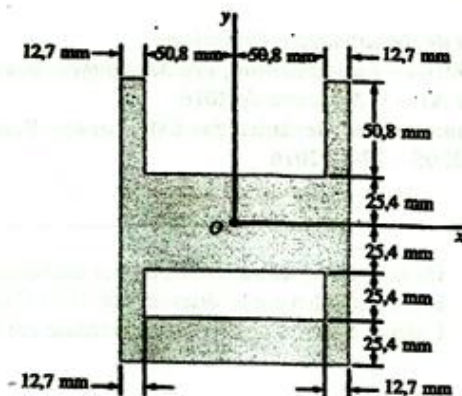
$$A = 4,8 \times 10^3 \text{ mm}^2$$

2, Determine os momentos de inércia e raios de giração da superfície sombreada, relativamente aos eixos x e y.



$$I_x = \frac{bh^3}{12}$$

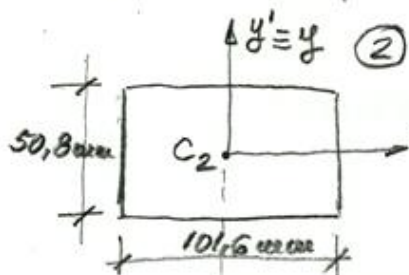
$$I_y = \frac{hb^3}{12}$$



$$I_{x_1} = \frac{127 \times 152,4^3}{12} = 37,46 \times 10^6 \text{ mm}^4$$

$$I_{y_1} = \frac{152,4 \times 127^3}{12} = 26,01 \times 10^6 \text{ mm}^4$$

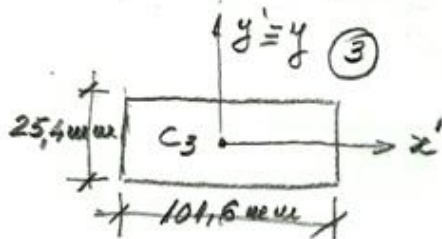
$$A_1 = 127 \times 152,4 = 19,35 \times 10^3 \text{ mm}^2$$



$$I_{x_2} = \frac{101,6 \times 50,8^3}{12} + 50,8^2 \times 101,6 \times 50,8 = 14,43 \times 10^6 \text{ mm}^4$$

$$I_{y_2} = \frac{50,8 \times 101,6^3}{12} = 4,44 \times 10^6 \text{ mm}^4$$

$$A_2 = 101,6 \times 50,8 = 5,16 \times 10^3 \text{ mm}^2$$



$$I_{x_3} = \frac{101,6 \times 25,4^3}{12} + (-38,1)^2 \times 101,6 \times 25,4 = 3,88 \times 10^6 \text{ mm}^4$$

$$I_{y_3} = \frac{25,4 \times 101,6^3}{12} = 2,22 \times 10^6 \text{ mm}^4$$

$$A_3 = 101,6 \times 25,4 = 2,58 \times 10^3 \text{ mm}^2$$

$$I_x = I_{x_1} - I_{x_2} - I_{x_3} \Rightarrow \boxed{I_x = 19,15 \times 10^6 \text{ mm}^4}$$

$$A = A_1 - A_2 - A_3 = 11,61 \times 10^3 \text{ mm}^2$$

$$k_x = \sqrt{\frac{I_x}{A}}$$

$$\boxed{k_x = 40,61 \text{ mm}}$$

$$I_y = I_{y_1} - I_{y_2} - I_{y_3} \Rightarrow \boxed{I_y = 19,35 \times 10^6 \text{ mm}^4}$$

$$k_y = \sqrt{\frac{I_y}{A}}$$

$$\boxed{k_y = 40,82 \text{ mm}}$$