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Question: 1. Find the moment of inertial of the rectangular area of Figure 1...



1. Find the moment of inertial of the rectangular area of Figure 1.0 about the centroidal x and y axes.

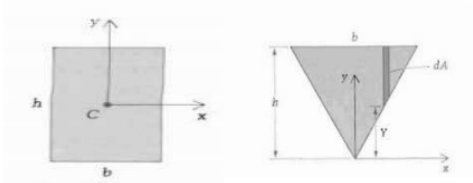


Figure 1.0

Figure 2.0

2. Find the moment of inertia of a triangular are in Figure 2.0 about the y – axis.
3. Find the moment of inertia of the area bounded by the cubic parabola $a^2y = x^3$, the y – axis and the line $y = 8a$ with respect to y – axis. ($A = 12a^2$)
4. Solve QUESTION No. 4 by another method.
5. The moment of inertia with respect to its axis of the solid generated by the revolving an arch of $y = \sin 3x$ about the x – axis is $I_x = \frac{\pi^2}{16} = \frac{3V}{8}$. Find the moment of inertia of solid with respect to the line $y = 2$.

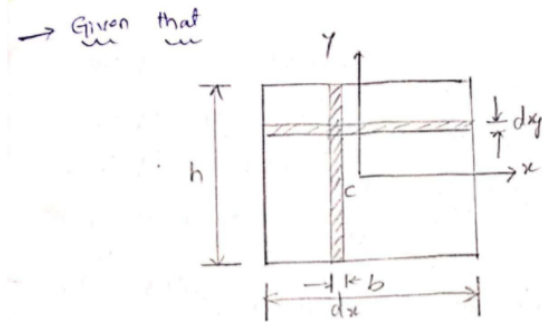
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Expert Answer 




Anonymous answered this
308 answers

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→ Given that
 formulae $I_x = \iint_A y^2 dy dx$
 $I_y = \iint_A x^2 dx dy$
 \bar{x} and \bar{y} are centroids
 → about \bar{x} axis

$$\begin{aligned}
 I_x &= \iint y^2 dy dx \\
 &= \int_0^b \int_0^h \frac{y^3}{3} dy dx \\
 &= \int_0^b \frac{y^3}{12} dx
 \end{aligned}$$



$\bar{y} = \frac{y}{2}$
 $y = 0 \text{ to } h$
 $x = 0 \text{ to } b$

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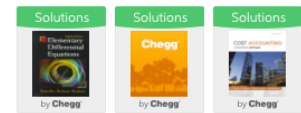
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$$\begin{aligned}
 &= \int_0^b \left(\frac{h^3}{12}\right) dx \\
 &= \frac{h^3}{12} [x]_0^b \Rightarrow \frac{bh^3}{12}
 \end{aligned}$$

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

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→ about y' axis

$$\begin{aligned}
 I_y &= \iint \bar{x}^2 dx dy \\
 &= \int_0^h \int_0^b \frac{x^2}{4} dx dy \\
 &= \int_0^h \left(\frac{x^3}{12}\right)_0^b dx \\
 &= \int_0^h \left(\frac{b^3}{12}\right) dx \\
 &= \frac{b^3}{12} (x)_0^h \\
 &= \frac{b^3 h}{12}
 \end{aligned}$$



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

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As per chegg guidelines we need to answer 1st question.

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