Mecânica 1

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Abstract

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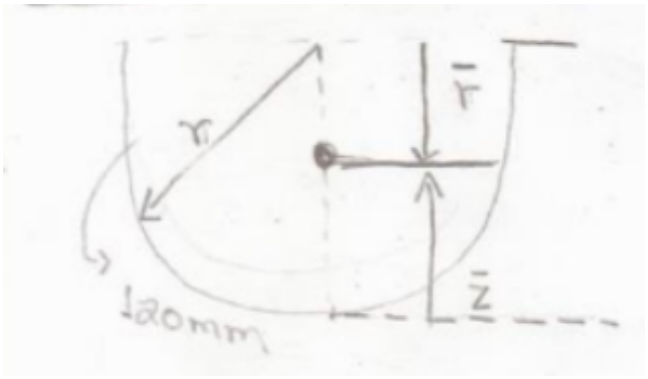

Figure 1:

$\overline{x} =?$ e $\overline{z} =?$
$\overline{r} = \frac{2*r}{\pi} => \frac{2*120}{\pi} => \overline{r} = 76,4mm$
$\overline{z} = r - \overline{r} => \overline{z} = 120 - 76,4$
$\overline{z} = 43,6mm$
$\overline{x} = -120mm$

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$yc = \frac{2*r}{\pi}$; $dA = \pi * r * dr$; $A = \pi * \int_{R/2}^{R} r * dr => A = \frac{3*\pi*R^2}{8}$

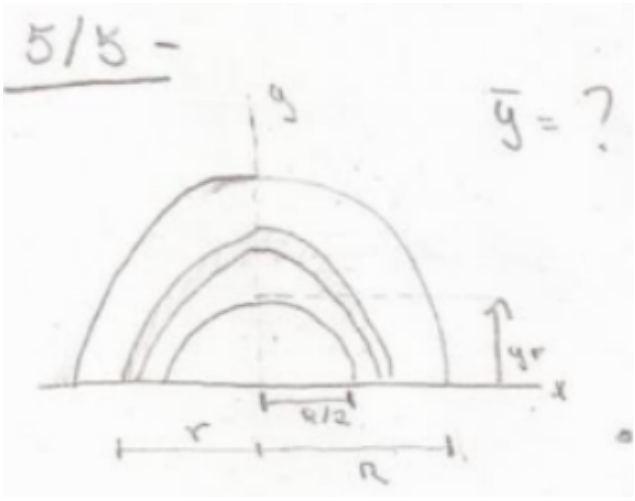

Figure 2:

$\int y * c * dA => \int_{R/2}^{R} \frac{2*r}{\pi} * \pi * r * dr => \frac{2*r^3}{3}|$
$= \frac{7}{12} * R^3$
$\overline{y}A = \int y * c * dA$; $\overline{y} = \frac{7}{12} * R^3 | \frac{3*\pi}{12} * R^3$

$= \frac{14*R}{9*\pi}$

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Figure 3:

$\overline{z}$ o vértice ao centróide do seu volume.
$x = \frac{r}{h} * z$

$dv = \pi * x^2 * dz = \pi * (\frac{r}{h} * z)^2 * dz$
$v = \frac{\pi * r^2}{h^2} * \int_0^h z * dz = \frac{\pi * r^2 * h}{3}$
$\int z * dz = \frac{\pi * r^2}{h} \int_0^h z^3 * dz => \frac{\pi * r^2 * h}{4}$
$\overline{z} = \int \frac{z * dv}{v} => \frac{\pi * r^2 * h^2/4}{\pi * r^2 * h/3}$
$\overline{z} = \frac{3 * h}{4}$

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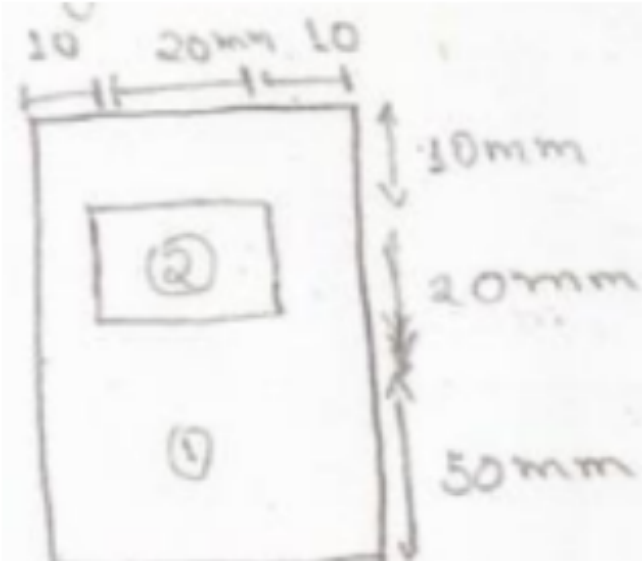

Figure 4:

y do centróide da área sombreada
1 - $A = 80 * 40 = 3200mm^2$
$\overline{y} = 40mm$
$\overline{y}A = 3200 * 40 = 12000mm^3$

2 - $A = -20 * 20 = -400mm^2$
$\overline{y} = 60$
$\overline{y}A = -400 * 60 = -2400mm^3$
$\sum A = 2800 e \sum yA = 104000$
$\overline{y} = \frac{\sum \overline{y}A}{\sum A} = \frac{104000mm^3}{2800mm^2} = 37,1mm$

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Volume do sólido gerado por rev=180(graus) em torno do eixo z
$V = \theta * \overline{r} * A$

$V = \pi * (8 + \frac{2}{y} * 12) * \frac{1}{2} * 12 * 12$
$V = 3620mm^3$

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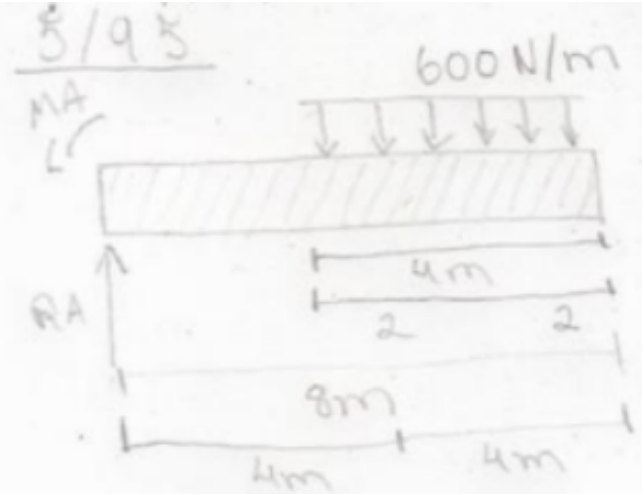

Figure 5:

Força RA e o momento MA em A
$F = 600 * 4 = 2400N \sum F = 0 : RA - 2400 = 0$
$RA = 2400N = 2,4KN$

$\sum MA = 0 : MA - 2400 * 6 = 0$
$MA = 14 * 400N = 14,4KN$

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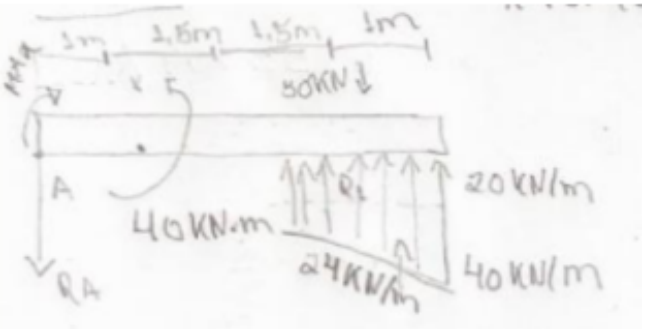

Figure 6:

A força e o momento de ração em A
$R2 = A2 = 36 * \frac{25}{2} = 45KN$

$\sum MX = 0$ portanto, $MA - 40 + 50 * 4 - 60 * 3,75 - 45 * 4,15$
$MA = 252,65KN * m$

$x \sum F = 0$
$-RA - 50 + 60 + 45 = 0$
$Ra = 55KN$

$\overline{x} = \frac{1,5+1}{3} = 0,833$
$R1 = A1 = 24 * 2,5 = 60KN$

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Força atrativa no meio do vão To
$L = 1280m$
$h = 145m$
$w = 310KN * 10^{-}3$
$w = 0,3108$

$To = \frac{w*L^2}{8*h}$ portanto, $To = \frac{0,3108*(1280)^2}{8*145}$
$To = 445,12KN$

$c = 2 * Tmax * \sin\theta$
$= 2 * \frac{w*L}{2} => w * L$
$c = w * L$
$c = 0,3108 * 1280$
$c = 397,82KN$

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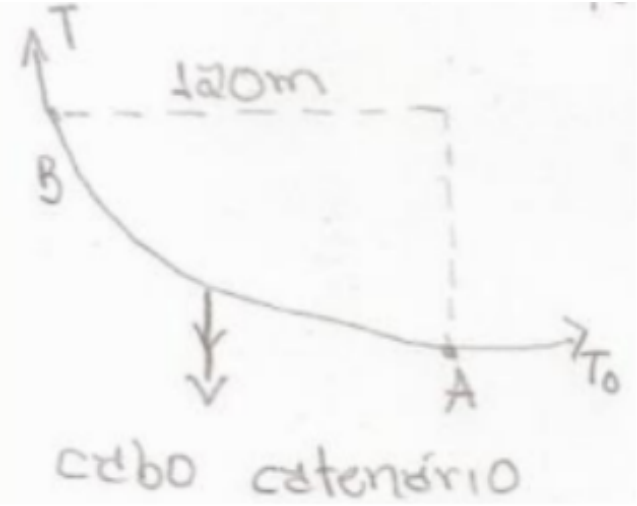

Figure 7:

$To =?$ e $Toparabola =?$
$x = 60m$
$y = 30m$
$\mu = 0,750 * 8,81 * 10^{-}3$
$\mu = 0,00735$

Cabo Catenário
$y = \frac{To}{\mu} * (\cos h * \frac{\mu * x}{To} - 1)$
$30 = \frac{To}{\mu} * (\frac{\cos h * 7,35 * 120}{To} - 1)$
$To = 1801N$

Cabo Parabólico
$y = \frac{w * x^2}{2 * To}$
$\frac{7,35 * (120)^2}{2 * To} = 30$
$7,35 * 14.400 = 60To$
$To = 1765N$

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$hagua =?$ e $hmercurio =?$
$PaZ = 1,0133 * 10^5 Pa$
$\rho agua = 1000Kg/m^3$

$\rho mercurio = 13570 Kg/m^3$

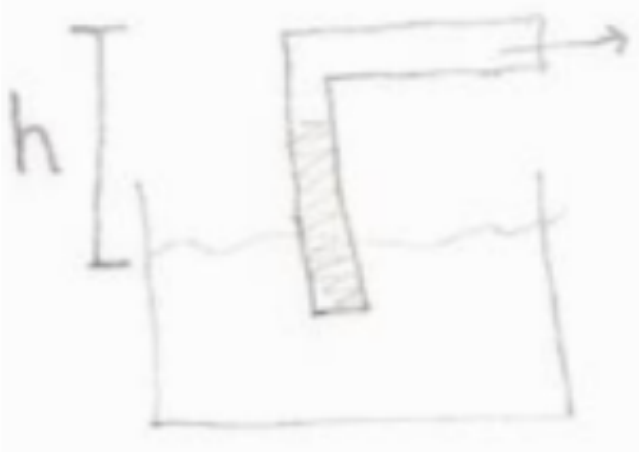

Figure 8:

Água:
$\rho * g * h = PaZ$
$1000 * 9,81 * h = 1,0133$
$h = 10,33m$

Mercúrio:
$\rho * g * h = PaZ$
$13570 * 9,81 * h = 1,0133$
$h = 0,761$

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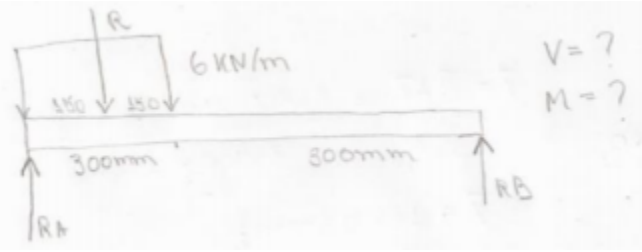

Figure 9:

$R = 6 * 0,3 = 1,8KN$

$\sum MB = 0$ portanto, $1,8 * (0,3+,015) - 0,6 * RA = 0$
$RA = 1,35KN$

$R1 = 6 * 0,2 = 1,2KN$

$\sum F = 0$ portanto, $1,35 - 12 - V = 0$
$V = 0,15K$

$\sum MA = 0$
$M - 1,2-,01-,015 * 0,2 = 0$
$M = 0,15KN$

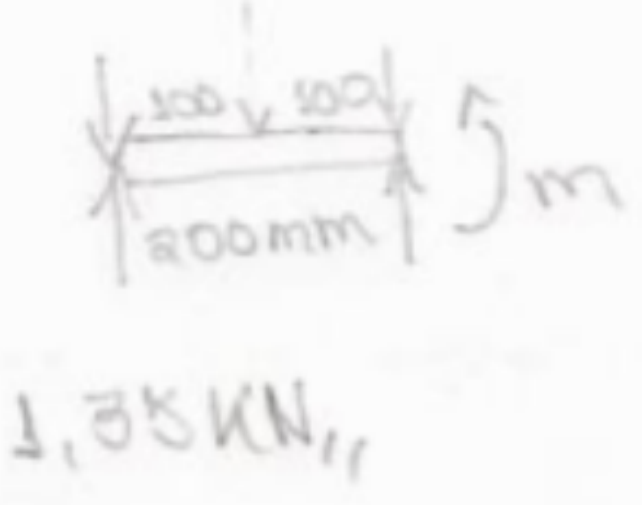

Figure 10: