17/03/2022

BEM UNIT-5 TEST:

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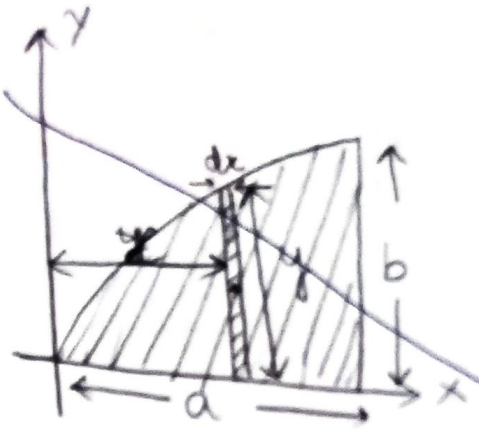
CSE-A
1602-21-733-052

1)



$y^2 = kx$

$\bar{x} = \int_0^b A\,x\,dy$

$= \int_0^b \frac{2a^{3/2}\sqrt{k}}{k}\, y^2\,dy$

$= \frac{2a^{3/2}}{\sqrt{k}} \cdot \frac{b^3}{3}$

$= \frac{2a\sqrt{a}}{3} \times \frac{k\sqrt{k}\cdot a\sqrt{a}}{\sqrt{k}}$

$= \frac{2a^3 \cdot b^2}{3\ a} = \frac{2a^2b^2}{3}$

$A = \int_0^a \sqrt{kx}$

$= \sqrt{k}\left[\frac{x^{3/2}}{\frac{1}{2}}\right]_0^a$

$= \sqrt{k} \cdot 2a\sqrt{a}$

$A = 2a^{3/2}\sqrt{k}$

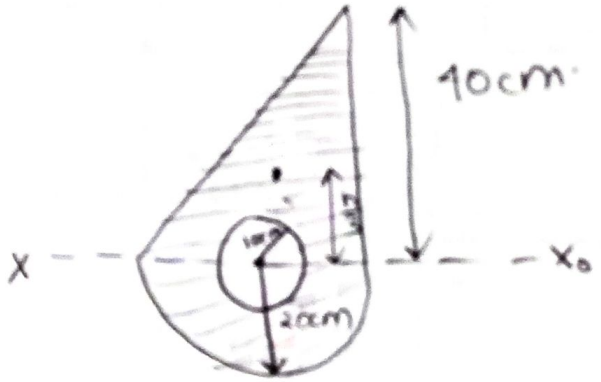
$b = \sqrt{ka}$

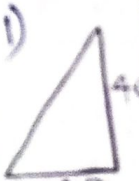
$\frac{b^2}{a}$

$y = \frac{3}{10}b$

$x = \frac{3a}{4}$

2)



Element	I_{GG}	A	d^2	I_{xx_0}
1) 	$\frac{bh^3}{36}$ 71111.1	$\frac{1}{2} \times 160$ = 800	$\left(\frac{h}{3}\right)^2$ = 177.78	
	~~$\frac{\pi r^4}{4}$~~ = ~~$\frac{\pi \cdot 20^4}{4}$~~			
2) 	$\frac{\pi r^4}{4}$ 0.055r^4 = 8800	$\frac{\pi r^2}{2}$ = 628	$\frac{4r}{3\pi}$ = (8.49)² = 72.25	
3) 	0.11r^4 1100	πr^2 = 314	0	

$\frac{\pi r^4}{4} = I_{xx} + \pi r^2 \cdot$

1602-21-733-052

4 $(I_{xx})_1 = 71111.1 + 142224$

$= 213335.1$

$(I_{xx})_2 = 8800 + 45373$

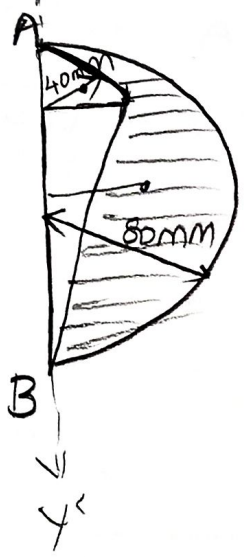
$= 54173.$

$(I_{xx})_3 = 1190$

$I_{xx} = 266408.1$

$= 26.64$ mm⁴

3)



	element	A_i	$\bar{x}_i$	$A_i \bar{x}_i$
1)		$\frac{\pi r^2}{4}$ $= 1256.$	2.7	3391.2
2)		$\frac{1}{2} \times 40 \times 40$ $= 800$	13.34	10672
3)		$\frac{\pi r^2}{2}$ $= 10048$	11.3	113542.4

$\bar{x} = \frac{\Sigma A_i \bar{x}_i}{\Sigma A_i} = \frac{994792}{7992}$

$= 12.44.$

$\frac{2r\sin\alpha}{3\alpha}$ $\alpha = \frac{\pi}{4}$

$\frac{2r\frac{1}{\sqrt{2}}}{\frac{3\pi}{4}}$: $\frac{\sqrt{2}r}{3}$

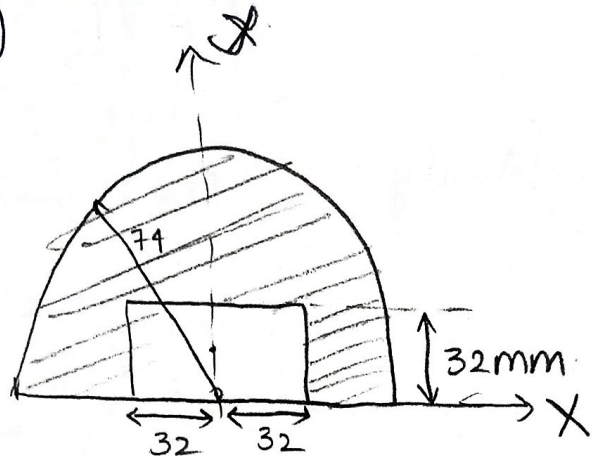
$\frac{r\sin\alpha}{\alpha}$

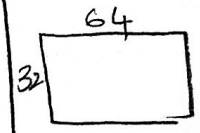
$= r \cdot \frac{\frac{1}{\sqrt{2}}}{\frac{\pi}{4}}$

$= \frac{4\sqrt{2}r}{3\pi}$

2x

1). a)

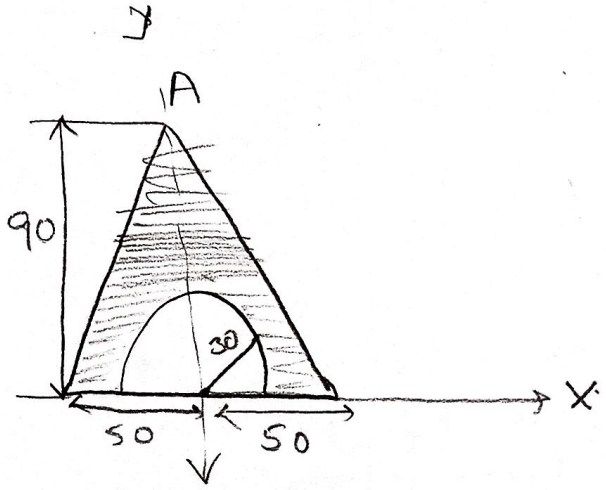


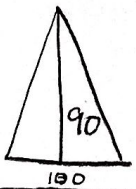
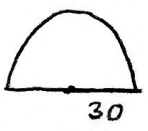
Element	A_i	$\bar{y}_i$	$A_i\bar{y}_i$
	$\frac{\pi(74)^2}{2}$ $= 4298.66$	$\frac{4r}{3\pi} = 31.5$	135418.5
	2048.	16	32768

$$\bar{y} = \frac{\Sigma A_i \bar{y}_i}{\Sigma A_i} = \frac{135418.5 - 32768}{2251}$$

$$= \underline{45.6} \text{ mm.}$$

b)



element	I_{GG}	A	d^2	Ad^2	$I_{X_0X_0}$
	$\frac{bh^3}{12}$ $= 6075 \times 10^3$	4500	$(30)^2$ $= 900$	4050000	10125×10^3.
	~~$\frac{\pi r^2}{2}$~~ $\neq$ 44550	$\frac{3.14 \times 900}{2}$ $= 1413.$	$(12.7)^2$ $= 161.29$	227902.77	272452.77

$$I_{xx} = 1039.74 \text{ mm}^4$$

1602-21-733-052

1/n/2022

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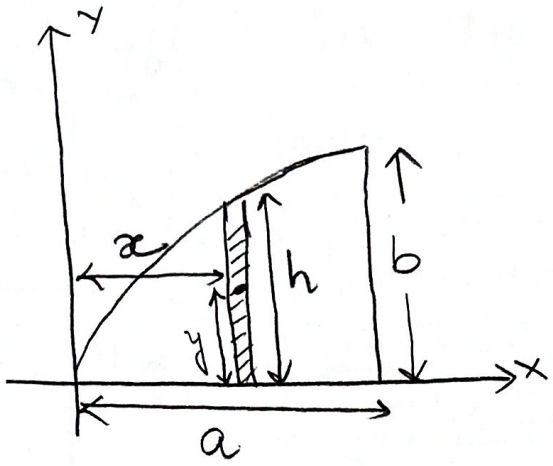
1)



$A\bar{X} = \int A x \, dy$

$A = \int_0^a \sqrt{k}\, x \, dx$

$= \sqrt{k} \cdot 2 \left[x^{3/2} \right]_0^a$

$= 2a\sqrt{a}\sqrt{k}$

$\boxed{A = 2a^{3/2} \cdot \sqrt{k}}$

$x =$

$\bar{X} = \frac{3a}{4}$

$\bar{Y} = \frac{3b}{10}$