

RESOLUCIÓN DEL PRIMER EXAMEN FINAL COLEGIADO DE ESTÁTICA  
SEMESTRE: 2011-2 MAYO 31, 2011

1. a)

$$\vec{M} = 900 \left( \frac{3i + 4j}{5} \right) = 540i + 720j \text{ N}$$

$$\vec{N} = 420 \left( \frac{3i + 6j + 2k}{7} \right) = 180i + 360j + 120k$$

$$\vec{O} = 250\sqrt{68} \left( \frac{2i + 8k}{\sqrt{68}} \right) = 500i + 2000k \text{ N}$$

$$\vec{P} = 360 \left( -\frac{8}{9}i + \frac{4}{9}j + \frac{1}{9}k \right) = -320i + 160j + 40k$$

$$\vec{R}_F = \vec{M} + \vec{N} + \vec{O} + \vec{P}$$

$$b) \vec{R}_F = 900i + 1240j + 2160k \text{ N}$$

$$b) |\vec{R}_F| = 2648.24 \text{ N}$$

$$c) \alpha_R = \cos^{-1} \left( \frac{900}{2648.24} \right) = 70.13^\circ$$

$$\beta_R = \cos^{-1} \left( \frac{1240}{2648.24} \right) = 62.08^\circ$$

$$\gamma_R = \cos^{-1} \left( \frac{2160}{2648.24} \right) = 35.34^\circ$$

2.

$$\vec{R} = \vec{P}_1 + \vec{P}_2 + \vec{P}_3 + \vec{P}_4 + \vec{P}_5 + \vec{P}_6$$

$$\vec{R} = 4i + (6-4)j + 5k \text{ N}$$

$$\vec{M}_O = 25j + (10 + 5b)k \text{ N}\cdot\text{m}$$

$$\vec{R} \cdot \vec{M}_O = 0$$

$$(4i + (6-4)j + 5k) \cdot (25j + (10 + 5b)k) = 0$$

$$50b - 50 = 0$$

$$a) b = 1$$

$$\therefore \vec{R} = 4i - 3j + 5k \text{ N}$$

$$\vec{M}_O = 25j + 15k \text{ N}\cdot\text{m}$$

$$\vec{r} \times \vec{R} = \vec{M}_O$$

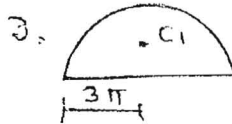
$$(xi + yj + zk) \times (4i - 3j + 5k) = 25j + 15k$$

$$5y + 3z = 0 \quad \text{--- (1)}$$

$$4z - 5x = 25 \quad \text{--- (2)}$$

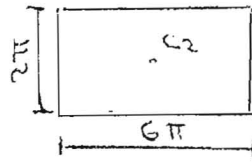
$$-3x - 4y = 15 \quad \text{--- (3), de (1), (2) y (3):}$$

$$b) \frac{4}{5}z - 5 = x = -\frac{4}{3}y - 5$$



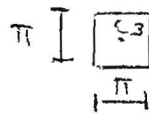
$$A_1 = 4.5\pi^3$$

$$\bar{x}_1 = 0; \bar{y}_1 = 4$$



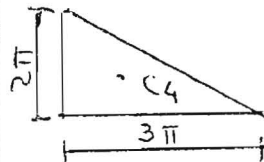
$$A_2 = 12\pi^2$$

$$\bar{x}_2 = 0; \bar{y}_2 = -\pi$$



$$A_3 = -\pi^2$$

$$\bar{x}_3 = -\frac{1}{2}\pi; \bar{y}_3 = -\frac{1}{2}\pi$$



$$A_4 = -3\pi^2$$

$$\bar{x}_4 = \pi; \bar{y}_4 = -\frac{4}{3}\pi$$

$$A = 4.5\pi^3 + 8\pi^2 = \pi^2(4.5\pi + 8)$$

$$Q_x = \pi^2(10.5) = \pi^2(10.5\pi)$$

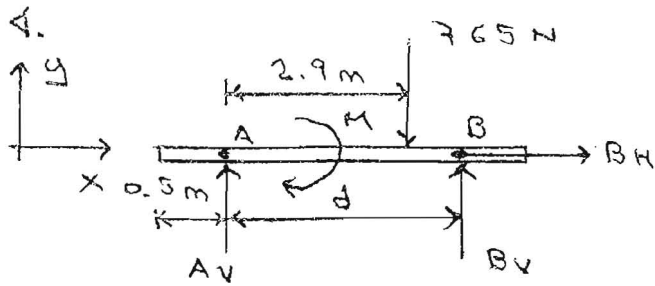
$$Q_y = -\pi^2(2.5) = -\pi^2(2.5\pi)$$

$$\bar{x} = \frac{Q_x}{A} = \frac{-\pi^2(2.5\pi)}{\pi^2(4.5\pi + 8)} = \frac{-2.5\pi}{4.5\pi + 8}$$

$$\bar{y} = \frac{Q_y}{A} = \frac{\pi^2(10.5\pi)}{\pi^2(4.5\pi + 8)} = \frac{10.5\pi}{4.5\pi + 8}$$

$$c(-0.354, 1.490) \text{ cm}$$

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$$\sum F_x = 0; \quad b) \quad \underline{B_H = 0 \text{ N}}$$

$$\sum F_y = 0$$

$$A_V + B_V - 765 = 0; \quad \text{como:} \quad B_V = 5 A_V$$

$$6 A_V = 765; \quad b) \quad \underline{A_V = 127.5 \text{ N}}$$

$$B_V = 5(127.5)$$

$$b) \quad \underline{B_V = 637.5 \text{ N}}$$

$$+ \sum M_A = 0$$

$$-765(2.9) - 126 + 637.5(d) = 0$$

$$a) \quad \underline{d = 3.677 \text{ m}}$$

5.

- BLOQUE A

$$\sum F_y = 0; \quad N_A = 87.59 \left( \frac{1}{\sqrt{2}} \right)$$

$$\sum F_x = 0; \quad T - \mu N_A - W_A \sin \theta = 0$$

$$T = 0.3 \left( \frac{87.59}{\sqrt{2}} \right) + \frac{87.59}{\sqrt{2}}$$

$$T = 789.05 \text{ N}$$

- CILINDRO

$$T = W_{\text{AGUA}}$$

$$W_{\text{AGUA}} = 1000 \pi r^2 g h = 1000 \pi (0.4)^2 g h$$

$$789.05 = 4931.04 h$$

$$\therefore \underline{h = 0.16 \text{ m}}$$