

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

1. a)

$$\vec{P} = 450 \left(\frac{3i+4j}{5} \right) = 270i + 360j \text{ N}$$

$$\vec{Q} = 210 \left(\frac{-3i+6j+2k}{7} \right) = -90i + 180j + 60k \text{ N}$$

$$\vec{R} = 125\sqrt{8} \left(\frac{-2i+8k}{\sqrt{8}} \right) = -250i + 1000k \text{ N}$$

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

$$\vec{R}_F = \vec{P} + \vec{Q} + \vec{R} + \vec{S} \quad |\vec{R}_F| = 1360.918 \text{ N}$$

b) $\vec{R}_F = -390i + 700j + 1100k \text{ N}$

c) $\alpha_R = \cos^{-1} \left(\frac{-390}{1360.918} \right) = 106.65^\circ$

$\beta_R = \cos^{-1} \left(\frac{700}{1360.918} \right) = 59.05^\circ$

$\gamma_R = \cos^{-1} \left(\frac{1100}{1360.918} \right) = 36.07^\circ$

2.

$$\vec{R} = (2i - 3j - 4k) + (3j + 2k) + (-i + 2j)$$

$$\vec{R} = i + 2j - 2k \text{ N} \Rightarrow \vec{R} \neq \vec{0}$$

$$\vec{M}_0 = (6j) \times (3j + 2k) + (-6k) \times (-i + 2j)$$

$$\vec{M}_0 = 12i - 6j + 18k \text{ N}\cdot\text{m} \Rightarrow \vec{M}_0 \neq \vec{0}$$

$$\vec{R} \cdot \vec{M}_0 = (i + 2j - 2k) \cdot (12i - 6j + 18k)$$

$$\vec{R} \cdot \vec{M}_0 = -36 \Rightarrow \vec{R} \cdot \vec{M}_0 \neq 0$$

a) Se comprueba que \vec{S} puede

reducirse a un motor

$$\vec{M} = \left(\frac{\vec{M}_0 \cdot \vec{R}}{|\vec{R}|} \right) \frac{\vec{R}}{|\vec{R}|}$$

$$\vec{M} = \left(\frac{-36}{3} \right) \left(\frac{i + 2j - 2k}{3} \right)$$

b) $\vec{M} = -4i - 8j + 8k \text{ N}\cdot\text{m}$

$$\vec{M}_0 - \vec{m} = 16i + 2j + 10k$$

$$16i + 2j + 10k = \begin{vmatrix} i & j & k \\ x & y & z \\ 1 & 2 & -2 \end{vmatrix}$$

$$-2y - 2z = 16 \Rightarrow y + z = -8 \quad \textcircled{a}$$

$$2x + z = 2 \quad \textcircled{b}$$

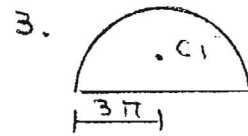
$$2x - y = 10 \quad \textcircled{c}$$

de \textcircled{a} $y = -z - 8 \quad \textcircled{d}$

de \textcircled{c} $y = 2x - 10 \quad \textcircled{e}$

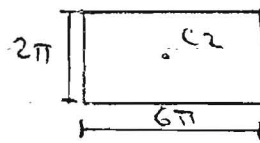
de \textcircled{d} y \textcircled{e} :

c) $2x - 10 = y = -z - 8$ ECUACION DEL EJE CENTRAL DE SE



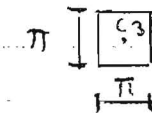
$$A_1 = 4.5\pi^3$$

$$\bar{x}_1 = 3\pi; \bar{y}_1 = 4 + 2\pi$$



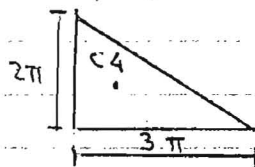
$$A_2 = 12\pi^2$$

$$\bar{x}_2 = 3\pi; \bar{y}_2 = \pi$$



$$A_3 = -\pi^2$$

$$\bar{x}_3 = 2.5\pi; \bar{y}_3 = 1.5\pi$$



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

$$\bar{x}_4 = 4\pi; \bar{y}_4 = \frac{2}{3}\pi$$

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

$$Q_x = \pi^3(26.5 + 9\pi)$$

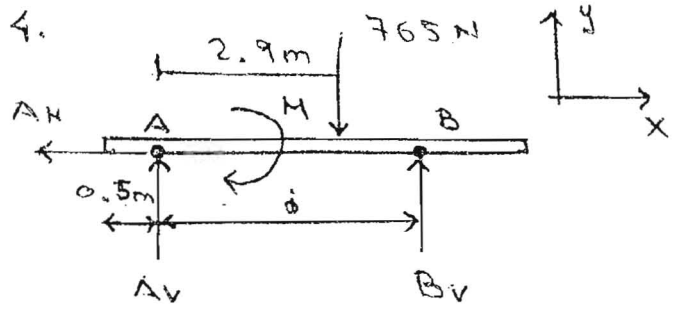
$$Q_y = \pi^3(13.5\pi + 21.5)$$

$$\bar{x} = \frac{Q_x}{A} = 9.069 \text{ cm}$$

$$\bar{y} = \frac{Q_y}{A} = 7.773 \text{ cm}$$

$$C(9.069, 7.773) \text{ cm}$$

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4.

$$\sum F_x = 0; \Rightarrow \underline{A_H = 0 \text{ N}}$$

$$\sum F_y = 0$$

$$A_V - 765 + B_V = 0; \text{ como } B_V = 9A_V$$

$$10A_V = 765 \Rightarrow \underline{A_V = 76.5 \text{ N}}$$

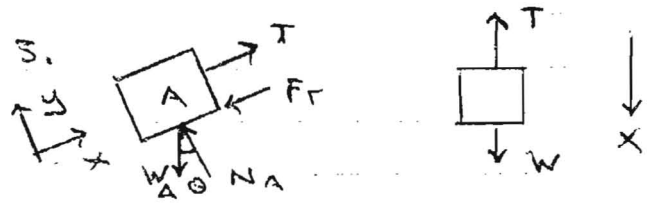
$$B_V = 9(76.5)$$

b) $\underline{B_V = 688.5 \text{ N}}$

$$\sum M_A = 0$$

$$-M - 765(2.9) + 688.5 d = 0$$

9) $\underline{d = 3.405 \text{ m}}$



5.

BLOQUE A

$$\sum F_y = 0; N_A = 87.5 g \left(\frac{1}{\sqrt{2}}\right)$$

$$\sum F_x = 0; T - MNA - W_A \sin \theta = 0$$

$$T = 0.3 \left(\frac{87.5 g}{\sqrt{2}} \right) + \frac{87.5 g}{\sqrt{2}}$$

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

CILINDRO

$$T = W_{AGUA}$$

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

$$789.05 = 4931.04 h$$

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