Auxiliar 1

ME3202/ME46A Resistencia de Materiales

Profesor Cátedra: Roger Bustamante P.
Profesor Auxiliar: Eladio Hurtado M.

31 de Marzo de 2010

1. Determinar las fuerzas en todas las barras y componente del sistema.

Datos: F=1000[N] C=400[Nm] $\theta = 40\ ^{o}$

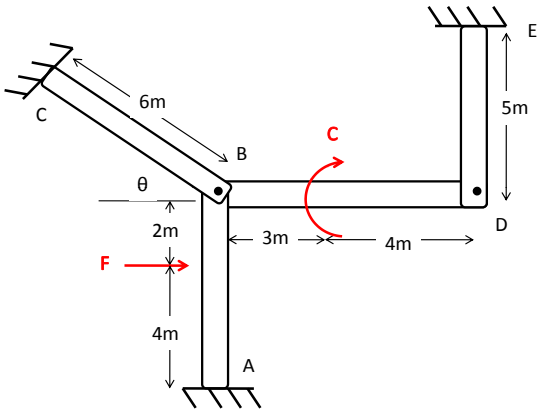

Figura 1: Figura Problema 1

Diagramas de cuerpo libre
Barra DE

Figura 2: DCL Barra DE

Barra BD

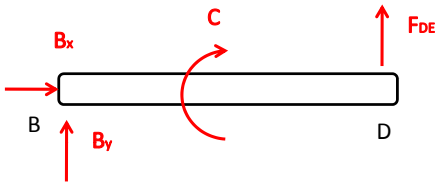

Figura 3: DCL Barra BD

$$\sum M_B = 0 \Rightarrow F_{DE} \cdot 7 = C$$
$$F_{DE} = \frac{400}{7} = 57,14[N] \tag{1}$$

$$\sum F_Y = 0 \Rightarrow B_y = -F_{DE} = 57,14[N] \tag{2}$$

$$\sum F_X = 0 \Rightarrow B_x = 0[N] \tag{3}$$

Barra AB

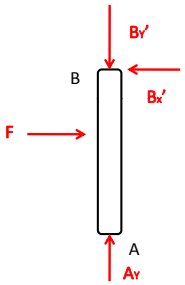

Figura 4: DCL Barra AB

$$\sum M_A = 0 \Rightarrow B'_x \cdot 6 = F \cdot 4$$
$$B'_x = \frac{4000}{6} = 666,67[N] \tag{4}$$

$$\sum F_X = 0 \Rightarrow A_x = B'_x - F = -333,33[N] \tag{5}$$

$$\sum F_Y = 0 \Rightarrow A_y = B'_y[N] \tag{6}$$

Barra BC

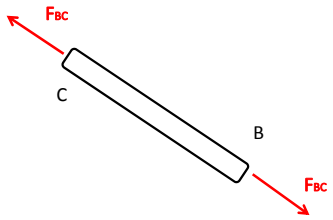

Figura 5: DCL Barra BC

Pasador en B

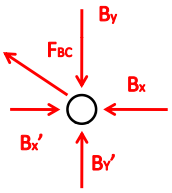

Figura 6: DCL Pasador

$$\sum F_X = 0 \Rightarrow -F_{BC} \cdot cos(40) + B'_x - B_x = 0$$
$$F_{BC} = \frac{B'_x}{cos(40)} = 870,27[N] \tag{7}$$

$$\sum F_Y = 0 \Rightarrow F_{BC} \cdot sen(40) + B'_y - By = 0$$
$$B'_y = B_y - F_{BC} \cdot sen(40) = -502,26[N] = A_y \tag{8}$$

2. Calcular las fuerzas sobre el resorte y las barras del sistema.

Datos: W=30[kgf] F=400[kgf]

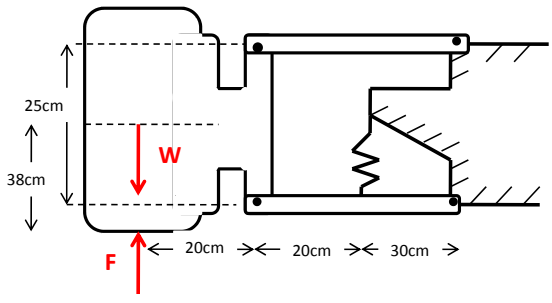

Figura 7: Figura Problema 2

DCL Barra Superior

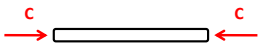

Figura 8: DCL Barra Superior

DCL Rueda

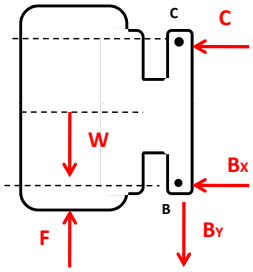

Figura 9: DCL rueda

$$\sum M_B = 0 \Rightarrow 0,25 \cdot C + 0,2 \cdot W = 0,2 \cdot F$$
$$C = \frac{0,2}{0,25}(F - W) = 296[kgf] \tag{9}$$

$$\sum F_X = 0 \Rightarrow B_x = -C$$
$$B_x = -296[kgf] \tag{10}$$

$$\sum F_Y = 0 \Rightarrow W + B_y = F$$
$$B_y = F - W = 370[kgf] \tag{11}$$

DCL Barra Inferior

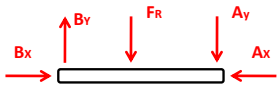

Figura 10: DCL Barra Inferior

$$\sum F_X = 0 \Rightarrow B_x = A_x = -296[kgf]$$
$$A_x = -296[kgf] \tag{12}$$

$$\sum M_A = 0 \Rightarrow 0,3 \cdot F_R - 0,5 \cdot B_y = 0$$
$$F_R = \frac{0,5}{0,3} B_y = 616,66[kgf] \tag{13}$$

$$\sum F_Y = 0 \Rightarrow B_y - F_R - A_y = 0$$
$$A_y = B_y - F_R = -246,66[kgf] \tag{14}$$

3. **Para una presión de 550 [Pa] contra el émbolo de 45 [mm] de diámetro. Encontrar la fuerza de sujeción en G para α=10°. En esa posición el vástago del émbolo es perpendicular a AB.**

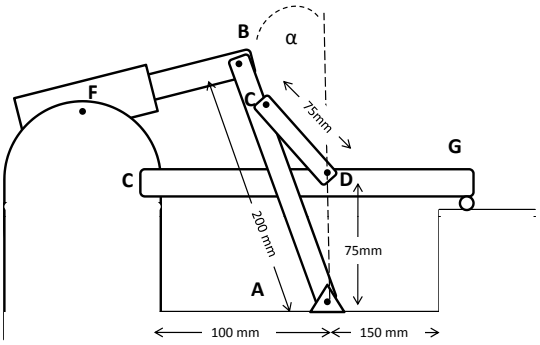

Figura 11: Figura Problema 3

Fuerza en el émbolo

$$F_E = P \cdot A = 550 \frac{0,045^2 \pi}{4} = 0,8747[N] \tag{15}$$

Barra AB

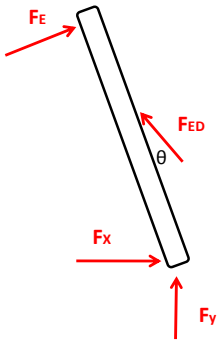

Figura 12: DCL AB

$$\sum M_A = 0 \Rightarrow -200 \cdot F_E - (75 + 75 \cdot sen(\theta)) \cdot F_{ED} cos(\theta) - 75 \cdot cos(\theta) \cdot F_{ED} sen(\theta) = 0 (*) \tag{16}$$

Barra CDG

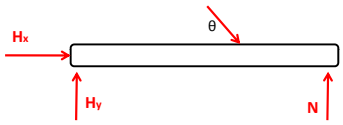

Figura 13: DCL CDG

$$\sum M_C = 0 \Rightarrow 250 \cdot N - 100 \cdot F_{ED} sen(\theta) = 0 (**) \tag{17}$$

Por propiedades del triángulo isosceles $\theta = 70^{\circ}$.
De las ecuaciones (*) y (**)se tiene:

$$\begin{array}{c} F_{ED} = 6,18[N] \\ N = 2,56[kgf] \end{array} \tag{18}$$