1- a) $\frac{P.\cos^2\theta}{A} = \frac{22000.\cos^2(71,5)}{12371,15} = 0,179\ MPa$

b) $\frac{P.\cos\theta.\operatorname{sen}\theta}{A} = \frac{22000.\cos(71,5).\operatorname{sen}(71,5)}{12371,15} = 0,535\ MPa$

2- $\sum M_A = 0 \rightarrow (5.2) + (7.4) + (6,5.7,5) - (F_{CD}.11) = 0$

$F_{CD} = 7,88\ KN.$

$\sum M_C = 0 \rightarrow (6,5.3,5) + (7.7) + (5.9) - (F_{AB}.11) = 0$

$F_{AB} = 10,61\ KN.$

$\sigma_{adm} = \frac{\sigma_w}{CS} \rightarrow \frac{480}{3,5} \rightarrow \sigma_{adm} = 137,14\ MPa$

- haste AB $\rightarrow d = \sqrt{\frac{4.(10,61.10^3)}{\pi.(137,14.10^6)}} = 9,92\ mm$

- haste CD $\rightarrow d = \sqrt{\frac{4.(7,88.10^3)}{\pi.(137,14.10^6)}} = 8,55\ mm$

3- a) $\varepsilon = \frac{0,238}{300} = 7,93.10^{-4}$

$\varepsilon = \frac{-0,0149}{60} = -2,48.10^{-4}$

$\nu = \frac{-(-2,48.10^{-4})}{7,93.10^{-4}} = 0,313$

b) $\frac{16\,000}{\frac{\pi \cdot (60)^2}{4}} \Rightarrow \sigma = 5,659 \text{ Kgf/mm}^2$

$E = \frac{5,659}{7,93 \cdot 10^{-4}} = 7,13 \cdot 10^3 \text{ Kgf/mm}^2$

4- $\Delta T = -53°C$

$\delta = (12 \cdot 10^{-6}) \cdot (-53) \cdot (620) = -0,394 \text{ mm}$

$\frac{R_B}{200} \cdot \left(\frac{310}{350} + \frac{310}{800} \right) = \delta_B \rightarrow \delta_B = 6,366 \cdot 10^{-3} \cdot R_B$

$\delta = \delta_T + \delta_B \rightarrow -0,394 + 6,366 \cdot 10^{-3} \cdot R_B$

$R_B = 61,89 \text{ KN}$

$\sigma_1 = \frac{61,89}{350} = 177 \text{ MPa}$

$\sigma_2 = \frac{61,89}{800} = 77 \text{ MPa}$

5- $J = \frac{\pi}{32} (6^4 - 4^4) = 102,1 \text{ cm}^4$

$\theta = \frac{150 \cdot 19\,000}{102,1 \cdot (18 \cdot 10^5)} = 34,89 \cdot 10^{-3} \text{ rad}$

ou

2°

6- $c^3 = \sqrt{\frac{2.14800}{600.\pi}} = 2,5\ cm$

$d = 2.c \rightarrow 2.2,5 = 5\ cm$