



SÈRIE 2

Exercici 1

Q1 b Q2 c Q3 a Q4 a Q5 b Q6 c Q7 a Q8 c

Exercici 2

2.1

$$\tau = \frac{\omega_2}{\omega_1} = \frac{1}{150}$$

$$v = \omega_2 \frac{d}{2} = \omega_1 \tau \frac{d}{2} = n_1 \frac{2\pi}{60} \tau \frac{d}{2} = 1450 \frac{2\pi}{60} \frac{1}{150} \frac{423}{2} = 0,2141 \text{ m/s} = 12,85 \text{ m/min}$$

A velocitat constant, i en les condicions de l'enunciat, la força que suporta el cable és:

$$F = m g = 1000 \cdot 9,807 = 9807 \text{ N}$$

2.2

$$P_{\text{mec}} = F v = 9807 \cdot 0,2141 = 2100 \text{ W}$$

Com que el reductor té un rendiment $\eta=0,7$, la potència a l'eix del motor ha de ser:

$$P_{\text{mot}} = \frac{P_{\text{mec}}}{\eta} = \frac{2100}{0,7} = 3000 \text{ W}$$

o també

$$P_{\text{mec}} = F \frac{d}{2} \omega_{\text{red}} = F \frac{d}{2} \tau \omega_{\text{mot}} = 9807 \cdot \frac{423 \times 10^{-3}}{2} 1450 \frac{2\pi}{60} = 2100 \text{ W}$$

$$P_{\text{mot}} = \frac{P_{\text{mec}}}{\eta} = \frac{2100}{0,7} = 3000 \text{ W}$$

Es requereix que el motor subministri 3000 W, per això cal triar l'opció D.

2.3

$$\text{El parell que subministrarà el reductor és } \Gamma_{\text{red}} = \frac{P_{\text{red}}}{\omega_{\text{red}}} = \frac{\eta P_{\text{mot}}}{\tau \omega_{\text{mot}}} = \frac{0,7 \cdot 3000}{\frac{1}{150} 1450 \frac{2\pi}{60}} = 2074 \text{ Nm}$$



Per tant, caldrà tarar el sensor a $\Gamma_{\text{sens}} = 1,15 \Gamma_{\text{sens}} = 1,15 \cdot 2074 = 2385 \text{ Nm}$

Exercici 3

3.1

$$m_{\text{propà}} = \frac{m_{\text{CO}_2}}{FE} \frac{1}{365} = 961,7 \text{ kg}$$

3.2

$$E_{\text{cons}} = m_{\text{propà}} \cdot p_c = 12,34 \text{ MWh}$$

3.3

$$Q_1 = m_a c_{e_a} \Delta T = 16000 \cdot 4,197 \cdot (100 - 80) = 1343 \text{ MJ}$$

$$Q_2 = m_a L_v = 16000 \cdot 2257 = 36112 \text{ MJ}$$

$$Q_3 = m_a c_{e_v} \Delta T = 16000 \cdot 2,155 \cdot (120 - 100) = 689,6 \text{ MJ}$$

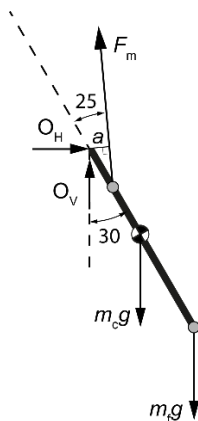
$$E_{\text{útil}} = Q_1 + Q_2 + Q_3 = 38145 \text{ MJ} = 10,60 \text{ MWh}$$

3.4

$$\eta = \frac{E_{\text{útil}}}{E_{\text{cons}}} = \frac{10,59}{12,34} = 0,8587$$

Exercici 4

4.1





4.2

$$\Sigma M(O) = 0$$

$$F_m a - m_c g b \sin(30) - m_f g c \sin(30) = 0$$

$$F_m = \frac{m_c g b \sin(30) + m_f g c \sin(30)}{a} = \frac{4 \cdot 9,807 \cdot 190 \frac{1}{2} + 12 \cdot 9,807 \cdot 400 \frac{1}{2}}{20} = 1363 \text{ N}$$

4.3

$$\left. \begin{array}{l} \Sigma F_{\text{horizontals}} = 0 \rightarrow O_H - F_m \sin(\alpha - \varphi) = 0 \\ \Sigma F_{\text{verticals}} = 0 \rightarrow O_V + F_m \cos(\alpha - \varphi) - m_f g - m_c g = 0 \end{array} \right\} \begin{array}{l} O_H = 118,8 \text{ N} \\ O_V = -1201 \text{ N} \end{array}$$

El signe negatiu d' O_V indica que té sentit oposat al dibuixat al diagrama de cos lliure.