SÈRIE 1

Primera part

Exercici 1

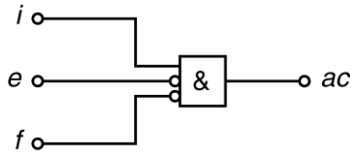
Q1 a **Q2** b **Q3** c **Q4** a **Q5** b

Exercici 2

	i	e	f	ac
	0	0	0	0
	0	0	1	0
	0	1	0	0
a)	0	1	1	0
	1	0	0	1
	1	0	1	0
	1	1	0	0
	1	1	1	0

b) $ac = i \cdot \bar{e} \cdot \bar{f}$

c)



Segona part

OPCIÓ A

Exercici 3

a) $s = 5\dfrac{b \cdot h_1}{2} + 5\dfrac{b \cdot h_2}{2} = 1{,}152 \text{ m}^2$

b) $L_1 = \sqrt{\left(\dfrac{b}{2}\right)^2 + h_1^2} = 0{,}7360\,\text{m}$; $L_2 = \sqrt{\left(\dfrac{b}{2}\right)^2 + h_2^2} = 0{,}3869\,\text{m}$

$p_1 = 5(b + 2L_1) + 5(b + 2L_2) = 15{,}78\,\text{m}$

c) $p_2 = 5(2L_1) = 7{,}360\,\text{m}$

d) opció A $c_A = 10 \cdot 1{,}152 + 0{,}5 \cdot 15{,}78 = 19{,}41\,€$

opció B $c_B = 10 \cdot 1{,}152 + 1{,}3 \cdot 7{,}360 = 21{,}09\,€$ $\Rightarrow$ L'opció A resulta més econòmica.

Exercici 4

a) $R_{\text{llums}} = \dfrac{U}{I_b} = \dfrac{12}{10,22} = 1,174\,\Omega$

$$U = I\,R_{\text{cable}} + I\,R_{\text{llums}} \quad \Rightarrow \quad \begin{cases} I \cdot R_{\text{llums}} = 0,97 \cdot U & \Rightarrow \quad I = 0,97 \cdot U / R_{\text{llums}} = 9,913 \text{ A} \\ I \cdot R_{\text{cable}} = 0,03 \cdot U & \Rightarrow \quad R_{\text{cable}} = 0,03 \cdot U / I = 0,03631\,\Omega \end{cases}$$

$$R_{\text{cable}} = \rho \frac{2\,L}{S_{\text{mín}}} \quad \Rightarrow \quad S_{\text{mín}} = \rho \frac{2\,L}{R_{\text{cable}}} = 1,7 \cdot 10^{-8}\,\frac{6}{0,03631} = 2,809 \cdot 10^{-6}\,\text{m}^2 = 2,809\,\text{mm}^2$$

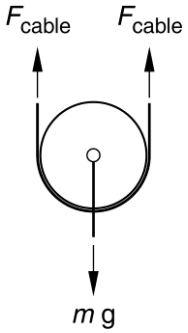
b) $R_{\text{cable}} = \rho \dfrac{2\,L}{S} = 1,7 \cdot 10^{-8}\,\dfrac{6}{4 \cdot 10^{-6}} = 0,0255\,\Omega$

c) $I = \dfrac{U}{R_{\text{cable}} + R_{\text{llums}}} = 10,00 \text{ A} \quad \Rightarrow \quad P = I^2 R = I^2 \left(R_{\text{cable}} + R_{\text{llums}}\right) = 120,0\,\text{W}$

OPCIÓ B

Exercici 3

a) $2F_{cable} - m\,\text{g} = 0 \quad \Rightarrow \quad F_{cable} = \dfrac{50 \cdot 9,807}{2} = 245,2\,\text{N}$



$$\sigma_n = \frac{F_{\text{cable}}}{S} = \frac{F_{\text{cable}}}{\pi d^2 / 4} = 12,49 \text{ N/mm}^2 = 12,49 \text{ MPa}$$

$$\varepsilon = \sigma_n / E = 96,05\ 10^{-6}$$

b) $\Delta L = \varepsilon\, L = 0,1921\,\text{mm}$

c) $W_{\text{motor}} = \Gamma\, \varphi_{\text{motor}} = m\,\text{g}\,\Delta h \quad \Rightarrow \quad \Gamma = m\,\text{g}\,\dfrac{(r_1 - r_2)\,r_3}{2\,r_1} = 2,942\,\text{Nm}$

Exercici 4

a) $P_{\text{diss}} = I \cdot U = 600\,\text{W} \quad \Rightarrow \quad U = \dfrac{P_{\text{diss}}}{I} = \dfrac{600}{50} = 12\,\text{V}$

b) $I = \dfrac{U - c\,\omega}{R} \quad \Rightarrow \quad \omega = \dfrac{U - I\,R}{c} = \dfrac{12 - 100 \cdot 0,03}{0,02} = 450 \text{ rad/s}$

c) $\eta_{\text{mot}} = \dfrac{P_{\text{mec}}}{P_{\text{elèctr}}} = \dfrac{\Gamma\,\omega}{I\,U} = \dfrac{c\,I\,\omega}{I\,U} =$

$$= \frac{c\,\omega}{U} = \frac{\omega}{600\,\text{rad/s}}$$