

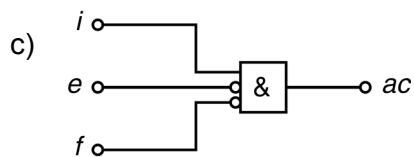
**SÈRIE 1****Primera part****Exercici 1**

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

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

**Segona part****OPCIÓ A****Exercici 3**

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

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

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

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

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

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

**Exercici 4**

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

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

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

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

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

## OPCIÓ B

**Exercici 3**

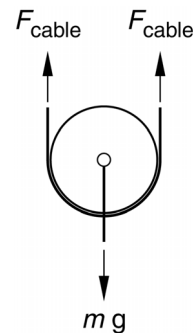
$$a) 2F_{\text{cable}} - mg = 0 \Rightarrow F_{\text{cable}} = \frac{50 \cdot 9,807}{2} = 245,2 \text{ N}$$

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

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

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

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

**Exercici 4**

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

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

$$c) \eta_{\text{mot}} = \frac{P_{\text{mec}}}{P_{\text{elèct}}} = \frac{\Gamma \omega}{IU} = \frac{c I \omega}{IU} = \frac{c \omega}{U} = \frac{\omega}{600 \text{ rad/s}}$$

