

Sèrie 3

Primera part

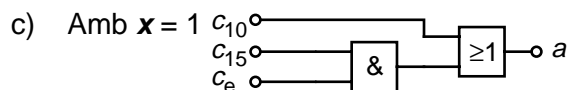
Exercici 1

Q1 b Q2 d Q3 d Q4 c Q5 c

Exercici 2

	c_{10}	c_{15}	c_e	a
	0	0	0	0
	0	0	1	0
	0	1	0	0
a) 0	1	1	1	1
	1	0	0	$x \leftarrow$ No és possible
	1	0	1	$x \leftarrow$ No és possible
	1	1	0	1
	1	1	1	1

b) Amb $x = 0$: $a = (c_{10} + c_e) \cdot c_{15}$
 Amb $x = 1$: $a = c_{10} + c_{15} \cdot c_e$



Segona part

OPCIÓ A

Exercici 3

a) $\eta_{\text{bomba}} = \frac{p q}{P_{\text{mot}}} = 0,7086$

b) $\eta_{\text{mq}} = \frac{P_{\text{mot}}}{P_{\text{dipòsit}}} = \frac{P_{\text{mot}} t_{\text{au}}}{E_{\text{dipòsit}}} = \frac{P_{\text{mot}} t_{\text{au}}}{V \rho p_e} = 0,4247$

c) $c = \frac{V \rho}{P_{\text{mot}} t_{\text{au}}} = \frac{1}{\rho_c \eta_{\text{mq}}} = 197,1 \frac{\text{g}}{\text{kW} \cdot \text{h}}$

Exercici 4

a) $\varphi_1 = \arctan \frac{L}{3L} = 18,43^\circ$ $\varphi_2 = \arctan \frac{1,5L}{3L} = 26,57^\circ$

b) $\sum \mathbf{F}_{\text{ext}} = 0 \rightarrow \begin{cases} F_1 \cos \varphi_1 - F_2 \cos \varphi_2 = 0 \\ F_1 \sin \varphi_1 + F_2 \sin \varphi_2 - mg = 0 \end{cases}$

$$F_1 = mg \frac{\cos \varphi_2}{\sin(\varphi_1 + \varphi_2)} = 496,2 \text{ N}$$

$$F_2 = mg \frac{\cos \varphi_1}{\sin(\varphi_1 + \varphi_2)} = 526,3 \text{ N}$$

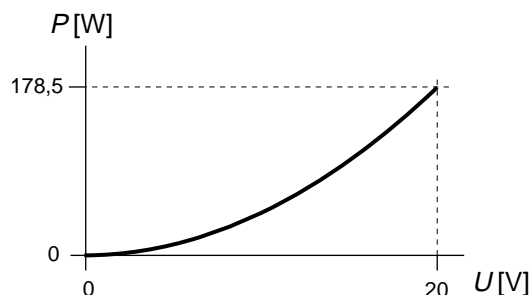
c) $\sigma_1 = \frac{F_1}{S}$; $\sigma_2 = \frac{F_2}{S} \rightarrow \frac{\sigma_1}{\sigma_2} = \frac{F_1}{F_2} = 0,9428$

OPCIÓ B

Exercici 3

a) $R = \rho \frac{L}{S} = \rho \frac{L}{\pi \left(\frac{d}{2}\right)^2} = 2,241 \Omega$

b) $P = UI = \frac{U^2}{R}$



c) $E = P t \frac{1}{\eta} = \frac{U^2}{R} t \frac{1}{\eta} = 1,148 \text{ MJ} = 318,9 \text{ W}\cdot\text{h}$

Exercici 4

a) $\eta_{\text{elèc}} = \frac{E_{\text{elèc}}}{m_r \rho} = 0,2644$

b) $E_{\text{aigua}} = m_a c_e \Delta t = 501,6 \cdot 10^3 \text{ MJ}$

$$E_{\text{tèrmica}} = m_r \rho (1 - \eta_{\text{elèc}}) = 651,0 \cdot 10^3 \text{ MJ}$$

$$\eta_{\text{tèrmic}} = \frac{E_{\text{aigua}}}{E_{\text{tèrmica}}} = 0,7705$$

c) $P_{\text{elèc}} = \frac{E_{\text{elèc}}}{24} = 2,708 \text{ MW}$

$$q = \frac{m_a}{24 \cdot 3600} \frac{1}{\rho_{\text{aigua}}} = 34,72 \text{ l/s}$$