

SÈRIE 2

Primera part

Exercici 1

Q1 c Q2 a Q3 b Q4 d Q5 d

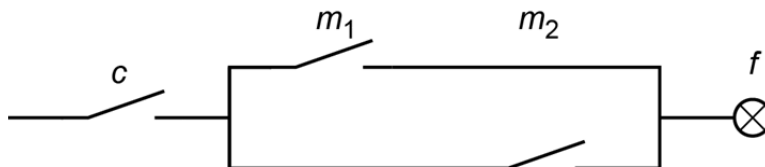
Exercici 2

a)

c	m_1	m_2	f
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

b) $f = c \cdot \overline{m_1} \cdot m_2 + c \cdot m_1 \cdot \overline{m_2} + c \cdot m_1 \cdot m_2 \Rightarrow f = c \cdot (m_1 + m_2)$

c)



Segona part

OPCIÓ A

Exercici 3

a) $E = \rho V c_e (T_1 - T_0) = 438,9 \text{ kJ}$

b) $P = \frac{E}{\Delta t} = 1,626 \text{ kW}; R_e = \frac{U^2}{P} = 32,54 \Omega; I = \frac{P}{U} = 7,068 \text{ A}$

c) $R_{eq} = \frac{U^2}{P_m} = 176,3 \Omega; R_{eq} = R_e + R_m \Rightarrow R_m = R_{eq} - R_e = 143,8 \Omega$

Exercici 4

$$a) \eta_{\text{gen}} = \frac{P_{\text{elèc}}}{P_2} \Rightarrow P_2 = \frac{P_{\text{elèc}}}{\eta_{\text{gen}}} = 1,765 \text{ MW}$$

Per a una potència constant, el parell Γ_2 màxim es produirà quan la velocitat de gir de l'eix sigui la mínima dins el rang de velocitats possibles: $\omega_2 = \tau \omega_1 = 90 \cdot 15 \cdot (2\pi / 60) = 141,4 \text{ rad/s}$

$$\Gamma_2 = \frac{P_2}{\omega_2} = 12,48 \text{ kNm}$$

$$b) \eta_{\text{mult}} = \frac{P_2}{P_1} = \frac{\Gamma_2 \omega_2}{\Gamma_1 \omega_1} = \frac{\Gamma_2 \tau}{\Gamma_1} = 0,7022$$

$$c) P_{\text{mult}} = \frac{P_{\text{elèc}}}{\eta_{\text{gen}} \eta_{\text{mult}}} (1 - \eta_{\text{mult}}) = 748,6 \text{ kW}; \quad P_{\text{gen}} = \frac{P_{\text{elèc}}}{\eta_{\text{gen}}} (1 - \eta_{\text{gen}}) = 264,7 \text{ kW}$$

OPCIÓ B

Exercici 3

$$a) V = \left[L_4 L_1 + \frac{1}{2} (L_4 - 2L_2) (L_3 - L_1) + L_2 (L_3 - L_1) \right] L_3 = 132 \cdot 10^{-6} \text{ m}^3; \quad m = \rho V = 0,165 \text{ kg}$$

$$b) V = \pi \left(\frac{d}{2} \right)^2 L \Rightarrow L = \frac{4V}{\pi d^2} = 18,67 \text{ m}$$

$$c) n = \frac{L_3}{e} = 200 \text{ capes}$$

Exercici 4

$$a) F_{\text{ch}} = mg = 12,26 \text{ kN}; \quad F_{\text{ch}} = p_{\text{int}} s_{\text{int}} \Rightarrow p_{\text{int}} = \frac{F_{\text{ch}}}{s_{\text{int}}} = \frac{F_{\text{ch}}}{\pi \left(\frac{d_{\text{int}}}{2} \right)^2} = 1,561 \text{ MPa}$$

$$b) \sigma = \frac{F_{\text{ch}}}{s_{\text{tija}}} = \frac{F_{\text{ch}}}{\pi \left(\frac{d_{\text{tija}}}{2} \right)^2} = 3,694 \text{ MPa}$$

$$c) v = \frac{q}{s_{\text{int}}} = \frac{q}{\pi \left(\frac{d_{\text{int}}}{2} \right)^2} = 0,3183 \text{ m/s}$$

$$d) P_h = p q = 4850 \text{ W}; \quad \eta = \frac{P_{\text{mec}}}{P_h} = \frac{F_{\text{ch}} v}{P_h} = 0,8046$$