SÈRIE 2

Primera part

Exercici 1

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

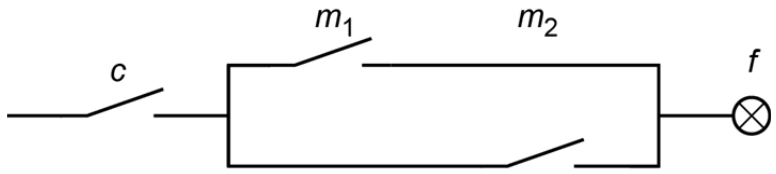
Exercici 2

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

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

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

Exercici 4

a) $\eta_{gen} = \dfrac{P_{elèc}}{P_2} \implies P_2 = \dfrac{P_{elèc}}{\eta_{gen}} = 1{,}765$ 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: $\omega_2 = \tau\, \omega_1 = 90 \cdot 15 \cdot (2\pi / 60) = 141{,}4$ rad/s

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

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

c) $P_{mult} = \dfrac{P_{elèc}}{\eta_{gen}\, \eta_{mult}}(1 - \eta_{mult}) = 748{,}6$ kW; $P_{gen} = \dfrac{P_{elèc}}{\eta_{gen}}\left(1 - \eta_{gen}\right) = 264{,}7$ kW

OPCIÓ B

Exercici 3

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

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

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

Exercici 4

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

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

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

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