SÈRIE 5

Primera part

Exercici 1

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

Exercici 2

a)

m_1	m_2	i	m_s	
0	0	0	1	
0	0	1	0	
0	1	0	0	
0	1	1	X	← No és possible
1	0	0	0	
1	0	1	X	← No és possible
1	1	0	X	← No és possible
1	1	1	1	

b) Amb X = 0 $m_s = \bar{m}_1 \cdot \bar{m}_2 \cdot \bar{i} + m_1 \cdot m_2 \cdot i$

c)
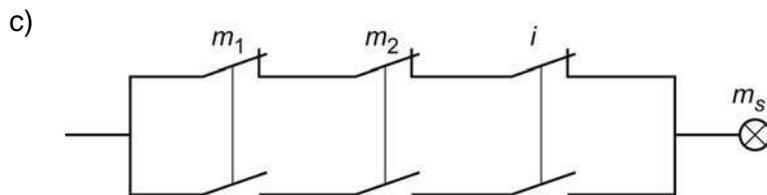
Segona part

OPCIÓ A

Exercici 3

a) $3U_{bat} - 3I_{led} R - U_{led} = 0 \;\Rightarrow\; R = \dfrac{3U_{bat} - U_{led}}{3I_{led}} = 1{,}067\ \Omega$

b) $E_{total} = \left(R(3I_{led})^2 + 3U_{led} \cdot I_{led} \right) t = 3U_{bat}\,3I_{led}\,t = 149{,}9\ \text{kJ} = 41{,}63\ \text{W h}$

c) $2U_{bat} - 3I_{led2} R - U_{led} = 0 \;\Rightarrow\; I_{led2} = \dfrac{2U_{bat} - U_{led}}{3R} = 1{,}344\ \text{A}$

d) Amb 3 bateries: $t_{bat} = \dfrac{3c_{bat}}{3I_{led}} = 1{,}2\ \text{h}$ Amb 2 bateries: $t_{bat} = \dfrac{2c_{bat}}{3I_{led2}} = 1{,}488\ \text{h}$

Exercici 4

a) $c = \dfrac{P}{c_b} = 0,2213$ kg/h

b) $t_b = \dfrac{m_b}{c} = 56,48$ h

c) $V_{ini} = m_b/\rho = 4,960$ m³ $\qquad V_{fi} = \pi d^2 h/4 = 0,03181$ m³

$\dfrac{\Delta V}{V_{ini}} = \dfrac{V_{ini} - V_{fi}}{V_{ini}} = 1 - \dfrac{V_{fi}}{V_{ini}} = 0,9936 = 99,36\%$

d) $m_b = t_b\, c = t_b\, \dfrac{P}{c_b} \;\; \Rightarrow \;\; t_b = \dfrac{m_b\, c_b}{P} \;\; \Rightarrow$

OPCIÓ B

Exercici 3

a)
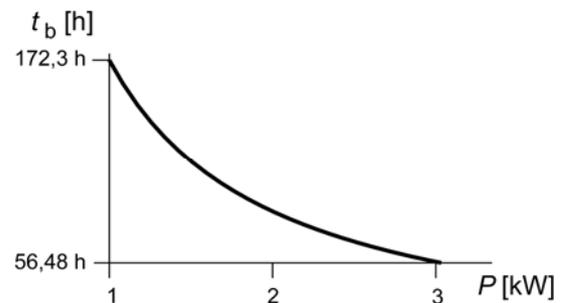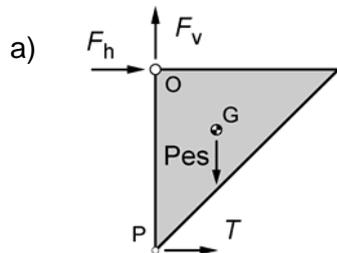
b) $m = \rho_{acer}\, \dfrac{1}{2} L^2\, e = 9,616$ kg

c)
$\sum \boldsymbol{M}(O) = 0 \;\; \rightarrow \;\; \dfrac{L}{3} mg - LT = 0 \;\; \rightarrow \;\; T = 31,44$ N

$\sum \boldsymbol{F} = 0 \;\; \rightarrow \;\; F_v - mg = 0 \;\; \rightarrow \;\; F_v = 94,31$ N

$\qquad\qquad\qquad\quad F_h + T = 0 \;\; \rightarrow \;\; F_h = -31,44$ N

d) $\sigma = \dfrac{T}{s} = 11,64$ MPa

Exercici 4

a) $P_{motor} = \eta_{motor}\, P_{elect} = \eta_{motor}\, U I = 343,6$ W

$n_{motor} = \dfrac{n_s}{\tau} \;\; \rightarrow \;\; \Gamma_{motor} = \dfrac{P_{motor}}{\dfrac{2\pi}{60} n_{motor}} = \dfrac{P_{motor}}{\dfrac{2\pi}{60} \dfrac{n_s}{\tau}} = 1,151\,Nm$

b) $P_s = \eta_{tot}\, P_{elect} = \eta_{tot}\, U I = 136,6$ W

$\Gamma_s = \dfrac{P_s}{\dfrac{2\pi}{60} n_s} = 130,5\,Nm$

c) $\Gamma_s = mg\, \dfrac{d}{2} \;\; \Rightarrow \;\; m = \dfrac{2\,\Gamma_s}{g\, d} = 120,9$ kg