SÈRIE 2

Exercici 1

Q1 b

Q2 b

Q3 a

Q4 c

Q5 d

Exercici 2

a)

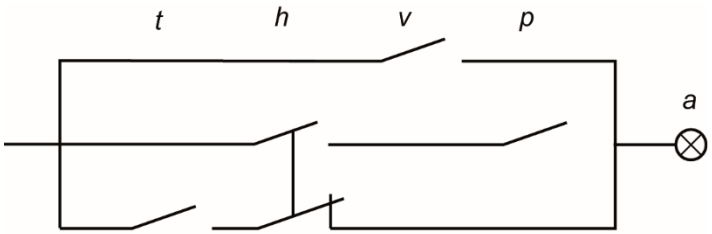
t	h	v	p	a
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

b)

$$a = (t + h + v + p)(t + h + v + \bar{p})(t + \bar{h} + v + p)(\bar{t} + \bar{h} + v + p)$$

$$a = t\bar{h} + hp + v$$

c)



Exercici 3

a)

$$P_{\text{butà}} = \frac{qc_e\Delta T}{\eta_{\text{butà}}} = 23{,}52\,\text{kW}$$

$$P_{\text{elèctr}} = \frac{qc_e\Delta T}{\eta_{\text{elèctr}}} = 21{,}58\,\text{kW}$$

b)

$$q_{\text{butà}} = \frac{P_{\text{butà}}}{p_{c\_butà}} = 1{,}802\,\text{kg/h}$$

c)

$$ce_{\text{butà}} = \frac{t\,c_{\text{butà}}}{m_{\text{butà}}/q_{\text{butà}}} = 12{,}73\,€$$

$$ce_{\text{elèctr}} = P_{\text{elèctr}}\,t\,c_{\text{elèctr}} = 22{,}66\,€$$

d)

$$m_{CO_2\_\text{butà}} = q_{\text{butà}}\,t\,e_{\text{butà}} = 26{,}67\,\text{kg CO}_2$$

$$m_{CO_2\_\text{elèctr}} = P_{\text{elèctr}}\,t\,e_{\text{elèctr}} = 26{,}98\,\text{kg CO}_2$$

Exercici 4

a)

$$c = \frac{E_{\text{bat}}}{U} = 6,667\text{Ah}$$

b)

$$P_{\text{mec}} = mgv_i \sin(\alpha);\ \ P_{\text{elèctr}} = \frac{P_{\text{mec}}}{\eta};$$

$$v_1 = \frac{\eta P_1}{mg\sin(\alpha)} = 0,4443\,\text{m/s} = 1,6\,\text{km/h}$$

$$v_2 = \frac{\eta P_2}{mg\sin(\alpha)} = 2,639\,\text{m/s} = 9,5\,\text{km/h}$$

c)

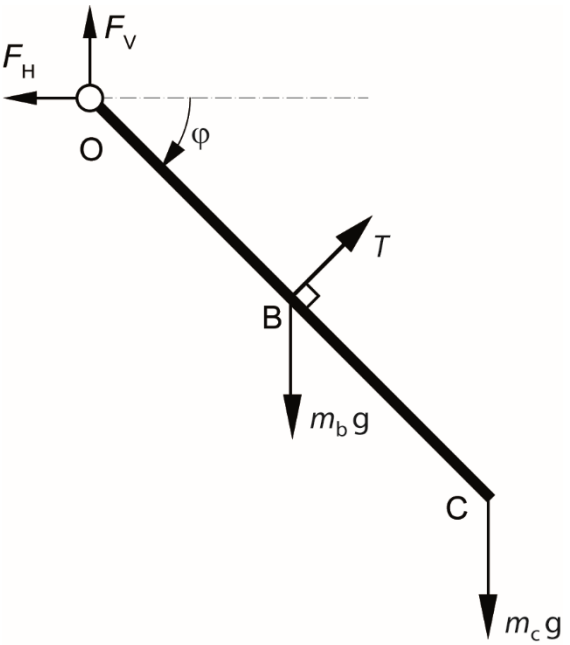
$$t_1 = \frac{E_{\text{bat}}}{P_1} = 2,192\,\text{h};$$

$$t_2 = \frac{E_{\text{bat}}}{P_2} = 0,3691\,\text{h};$$

$$s_{\text{màx}} = v_1 t_1 = v_2 t_2 = 3,506\,\text{km}$$

Exercici 5

a)



b)

$$\sum M(O)=0; \quad T\,l - m_b\,g\,l\cos(\varphi) - m_c\,g\,2l\cos(\varphi)=0;$$

$$\varphi = 45^o \quad \rightarrow \quad T = 1040\,\text{N}$$

c)

$$\left.\begin{array}{ll} \sum F_{\text{horitzontals}}=0 & \rightarrow \quad T\sin(45) - F_H = 0 \\ \sum F_{\text{verticals}}=0 & \rightarrow \quad F_V + T\cos(45) - m_b g - m_c g = 0 \end{array}\right\} \begin{array}{l} F_H = T\sqrt{2}/2 = 735{,}5\,\text{N} \\ F_V = g(m_b + m_c) - T\sqrt{2}/2 = 294{,}2\,\text{N} \end{array}$$

d)

$$\Gamma = T\frac{d}{2} = 130{,}0\,\text{Nm}$$

Exercici 6

a)

$$p = \frac{F}{\frac{\pi d_{\text{int\_mín}}^2}{4}} \rightarrow d_{\text{int\_mín}} = \sqrt{\frac{4F}{p\pi}} = 64{,}33\,\text{mm}$$. Cal escollir el model M_5 $d_{\text{int}} = 70\text{mm}$ i $d_{\text{tija}} = 40\text{mm}$

b)

$$p_0 = \frac{F}{A_{\text{avanç}}} = \frac{F}{\frac{\pi d_{\text{int}}^2}{4}} = 16{,}89\,\text{MPa}$$

c)

$$v_{\text{tija}} = \frac{q}{A_{\text{avanç}}} = 216{,}5\,\text{mm/s}$$

$$P_{\text{cil}} = F v_{\text{tija}} = 14{,}04\ \text{kW}$$

d)

$$\sigma = \frac{4F}{\pi d_{\text{tija}}^2} = 51{,}73\ \text{MPa}$$