



SÈRIE 2

Exercici 1

Q1 b

Q2 b

Q3 a

Q4 c

Q5 d

Exercici 2

a)

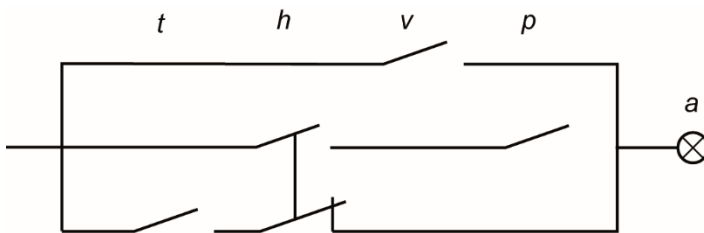
| t | h | v | p | a |
|-----|-----|-----|-----|-----|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 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)

$$q_{\text{butà}} = \frac{P_{\text{butà}}}{\rho_{c_butà}} = 1,802 \text{ kg/h}$$

c)

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

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

d)

$$m_{\text{CO}_2_{\text{butà}}} = q_{\text{butà}} t e_{\text{butà}} = 26,67 \text{ kg CO}_2$$

$$m_{\text{CO}_2_{\text{elèctr}}} = P_{\text{elèctr}} t e_{\text{elèctr}} = 26,98 \text{ kg CO}_2$$



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)

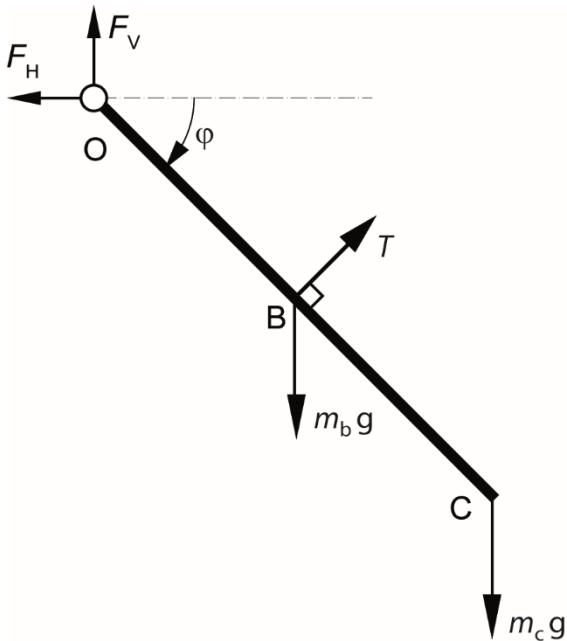
$$t_1 = \frac{E_{\text{bat}}}{P_1} = 2,192 \text{ h};$$

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

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

Exercici 5

a)



b)

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

$$\varphi = 45^\circ \rightarrow T = 1040 \text{ N}$$

c)

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

d)

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



Exercici 6

a)

$$\rho = \frac{F}{\frac{\pi d_{\text{int_mín}}^2}{4}} \rightarrow d_{\text{int_mín}} = \sqrt{\frac{4F}{\rho\pi}} = 64,33 \text{ mm. Cal escollir el model M}_5 \text{ } d_{\text{int}} = 70 \text{ mm i } d_{\text{tija}} = 40 \text{ mm}$$

b)

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

c)

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

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

d)

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