



SÈRIE 2

Exercici 1

Q1 d

Q2 b

Q3 a

Q4 c

Q5 a

Exercici 2

a)

a	b	c	d	z
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

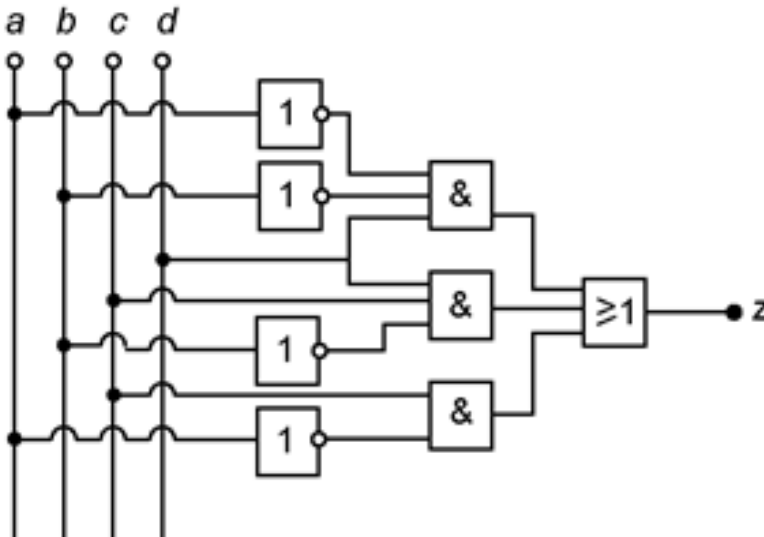
b)

$$z = (\bar{a} \bar{b} \bar{c} d) + (\bar{a} \bar{b} c \bar{d}) + (\bar{a} \bar{b} c d) + (\bar{a} b \bar{c} \bar{d}) + (\bar{a} b \bar{c} d) + (\bar{a} b c \bar{d}) + (\bar{a} b c d)$$

simplificant: $z = \bar{a} \bar{b} d + \bar{b} c d + \bar{a} c$



c)



Exercici 3

a)

$$E_{\text{cons}} = P_1 t_1 + P_2 (t - t_1) = 1250 \text{ Wh} = 4500 \text{ kJ}$$

b)

$$c_r = \frac{P_1 t_1}{E_{\text{cons}}} \cdot 100 = 80 \%$$

c)

$$c_{\text{punta}} = E_{\text{cons}} p_{\text{punta}} = 0,4287 \text{ €}$$

$$c_{\text{vall}} = E_{\text{cons}} p_{\text{vall}} = 0,2712 \text{ €}$$

d)

$$e_q = (c_{\text{punta}} - c_{\text{vall}}) n \cdot 12 = 18,90 \text{ €}$$



Exercici 4

a)

$$\alpha = \frac{\omega_f - \omega_0}{t} = \frac{-n_0 \frac{2\pi}{60}}{t} = -8,727 \text{ rad/s}^2$$

b)

$$\varphi = \varphi_0 + \omega_0 t + \frac{1}{2} \alpha t^2 = 15,71 \times 10^3 \text{ rad}$$

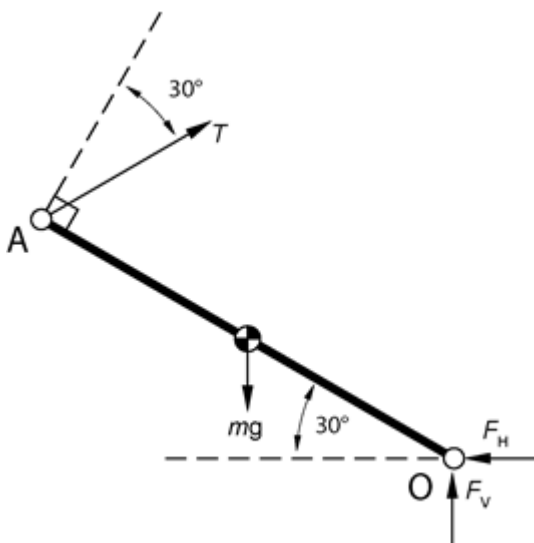
$$n = \frac{\varphi}{2\pi} = 2500 \text{ voltes}$$

c)

$$E_{\text{diss}} = \frac{1}{2} I (\omega_0^2 - \omega_f^2) = 123,4 \text{ kJ}$$

Exercici 5

a)



b)

$$\sum M(O) = 0 \rightarrow T \cos(30) 2L - mg \cos(30)L = 0 \rightarrow T = \frac{mg}{2} = 245,2 \text{ N}$$



c)

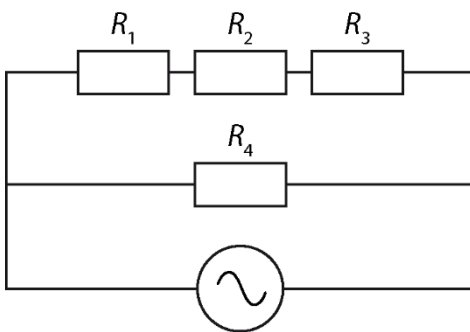
$$\left. \begin{array}{l} \sum F_{\text{horizontals}} = 0 \rightarrow T \cos(30) - F_H = 0 \\ \sum F_{\text{verticals}} = 0 \rightarrow T \sin(30) - mg + F_V = 0 \end{array} \right\} \begin{array}{l} F_H = T\sqrt{3}/2 = 212,3 \text{ N} \\ F_V = 3mg/4 = 367,8 \text{ N} \end{array}$$

d)

$$\Gamma = T \frac{d}{2} = 55,16 \text{ Nm}$$

Exercici 6

a)



b)

$$R_{\text{eq}} = \frac{1}{\frac{1}{R_1 + R_2 + R_3} + \frac{1}{R_4}} = 37,5 \Omega$$

c)

$$I = \frac{U}{R_{\text{eq}}} = 6,133 \text{ A}; \quad P = \frac{U^2}{R_{\text{eq}}} = 1,411 \text{ kW}$$



SÈRIE 5

Exercici 1

Q1 c

Q2 b

Q3 a

Q4 d

Q5 a



Exercici 2

a)

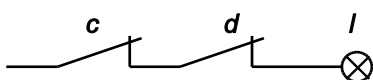
a	b	c	d	t
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

b)

$$I = \bar{a} \bar{b} \bar{c} \bar{d} + \bar{a} b \bar{c} \bar{d} + a \bar{b} \bar{c} \bar{d} + a b \bar{c} \bar{d}$$

simplificant: $I = \bar{c} \bar{d}$

c)





Exercici 3

a)

$$m_{electr} = c_{electr} (d_{urbà} + d_{extraurbà}) FE_{electr} = 4,167 \text{ kg de CO}_2$$

$$m_{gas} = (c_{gas_urbà} d_{urbà} + c_{gas_extraurbà} d_{extraurbà}) FE_{gas} = 13,66 \text{ kg de CO}_2$$

b)

$$p_{electr} = c_{electr} (d_{urbà} + d_{extraurbà}) p_{electr} = 2,421 \text{ €}$$

$$p_{gas} = (c_{gas_urbà} d_{urbà} + c_{gas_extraurbà} d_{extraurbà}) p_{gas} = 5,755 \text{ €}$$

c)

$$c_{v_electr} + p_{electr} t = c_{v_gas} + p_{gas} t$$

$$t = 2309 \text{ dies} = 8,2 \text{ anys}$$



Exercici 4

a)

$$E_{\text{aigua}} = c_e m \Delta T = c_e \rho V \Delta T = 109,7 \text{ kJ}$$

b)

$$R = \frac{U^2}{P} = 44,08 \Omega$$

c)

$$E_{\text{escalf}} = P_{\text{escalf}} t = 150 \text{ KJ}$$

d)

$$\eta_{\text{escalf}} = \frac{E_{\text{aigua}}}{E_{\text{escalf}}} = 73,15\%$$

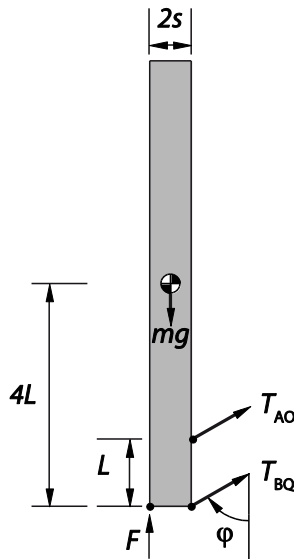
$$\eta_{\text{vitro}} = \frac{E_{\text{aigua}}}{E_{\text{vitro}}} = 27,71\%$$

El procés més eficient té lloc quan s'utilitza l'escalfador d'aigua, que seria l'alternativa a escollir.



Exercici 5

a)



b)

$$\left. \begin{aligned} \sum F_{\text{horizontals}} &= 0; \\ T_{AO} \sin(\varphi) + T_{BQ} \sin(\varphi) &= 0; \quad T_{AO} = -T_{BO} \\ \sum F_{\text{verticals}} &= 0; \\ T_{AO} \cos(\varphi) + T_{BQ} \cos(\varphi) + F - mg &= 0 \end{aligned} \right\} F = mg = 29,42 \text{ N}$$

c)

$$\begin{aligned} \sum M(P) &= 0; \\ mgs - T_{BQ} \cos(\varphi) 2s - T_{AO} \cos(\varphi) 2s + T_{AO} \sin(\varphi) L &= 0 \\ T_{AO} &= -\frac{mgs}{\sin(\varphi)L} \Big|_{\varphi=30^\circ} = -35,31 \text{ N} \end{aligned}$$

El valor negatiu de T_{AO} indica que el sentit correcte de la força és el contrari al dibuixat al diagrama de cos lliure inicial



Exercici 6

a)

$$\omega_{\text{roda}} = \frac{P_{\text{mot}}}{\tau_{\text{mot}}} = 100 \text{ rad/s}$$

$$v = \omega_{\text{roda}} \frac{d}{2} = 113,4 \text{ km/h}$$

b)

$$t_{\text{màx}} = \frac{s_{\text{màx}}}{v} = 1,764 \text{ h}$$

$$E_{\text{subm}} = P_{\text{mot}} t_{\text{màx}} = 26,46 \text{ kWh} = 95,2 \text{ MJ}$$

c)

$$E_{\text{bat}} = \frac{E_{\text{subm}}}{\eta_{\text{mot}}} = 29,39 \text{ kWh} = 105,8 \text{ MJ}$$