Sèrie 4

Primera part

Exercici 1

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

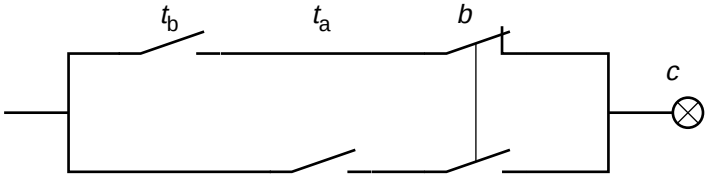
Exercici 2

a)

t_b	t_a	b	c	
0	0	0	0	
0	0	1	0	
0	1	0	0	
0	1	1	1	
1	0	0	1	
1	0	1	0	
1	1	0	X	← No és possible
1	1	1	X	← No és possible

b) Amb X = 1 $c = t_b \cdot \bar{b} + t_a \cdot b$

c)



Segona part

OPCIÓ A

Exercici 3

a) $\sum M(O) = 0 \quad \rightarrow \quad mg(L+d) - FL = 0$

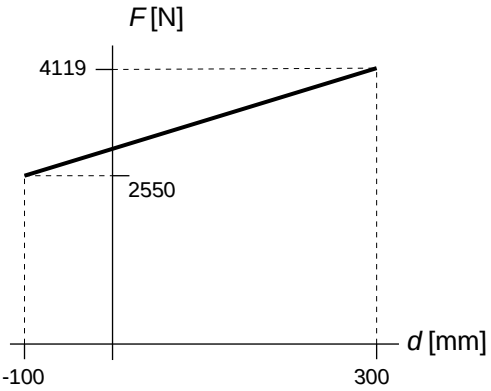
$$F = mg\frac{(L+d)}{L} = mg\left(1+\frac{d}{L}\right) = mg\left(1+\frac{d}{750}\right) \text{N},\ d \text{ en mm}$$

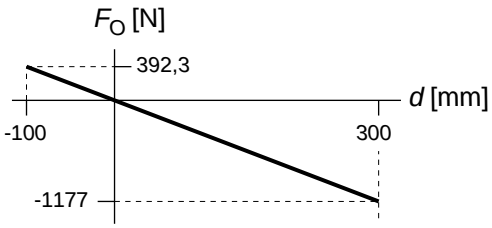
La roda fa sobre el terra aquesta força F avall.

b) $F + F_O = mg \rightarrow F_O = mg - F = mg - mg\left(1+\frac{d}{L}\right) = -mg\frac{d}{L}$.

El vehicle fa una força de valor $mg\frac{d}{L}$ vertical avall.

c)





d) $d = 0 \;\rightarrow\; F_O = 0$ i $F = 2942\,\text{N}$

Exercici 4

a) $P = q \cdot \rho_{\text{aigua}} \cdot c_p \cdot \Delta t = 7\,\frac{\text{l}}{\text{min}}\,\frac{1\,\text{min}}{60\,\text{s}}\,1000\,\frac{\text{g}}{\text{l}}\,4{,}187\,\frac{\text{J}}{\text{g K}}\,25\,\text{K} = 12{,}21\,\text{kW}$

b) $\eta = \dfrac{P}{q_{\text{comb}} \cdot p_c} \;\rightarrow\; q_{\text{comb}} = \dfrac{P}{\eta \cdot p_c} = 0{,}32\,\dfrac{\text{g}}{\text{s}}$

c) $m_{\text{comb}} = q_{\text{comb}} \cdot t = 0{,}32 \cdot 10 \cdot 60 = 192{,}0\,\text{g}$

$c = m_{\text{comb}}\,\dfrac{c_b}{m_b} = 0{,}2074\,€$

OPCIÓ B

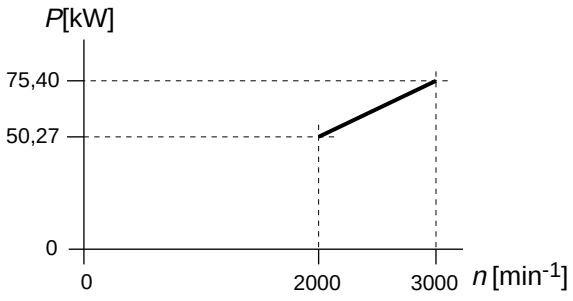
Exercici 3

a) $E_m = \Delta E_c = \frac{1}{2} m v_2^2 = \frac{1}{2} 1290 \left(100\,\frac{1000}{3600}\right)^2 = 497{,}7 \cdot 10^3\,\text{J} = 497{,}7\,\text{kJ}$

b) $\eta = \dfrac{E_m}{E_{\text{comb}}} = \dfrac{E_m}{m_{\text{comb}} \cdot p_c} = 0{,}2129 = 21{,}29\%$

c) $n_1 = 2000\,\text{min}^{-1} \;\rightarrow\; \omega_1 = 209{,}4\,\text{rad/s} \;\rightarrow\; P_1 = 50{,}27\,\text{kW}$

$n_1 = 3000\,\text{min}^{-1} \;\rightarrow\; \omega_1 = 314{,}2\,\text{rad/s} \;\rightarrow\; P_1 = 75{,}40\,\text{kW}$



Exercici 4

a) $I_{34} = \dfrac{U}{R_3 + R_4} = \dfrac{6}{250 + 125} = 16 \cdot 10^{-3}\ \text{A} = 16\ \text{mA}$

b) $U_{DB} = I_{34} \cdot R_4 = 16 \cdot 10^{-3} \cdot 125 = 2\ \text{V}$

c) Com que el pont està equilibrat, la tensió U_{CB} i la U_{DB} és la mateixa.

$I_2 = \dfrac{U_{CB}}{R_2} = \dfrac{U_{DB}}{R_2} = \dfrac{2}{200} = 10 \cdot 10^{-3}\ \text{A} = 10\ \text{mA}$

d) Com que el pont està equilibrat, el corrent per R_2 i per R_1 és el mateix.

$U = I_2 (R_1 + R_2) \ \rightarrow\ R_1 = \dfrac{U}{I_2} - R_2 = 400\ \Omega$

Sèrie 3

Primera part

Exercici 1

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

Exercici 2

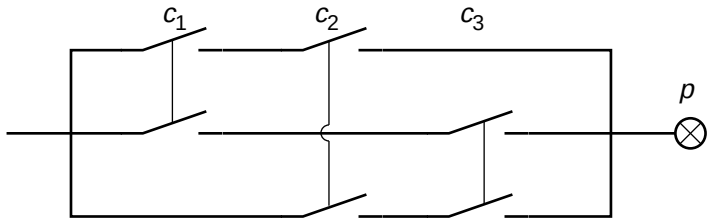
a)

c_1	c_2	c_3	p
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

b) $p = \bar{c}_1 \cdot c_2 \cdot c_3 + c_1 \cdot \bar{c}_2 \cdot c_3 + c_1 \cdot c_2 \cdot \bar{c}_3 + c_1 \cdot c_2 \cdot c_3$

$p = c_1 \cdot c_2 + c_1 \cdot c_3 + c_2 \cdot c_3$

c)



Segona part

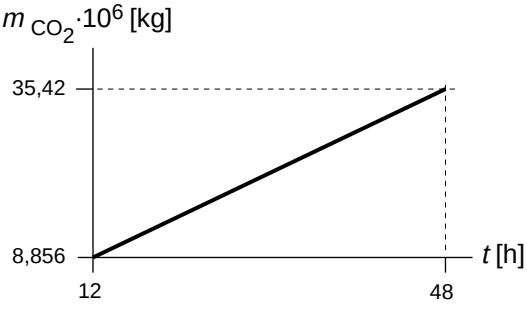
OPCIÓ A

Exercici 3

a) $V = \dfrac{m}{\rho} = 6{,}296 \cdot 10^3 \text{ m}^3$

b) $\eta = \dfrac{P_{\text{elèc}}}{P_{\text{calor}}} = \dfrac{P_{\text{elèc}}}{p \cdot \dfrac{m}{t}} = 0{,}299$

c) $m_{CO_2} = e \cdot E_{\text{elèc}} = e \cdot P_{\text{elèc}} \cdot t = 738 \cdot 10^3 \cdot t$ kg , t en h.



Exercici 4

a) $\left.\begin{array}{l} P = U \cdot I \\ U = R \cdot I \end{array}\right\} \rightarrow \quad R = \dfrac{U^2}{P} = 88{,}16\hat{} \ \Omega$

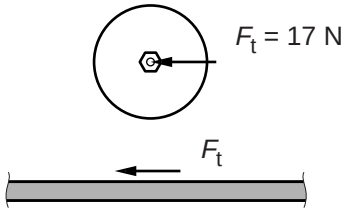
b) $L = \dfrac{R \cdot S}{\rho} = \dfrac{R \cdot \pi \dfrac{d^2}{4}}{\rho} = 5{,}540 \text{ m}$

c) $E = P \cdot t = 312{,}5 \text{ W} \cdot \text{h}$

OPCIÓ B

Exercici 3

a)



b) $P_{mec} = \Gamma \cdot \omega = F_f \cdot r \cdot \omega = F_E \cdot r \cdot n \cdot \dfrac{2\pi}{60} = 352{,}5 \text{ W}$

c) $P_{elèc} = \dfrac{P_{mec}}{\eta} = 542{,}3 \text{ W}$

d) $E_{elèc} = P_{elèc} \cdot t = 226{,}0 \text{ W} \cdot \text{h}$

Exercici 4

a) $L = 3\left(10\, d + 2\pi \dfrac{d}{2}\right) = 15{,}77 \text{ m}$

$L_t = n \cdot L = 630{,}8 \text{ m}$

b) $P = P_{tub} \cdot L = 788{,}5 \text{ W}$

$P_t = n \cdot P = 31{,}54 \text{ kW}$

c) $E = P_t \cdot t = 157{,}7 \text{ kW} \cdot \text{h}$