

SÈRIE 4

Primera part

Exercici 1

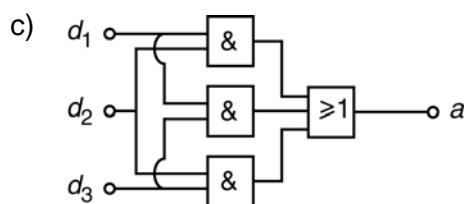
Q1 b Q2 c Q3 d Q4 c Q5 b

Exercici 2

d_1	d_2	d_3	a
0	0	0	0
0	0	1	0
0	1	0	0
a) 0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

$$b) \quad a = \bar{d}_1 \cdot d_2 \cdot d_3 + d_1 \cdot \bar{d}_2 \cdot d_3 + d_1 \cdot d_2 \cdot \bar{d}_3 + d_1 \cdot d_2 \cdot d_3$$

$$a = d_1 \cdot d_2 + d_1 \cdot d_3 + d_2 \cdot d_3$$



Segona part

OPCIÓ A

Exercici 3

$$a) \quad \eta_{\text{alternador}} = \frac{P_e}{P_{\text{motor}}} = 0,8889$$

$$b) \quad \eta_{\text{motor}} = \frac{E_{\text{motor}}}{E_{\text{combustible}}} = \frac{1}{\rho_c c_e} = 0,3032$$

$$c) \quad I = \frac{P_e}{\sqrt{3} U \cos \varphi} = \frac{32 \cdot 10^3}{\sqrt{3} \cdot 230 \cdot 0,8} = 100,4 \text{ A}$$

$$d) \quad \eta = \eta_{\text{motor}} \cdot \eta_{\text{alternador}}$$

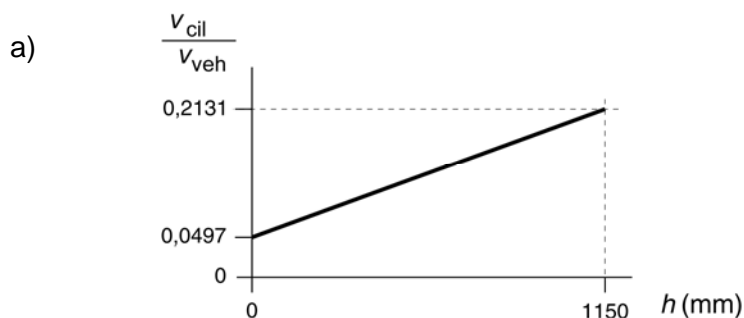
$$\rightarrow E_{\text{dis}} = (P_{\text{combustible}} - P_e) t = P_e \left(\frac{1}{\eta} - 1 \right) t = 346,92 \text{ kW h} = 1249 \text{ MJ}$$

Exercici 4

$$a) m = \rho V = \rho(3 \cdot L_3 \cdot L_3 \cdot L_2) = \rho(L_1 \cdot L_3 \cdot L_2 + L_3 \cdot L_3 \cdot L_2) = 9,75 \cdot 10^{-3} \text{ kg} = 9,75 \text{ g}$$

$$b) V = \pi \left(\frac{d}{2} \right)^2 L \rightarrow L = \frac{4V}{\pi d^2} = 1,103 \text{ m}$$

$$c) \frac{L_1}{e} = 40 \text{ capes}$$

OPCIÓ B**Exercici 3**

b) La potència d'elevació del vehicle la proporcionen els cilindres:

$$P_{\text{cil}} = F_{\text{cil}} v_{\text{cil}} = mg v_{\text{veh}} \rightarrow F_{\text{cil}} = mg \frac{v_{\text{veh}}}{v_{\text{cil}}} = mg \frac{7040}{h + 350} = 1500 \cdot 9,807 \frac{7040}{800 + 350} = 90,05 \text{ kN}$$

$$c) p_{\text{int}} = \frac{F_{\text{cil}}}{2\pi(d_{\text{int}}/2)^2} = 5,733 \text{ MPa}$$

Exercici 4

$$a) P_{\text{motor}} = \eta_{\text{motor}} P_{\text{elect}} = \eta_{\text{motor}} UI = 22,70 \text{ W}$$

$$\eta_{\text{motor}} = \frac{n_s}{\tau} \rightarrow \Gamma_{\text{motor}} = \frac{P_{\text{motor}}}{\frac{2\pi}{60} n_{\text{motor}}} = \frac{P_{\text{motor}}}{\frac{2\pi}{60} \frac{n_s}{\tau}} = 0,2062 \text{ Nm}$$

$$b) P_{\text{sortida}} = \eta_{\text{tot}} P_{\text{elect}} = \eta_{\text{tot}} UI = 9,504 \text{ W}$$

$$\Gamma_{\text{sortida}} = \frac{P_{\text{sortida}}}{\frac{2\pi}{60} n_s} = 3,108 \text{ Nm}$$

$$c) \eta_{\text{red}} = \frac{\eta_{\text{tot}}}{\eta_{\text{mot}}} = \frac{0,36}{0,86} = 0,4186$$

SÈRIE 3

Primera part

Exercici 1

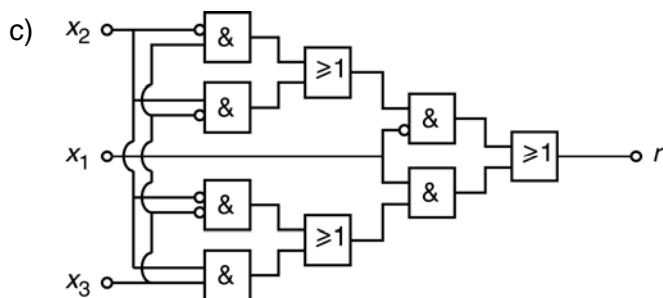
Q1 a Q2 a Q3 c Q4 b Q5 d

Exercici 2

x_1	x_2	x_3	r
0	0	0	0
0	0	1	1
0	1	0	1
a) 0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

b)
$$r = \bar{x}_1 \cdot \bar{x}_2 \cdot x_3 + \bar{x}_1 \cdot x_2 \cdot \bar{x}_3 + x_1 \cdot \bar{x}_2 \cdot \bar{x}_3 + x_1 \cdot x_2 \cdot x_3$$

$$r = \bar{x}_1 \cdot (\bar{x}_2 \cdot x_3 + x_2 \cdot \bar{x}_3) + x_1 \cdot (\bar{x}_2 \cdot \bar{x}_3 + x_2 \cdot x_3)$$

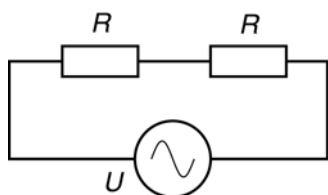


Segona part

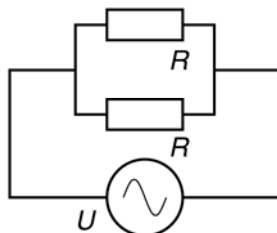
OPCIÓ A

Exercici 3

a) Interruptors avall (1)



Interruptors amunt (2)



b) $R_1 = R + R = 2R = 500 \Omega$

$$R_2 = \left(\frac{1}{R} + \frac{1}{R} \right)^{-1} = \frac{R}{2} = 125 \Omega$$

c) $P_1 = \frac{U^2}{R_1} = \frac{230^2}{500} = 105,8 \text{ W}$; $P_2 = \frac{U^2}{R_2} = \frac{230^2}{125} = 423,2 \text{ W}$

Exercici 4

$$a) P_{\text{cons}} = \frac{E_{\text{anual}}}{t_{\text{any}}} = \frac{92600 \cdot 10^6}{365 \cdot 24 \cdot 60 \cdot 60} = 2936 \text{ W}$$

$$b) c_{\text{mín}} = \frac{P_{\text{mín}}}{\eta \rho_{\text{pellets}}} = \frac{4,4 \cdot 10^3}{0,90 \cdot 17,25 \cdot 10^6} = 0,2834 \cdot 10^{-3} \text{ kg/s} = 1,020 \text{ kg/h}$$

$$c_{\text{màx}} = \frac{P_{\text{màx}}}{\eta \rho_{\text{pellets}}} = \frac{25 \cdot 10^3}{0,90 \cdot 17,25 \cdot 10^6} = 1,610 \cdot 10^{-3} \text{ kg/s} = 5,797 \text{ kg/h}$$

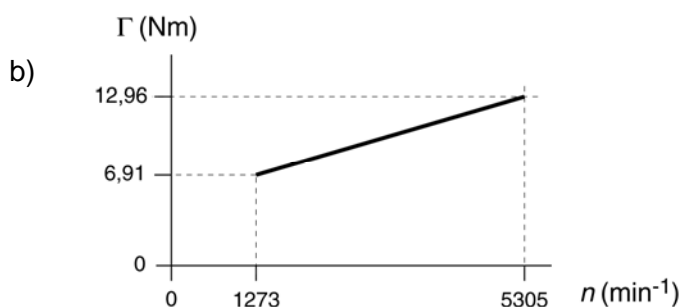
$$c) P_{\text{útil}} = c \rho_{\text{pellets}} \eta = 3,7 \frac{1}{3600} 17,25 \cdot 10^6 \cdot 0,90 = 15,96 \text{ kW}$$

$$E_{\text{anual}} = P_{\text{útil}} t_{\text{func.}} \rightarrow \frac{t_{\text{func.}}}{t_{\text{any}}} \cdot 100 = \frac{E_{\text{anual}}/P_{\text{útil}}}{t_{\text{any}}} \cdot 100 = \frac{P_{\text{cons}}}{P_{\text{útil}}} \cdot 100 = 18,40 \%$$

OPCIÓ B**Exercici 3**

$$a) n_{\text{mín}} = \frac{1,2 \cdot 10^3}{\Gamma_{\text{mot}}} \frac{60}{2\pi} = 1273 \text{ min}^{-1}$$

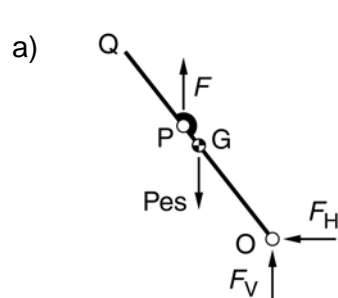
$$n_{\text{màx}} = \frac{5 \cdot 10^3}{\Gamma_{\text{mot}}} \frac{60}{2\pi} = 5305 \text{ min}^{-1}$$



c) En règim estacionari:

$$\Gamma_{\text{mot}} = \Gamma_{\text{màq}} = a + b n_{\text{nom}} \rightarrow n_{\text{nom}} = \frac{\Gamma_{\text{mot}} - a}{b} = 2667 \text{ min}^{-1}$$

$$d) P_{\text{nom}} = \Gamma_{\text{mot}} 2\pi n_{\text{nom}}/60 = 2,513 \text{ kW} \rightarrow E_{\text{cons}} = \frac{P_{\text{nom}} t}{\eta} = 11,09 \text{ kW h}$$

Exercici 4

$$b) \sum M(O) = 0 \rightarrow mg \frac{(L_1 + L_2)}{2} \cos \varphi - F L_2 \cos \varphi = 0$$

$$F = mg \frac{(L_1 + L_2)}{2 L_2} = 50 \cdot 9,807 \frac{(250 + 380)}{2 \cdot 380} = 406,5 \text{ N}$$

$$F_V - mg + F = 0 \rightarrow F_V = mg - F = 83,88 \text{ N}$$

$$F_H = 0$$

$$c) \text{Posició A} \quad \sin \varphi = \frac{h}{L_2} \rightarrow \varphi = \text{asin} \left(\frac{h}{L_2} \right) = 52,14^\circ$$

$$\text{Posició B} \quad \sin \varphi = \frac{(h-b)}{L_2} \rightarrow \varphi = \text{asin} \left(\frac{h-b}{L_2} \right) = 23,25^\circ$$