SÈRIE 4

Primera part

Exercici 1

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

Exercici 2

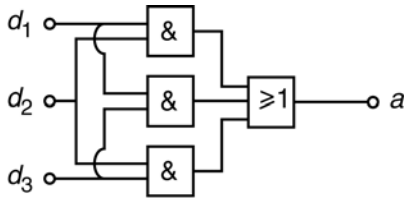
a)

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

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

c)



Segona part

OPCIÓ A

Exercici 3

a) $\eta_{\text{alternador}} = \dfrac{P_{\text{e}}}{P_{\text{motor}}} = 0{,}8889$

b) $\eta_{\text{motor}} = \dfrac{E_{\text{motor}}}{E_{\text{combustible}}} = \dfrac{1}{p_{\text{c}}\, c_e} = 0{,}3032$

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

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

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

Exercici 4

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

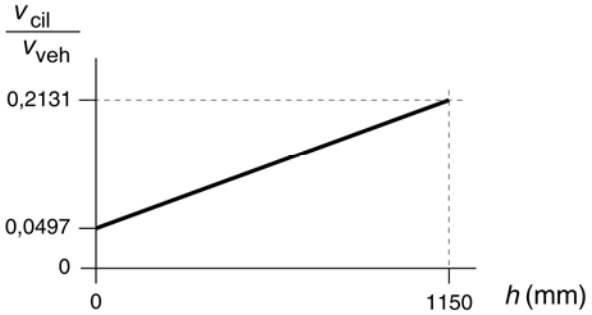
b) $V = \pi\left(\dfrac{d}{2}\right)^2 L \quad \rightarrow \quad L = \dfrac{4V}{\pi d^2} = 1{,}103\ \text{m}$

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

OPCIÓ B

Exercici 3

a)



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

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

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

Exercici 4

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

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

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

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

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

SÈRIE 3

Primera part

Exercici 1

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

Exercici 2

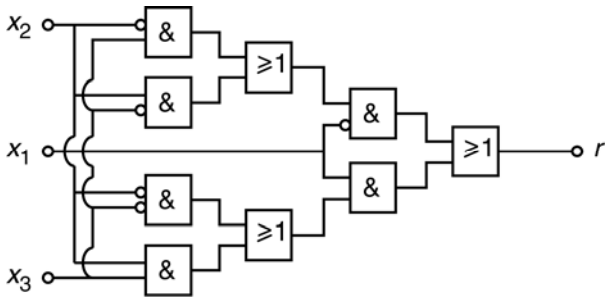
a)

x_1	x_2	x_3	r
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

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

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

c)

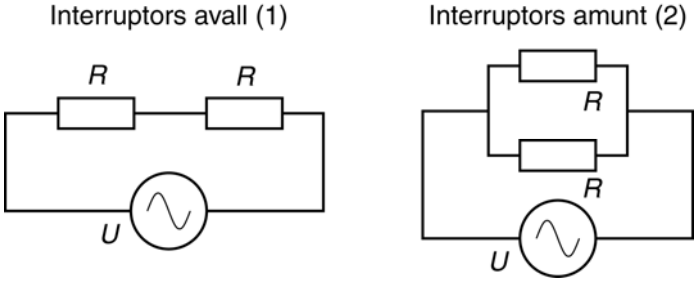


Segona part

OPCIÓ A

Exercici 3

a)



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

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

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

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

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

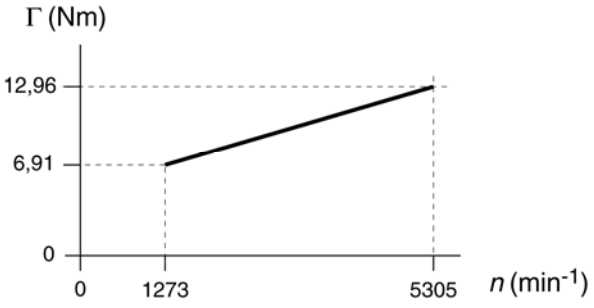
OPCIÓ B

Exercici 3

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

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

b)



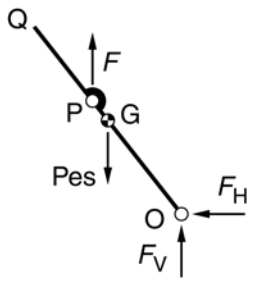
c) En règim estacionari:

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

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

Exercici 4

a)



b) $\sum M(\text{O}) = 0 \quad \rightarrow \quad m g \dfrac{(L_1 + L_2)}{2} \cos\varphi - F\, L_2 \cos\varphi = 0$

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

$F_{\text{V}} - m g + F = 0 \quad \rightarrow \quad F_{\text{V}} = m g - F = 83,88 \text{ N}$

$F_{\text{H}} = 0$

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

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