



SÈRIE 1

Exercici 1

Q1 d

Q2 a

Q3 d

Q4 b

Q5 c

Exercici 2

a)

v_1	v_2	s	p	d
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	0
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

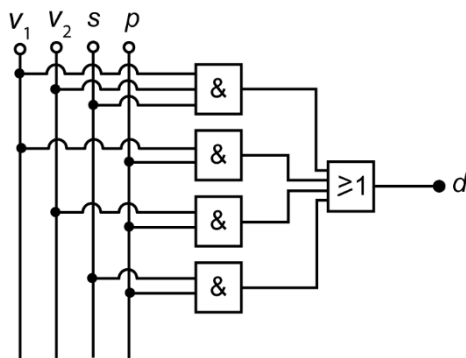


b)

$$d = \bar{v}_1 \bar{v}_2 s p + \bar{v}_1 v_2 \bar{s} p + \bar{v}_1 v_2 s \bar{p} + v_1 \bar{v}_2 \bar{s} p + v_1 \bar{v}_2 s \bar{p} + v_1 v_2 \bar{s} \bar{p} + v_1 v_2 s p$$

$$d = v_1 v_2 s + s p + v_1 p + v_2 p$$

c)



Exercici 3

a)

$$P_{\text{mec}} = mgv = \frac{mg(h_2 - h_1)}{t}; \quad P_{\text{elèctr}} = \frac{P_{\text{mec}}}{\eta_{\text{mot}}} = 4,631 \text{ W}$$

b)

$$\omega_{\text{mot}} = \frac{v}{d/2} = 1,7 \text{ rad/s}; \quad \Gamma_{\text{mot}} = \frac{P_{\text{mec}}}{\omega_{\text{mot}}} = 2,452 \text{ Nm}$$

c)

$$\tilde{P}_{\text{elèctr}} = \frac{mg(h_2 - h_1)}{\eta_{\text{mot}} t / 2} = 2 P_{\text{elèctr}}$$

$$\text{Inc} = \frac{\tilde{P}_{\text{elèctr}} - P_{\text{elèctr}}}{P_{\text{elèctr}}} = 100 \%$$



Exercici 4

a)

$$ce_{\text{pèl}} = \frac{c_{\text{pèl}}}{\rho_{c_{\text{pèl}}}} = 83,33 \times 10^{-3} \text{ €/kWh}; \quad ce_{\text{gas}} = \frac{c_{\text{gas}}}{\rho_{c_{\text{gas}}}} = 122,9 \times 10^{-3} \text{ €/kWh}$$

b)

$$E_{\text{pèl}} = \frac{E_{\text{cons}}}{\eta_{\text{pèl}}}; \quad m_{\text{pèl}} = \frac{E_{\text{pèl}}}{\rho_{c_{\text{pèl}}}} = 3324 \text{ kg}$$

c)

$$E_{\text{gas}} = \frac{E_{\text{cons}}}{\eta_{\text{gas}}}; \quad V_{\text{gas}} = \frac{E_{\text{gas}}}{\rho_{c_{\text{gas}}}} = 1729 \text{ L}$$

d)

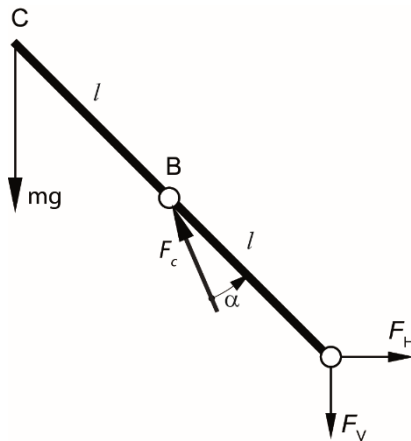
diferència anual en el cost del combustible: $\Delta c_{\text{comb}} = V_{\text{gas}} c_{\text{gas}} - m_{\text{pel}} c_{\text{pel}}$

$$t = \frac{c_{\text{inv}_{\text{pèl}}} - c_{\text{inv}_{\text{gas}}}}{\Delta c_{\text{comb}}} = 5,444 \text{ anys}$$



Exercici 5

a)



b)

A partir del triangle OPB es pot veure que: $\varphi + 90 + 2\alpha = 180$; $\alpha = \frac{90 - \varphi}{2}$

c)

$$\sum M(O) = 0; \quad F_c \sin(\alpha) l - m g 2l \cos(\varphi) = 0;$$

$$\left. \begin{array}{l} \varphi = 30^\circ \\ \alpha = 30^\circ \end{array} \right\} \rightarrow F_c = 2548 \text{ N}$$

d)

$$\rho_{\text{int}} = \frac{F_c}{\frac{\pi d_{\text{int}}^2}{4}} = 2,028 \text{ MPa}$$

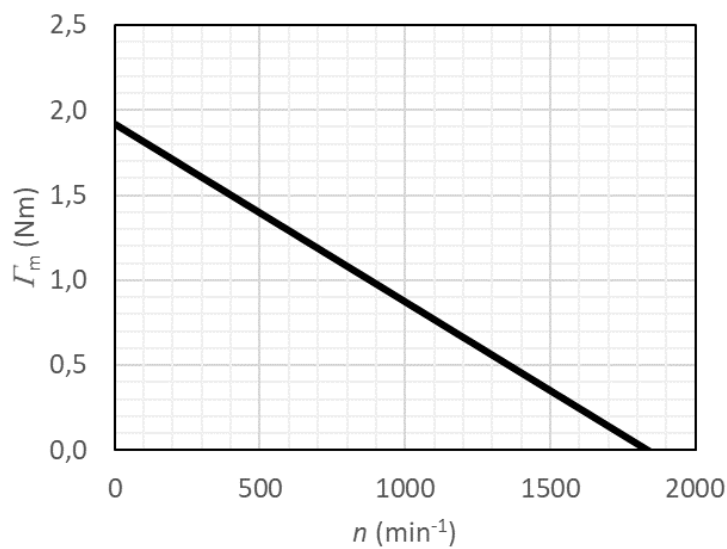


Exercici 6

a)

$$\tau = \frac{z_p}{z_r} = 0,1452$$

b)



La velocitat de gir és màxima quan el parell és nul: $n_{\text{màx}} = 192,0 \text{ rad/s} = 1833 \text{ min}^{-1}$

c)

$$\omega_{\text{mot}} = n_{\text{mot}} \frac{2\pi}{60}$$
$$I = \frac{P_{\text{elèctr}}}{U} = \frac{P_{\text{mec}}}{\eta U} = \frac{\Gamma_{\text{mot}} \omega_{\text{mot}}}{\eta U} = \frac{(0,08U - 0,01\omega_{\text{mot}}) \omega_{\text{mot}}}{\eta U} = 6,924 \text{ A}$$

d)

$$\omega_{\text{con}} = \tau \omega_{\text{mot}} = 15,20 \text{ rad/s}$$