



Sèrie 2

Exercici 1

Q1 a

Q2 c

Q3 b

Q4 a

Q5 c

Exercici 2

a)

m_1	m_2	p_1	p_2	t
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	1
1	0	1	0	1
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

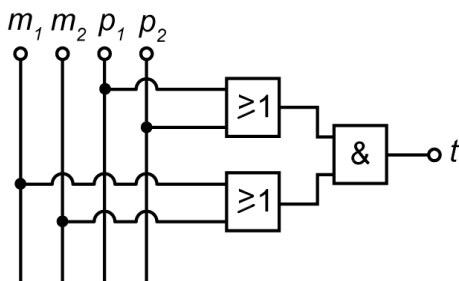


b)

$$t = (m_1 + m_2 + p_1 + p_2)(m_1 + m_2 + p_1 + \bar{p}_2)(m_1 + m_2 + \bar{p}_1 + p_2) \\ (m_1 + m_2 + \bar{p}_1 + \bar{p}_2)(m_1 + \bar{m}_2 + p_1 + p_2) \\ (\bar{m}_1 + m_2 + p_1 + p_2)(\bar{m}_1 + \bar{m}_2 + p_1 + p_2)$$

simplificant: $t = (m_1 + m_2)(p_1 + p_2)$

c)



Exercici 3

a)

$$\Gamma_{\text{mot}} = \frac{P_{\text{mot}}}{\omega_{\text{mot}}} = \frac{P_{\text{mot}}}{n_{\text{mot}} \frac{2\pi}{60}} = 3,712 \text{ Nm}$$

b)

$$\Gamma_{\text{red}} = \frac{P_{\text{red}}}{\omega_{\text{red}}} = \frac{\eta P_{\text{mot}}}{\omega_{\text{red}}} = \frac{\eta \Gamma_{\text{mot}}}{\tau} = 51,72 \text{ Nm}$$

c)

$$n_d = n_{\text{mot}} \tau = 97,49 \text{ min}^{-1}$$



d)

$$n_{\text{bombo}} = n_d \frac{d}{D} = 12,28 \text{ min}^{-1}$$

e)

$$\Gamma_{\text{res}} = \frac{\eta P_{\text{mot}}}{\omega_{\text{bombo}}} = \frac{\eta P_{\text{mot}}}{n_{\text{bombo}} \frac{2\pi}{60}} = 410,4 \text{ Nm}$$

Exercici 4

a)

$$E_{\text{cons}} = P_{\text{inst}} c t = 98550 \text{ kWh anuals} = 354780 \text{ MJ anuals}$$

b)

$$P_{\text{fotovolt}} = r P_{\text{cons}} c = 3,375 \text{ kW}$$

c)

$$\eta_{\text{placa}} = \frac{\frac{P_{\text{placa}}}{A}}{I_{\text{rad}}} = 13,38\%$$

d)

$$n_p = \frac{P_{\text{foto}}}{P_{\text{placa}}} = 17,4 \text{ plaques. Calen 18 plaques}$$

e)

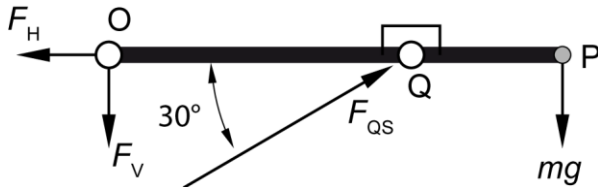
Si s'utilitzen 18 plaques $r' = 15,52\%$

$$\Delta m = r' E_{\text{cons}} FE = 3,686 \text{ tones de CO}_2$$



Exercici 5

a)



b)

$$\sum M(O) = 0;$$

$$F_{QS} \sin(30) 4L = mg 6L \rightarrow F_{QS} = 3mg = 2354 \text{ N}$$

La barra treballa a compressió

c)

$$\sum F_{\text{horizontals}} = 0; F_H = F_{QS} \cos(30) = 3mg\sqrt{3}/2 = 2038 \text{ N}$$

$$\sum F_{\text{verticals}} = 0; F_V + mg = F_{QS} \sin(30) \rightarrow F_V = 392,3 \text{ N}$$

Exercici 6

a)

$$\eta_{\text{alt}} = \frac{P_{\text{electr}}}{P_{\text{mot}}} = 73,76\%$$

b)

$$c_{\text{gasoil}} = \frac{\rho_{\text{gasoil}} V}{t} = 915,4 \text{ g/h}$$



c)

$$\eta = \frac{P_{\text{mot}}}{P_{\text{cons}}} = \frac{P_{\text{mot}}}{c_{\text{gasoil}} p_c} = 65,46\%$$

d)

$$P_{\text{diss}} = P_{\text{cons}} - P_{\text{electr}} = 5,891 \text{ kW}$$



SÈRIE 5

Exercici 1

Q1 b

Q2 b

Q3 a

Q4 a

Q5 c

Exercici 2

a)

f	t	v	p
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

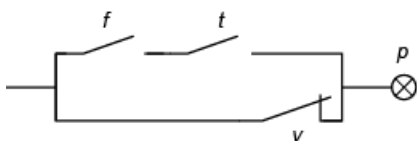
b)

$$p = (f + t + \bar{v})(f + \bar{t} + \bar{v})(\bar{f} + t + \bar{v})$$

$$\text{O també } p = (\bar{f} \cdot \bar{t} \cdot \bar{v}) + (\bar{f} \cdot t \cdot \bar{v}) + (f \cdot \bar{t} \cdot \bar{v}) + (f \cdot t \cdot \bar{v}) + (f \cdot t \cdot v)$$

$$\text{Simplificant } p = \bar{v} + f \cdot t$$

c)





Exercici 3

a)

$$P_{\text{cons}} = \frac{P_{\text{central}}}{\eta_c} = \frac{3 \cdot P_{\text{turb}}}{\eta_c} = 4602 \text{ MW}$$

$$E_{\text{cons}} = P_{\text{cons}} \cdot t = 397,6 \cdot 10^{12} \text{ J}$$

b)

$$m_c = \frac{E_{\text{cons}}}{p_{c,c}} = 14 \cdot 10^6 \text{ kg}$$

c)

$$E_q = m_q \cdot p_{c,q} = 268,1 \cdot 10^9 \text{ KJ}; \quad P_q = \frac{E_q}{t} = 3103 \text{ MW};$$

$$\eta_q = \frac{P_{\text{central}}}{P_q} = 0,35$$

Exercici 4

a)

$$\Delta h = s \cdot \sin\left(\arctan\left(\frac{5}{100}\right)\right) = 599,3 \text{ m}$$

b)

$$\Delta E_p = m \cdot g \cdot \Delta h = 764,0 \text{ kJ}$$

c)

$$E_{\text{cons}} = \frac{\Delta E_p}{\eta_{\text{glob}}} = 848,9 \text{ kJ}$$

d)

$$E_{\text{reg}} = \Delta E_p \cdot \eta_{\text{reg}} = 496,6 \text{ kJ}$$

$$E_{\%} = \frac{E_{\text{bat,fin}}}{E_{\text{bat,ini}}} \cdot 100 = \frac{E_{\text{bat}} - E_{\text{cons}} + E_{\text{reg}}}{E_{\text{bat}}} \cdot 100 = 93,60\%$$



Exercici 5

a)

$$E_{\text{bat}} = c \cdot U = 207,8 \text{ kJ}$$

b)

$$P_{\text{cons}} = \frac{P_{\text{subm}}}{\eta_{\text{motor}}} = 33,71 \text{ W}$$

c)

$$E_{\text{cons}} = 5 \% \cdot E_{\text{bat}} = 10,39 \text{ kJ}$$

$$t = \frac{E_{\text{cons}}}{4 \cdot P_{\text{cons}}} = 77,06 \text{ s} = 1,284 \text{ min}$$

d)

$$\Gamma = \frac{P_{\text{subm}}}{\omega} = \frac{P_{\text{subm}}}{n \frac{2\pi}{60}} = 28,65 \text{ mN} \cdot \text{m}$$

Exercici 6

a)

$$L = \frac{RA}{\rho} = \frac{R \cdot \pi \cdot d^2 / 4}{\rho} = 17,14 \text{ m}$$

b)

$$P_{\text{elèctr}} = \frac{U^2}{R} = 1763 \text{ W}$$

c)

$$E_{\text{cons}} = P_{\text{elèctr}} \cdot t = 1,058 \text{ MJ}$$



d)

$$I = \frac{U}{R} = 7,667 \text{ A}$$

e)

$$P'_{\text{elèctr}} = \frac{U'^2}{R} = 403,3 \text{ W}$$