



SÈRIE 3

Exercici 1

Q1 a

Q2 b

Q3 a

Q4 c

Q5 c

Exercici 2

a)

a	b	c	d	s
0	0	0	0	0
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1



b)

$$s = \bar{a}\bar{b}c\bar{d} + \bar{a}b\bar{c}d + \bar{a}b\bar{c}\bar{d} + \bar{a}b\bar{c}d + \bar{a}b\bar{c}\bar{d} + \bar{a}b\bar{c}d + \bar{a}b\bar{c}\bar{d} + \bar{a}b\bar{c}d + \bar{a}b\bar{c}d + \bar{a}b\bar{c}d + \bar{a}b\bar{c}d$$

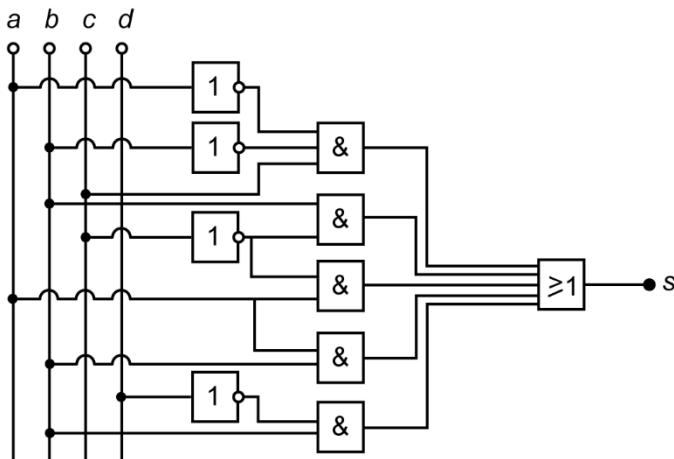
o també

$$s = (a+b+c+d)(a+b+c+\bar{d})(a+\bar{b}+\bar{c}+\bar{d})(\bar{a}+b+\bar{c}+d)(\bar{a}+b+\bar{c}+\bar{d})$$

simplificant

$$s = \bar{a}\bar{b}c + b\bar{c} + a\bar{c} + ab + b\bar{d}$$

c)





Exercici 3

a)

$$E_{\text{mec}} = mg\Delta h$$

$$\Delta h = d \sin \varphi_1 - d \sin \varphi_2 = d \sin 45 - d \sin 15 = 1,345 \text{ m}$$

$$E_{\text{mec}} = 1319 \text{ J}$$

b)

$$E_{\text{mot}} = \frac{E_{\text{mec}}}{\eta} = 1649 \text{ J}$$

c)

$$v_{\text{vert}} = |\omega| 3l \cos \varphi = 0,4534 \text{ m/s}$$

d)

$$P_{\text{mot}} = \frac{P_{\text{mec}}}{\eta} = \frac{mgv_{\text{vert}}}{\eta} = 555,8 \text{ W}$$

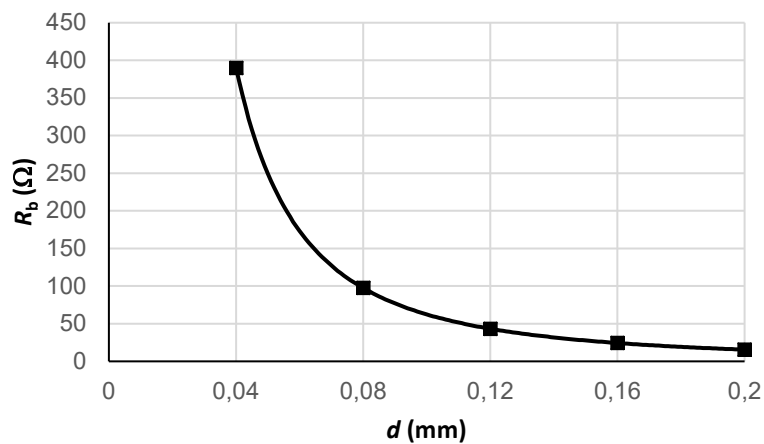


Exercici 4

a)

$$R = \frac{U^2}{P} = \frac{230^2}{2200} = 24,05 \, \Omega$$

b)



c)

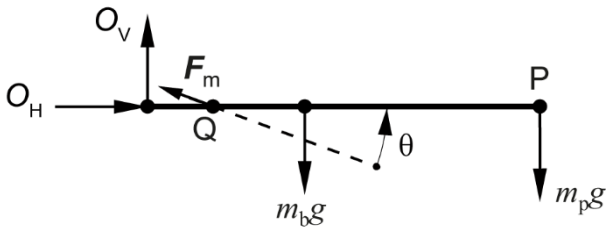
Cal seleccionar la bobina B4, de diàmetre 0,16 mm, ja que la seva resistència és de 24,37 Ω, lleugerament per sobre de la resistència desitjada (24,05 Ω).

$$l = \frac{RS}{\rho} = \frac{R \frac{\pi d^2}{4}}{\rho} = 0,987 \text{ m}$$



Exercici 5

a)



b)

$$\sum M(O) = 0; \quad F_m \sin(\theta) a - m_b g b - m_p g c = 0 \rightarrow F_m = 688,2 \text{ N}$$

c)

$$\left. \begin{array}{l} \sum F_{\text{horizontals}} = 0 \rightarrow O_H - F_m \cos(\theta) = 0 \\ \sum F_{\text{verticals}} = 0 \rightarrow O_V + F_m \sin(\theta) - m_b g - m_p g = 0 \end{array} \right\} \begin{array}{l} O_H = F_m \cos(20) = 646,7 \text{ N} \\ O_V = g(m_b + m_p) - F_m \sin(20) = -166,7 \text{ N} \end{array}$$

Les forces desconegudes (O_H i O_V) s'han dibuixat en un sentit arbitrari.

El valor i el sentit dibuixat han de ser coherents.

El signe negatiu d' O_V indica que aquesta força té sentit oposat al dibuixat al diagrama de cos lliure.



Exercici 6

a)

$$Q_1 = m_a c_{e_a} \Delta T = m c_{e_a} (100 - T_1) = 125,9 \text{ MJ}$$

$$Q_2 = m_a L_v = 3386 \text{ MJ}$$

$$Q_3 = m_a c_{e_v} \Delta T = m c_{e_v} (T_2 - 100) = 80,81 \text{ MJ}$$

$$E_{\text{dia}} = Q_1 + Q_2 + Q_3 = 3592 \text{ MJ}$$

b)

$$E_{\text{cons}} = p c m_p = 4157 \text{ MJ}$$

$$\eta = \frac{E_{\text{dia}}}{E_{\text{cons}}} = 86,42\%$$

c)

$$m_{\text{CO}_2} = 365 \text{ FE } m_p = 96,58 \text{ Tn de CO}_2$$