

## SÈRIE 2

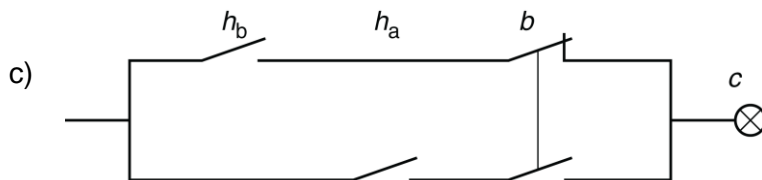
## Primera part

## Exercici 1

Q1 c    Q2 d    Q3 c    Q4 b    Q5 a

## Exercici 2

	$h_b$	$h_a$	$b$	$c$
	0	0	0	0
	0	0	1	0
	0	1	0	0
a) 0	1	1	1	1
1	0	0	1	1
1	0	1	0	0
1	1	0	0	X ← No és possible
1	1	1	1	X ← No és possible

b) Amb  $X = 1$      $c = h_b \cdot \bar{b} + h_a \cdot b$ 

## Segona part

## OPCIÓ A

## Exercici 3

a)  $P_1 = P_{\text{elèctr}} \cdot \eta_{\text{mot}} = 1100 \cdot 0,76 = 836 \text{ W}$

b)  $P_2 = P_1 \cdot \eta_{\text{transm}} \quad n_2 = \tau \cdot n_1$

$$\Gamma_2 = \frac{P_2}{n_2 \frac{2\pi}{60}} = \frac{P_1 \cdot \eta_{\text{transm}}}{\tau \cdot n_1 \frac{2\pi}{60}} = 7,196 \text{ Nm}$$

c)  $P_{\text{diss}} = P_{\text{elèctr}} - P_2 = P_{\text{elèctr}} (1 - \eta_{\text{mot}} \cdot \eta_{\text{transm}}) = 314,2 \text{ W}$

d)  $\tau = \frac{n_2}{n_1} = \frac{d_1}{d_2} \Rightarrow d_2 = \frac{d_1}{\tau} = 112 \text{ mm}$

**Exercici 4**

$$a) W = E_p = mgh = V \rho gh = 600 \cdot 1000 \cdot 9,807 \cdot 3,6 = 21,18 \text{ MJ}$$

$$b) P_h = \frac{W}{t} = 588,4 \text{ W}$$

$$c) \eta = \frac{W}{c \cdot \rho \cdot p_c} = 0,1955$$

**OPCIÓ B****Exercici 3**

$$a) E = P \cdot t \Rightarrow P = \frac{E}{t} = 2400 \text{ W}$$

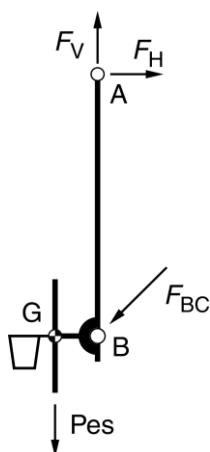
$$I = \frac{P}{U} = 10,43 \text{ A}$$

$$b) R = \frac{U^2}{P} = \frac{\rho \cdot L}{A} \Rightarrow L = \frac{U^2 \cdot A}{P \cdot \rho} = 2,802 \text{ m}$$

$$c) S_{\text{optima}} = 2,802 \cdot 1,5 \cdot 10^{-3} \text{ m}^2 \Rightarrow S = \frac{100}{3,5} S_{\text{optima}} = 0,12 \text{ m}^2$$

**Exercici 4**

a)



$$b) \sum M(A) = 0 \rightarrow mgL_2 - F_{BC}L_1 \cos \alpha = 0$$

$$F_{BC} = \frac{mgL_2}{L_1 \cos \alpha} = \frac{35 \cdot 9,807 \cdot 0,5}{3 \cos 45^\circ} = 80,90 \text{ N}$$

$$c) F_V - mg - F_{BC} \sin \alpha = 0 \rightarrow F_V = mg + F_{BC} \sin \alpha = 400,5 \text{ N}$$

$$F_H - F_{BC} \cos \alpha = 0 \rightarrow F_H = F_{BC} \cos \alpha = 57,21 \text{ N}$$

$$d) F_{\text{cable}} = F_{BC} \cos \alpha = 57,21 \text{ N}$$

## Sèrie 4

## Primera part

## Exercici 1

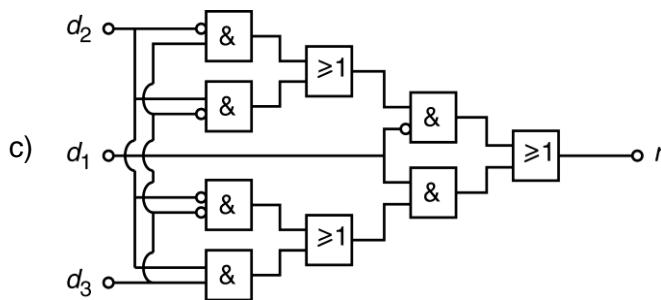
Q1 c    Q2 a    Q3 c    Q4 d    Q5 a

## Exercici 2

$d_1$	$d_2$	$d_3$	$r$
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

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

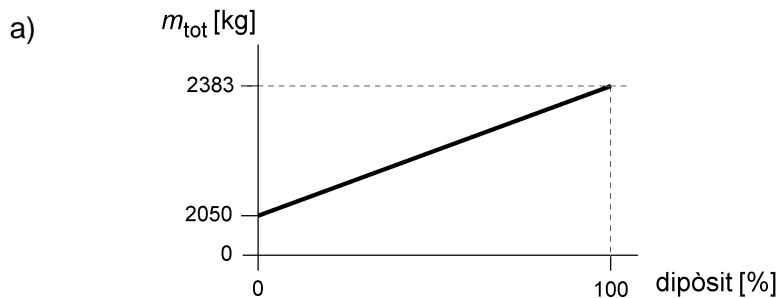
$$b) \quad r = \bar{d}_1 \cdot (\bar{d}_2 \cdot d_3 + d_2 \cdot \bar{d}_3) + d_1 \cdot (\bar{d}_2 \cdot \bar{d}_3 + d_2 \cdot d_3)$$



## Segona part

## OPCIÓ A

## Exercici 3



$$b) \eta_{\text{trans}} = \frac{\Gamma_r \omega_r}{\Gamma \omega_{\text{mot}}} \Rightarrow \Gamma_r = \eta_{\text{trans}} \Gamma \frac{n_{\text{mot}}}{n_r} = \eta_{\text{trans}} \frac{\Gamma}{\tau} = 2237 \text{ Nm}$$

$$c) \text{Analitzant les rodes s'obté la força de tracció: } \Gamma_r = F_{\text{tracció}} r$$

$$\text{Analitzant tot el cotxe: } m_{\text{tot}} a = F_{\text{tracció}}$$

$$a = \frac{\Gamma_r}{r m_{\text{tot}}} \Rightarrow \begin{cases} a_{100\%} = \frac{\Gamma_r}{r(m + V \cdot \rho)} = 2,347 \text{ m/s}^2 \\ a_{5\%} = \frac{\Gamma_r}{r(m + 0,05 V \cdot \rho)} = 2,706 \text{ m/s}^2 \end{cases}$$

## Exercici 4

$$a) W = E_p = mg(h + \Delta h) = V \rho g(h + \Delta h) = 2540 \cdot 1000 \cdot 9,807 \cdot (129 + 70,81) = 4977 \text{ MJ}$$

$$b) \eta = \frac{W}{6 \cdot P_{\text{elèctr}} \cdot t} \Rightarrow P_{\text{elèctr}} = \frac{W}{6 \cdot \eta \cdot t} = \frac{4977 \cdot 10^6}{6 \cdot 0,7 \cdot 8 \cdot 3600} = 41,15 \text{ kW}$$

$$E_{\text{elèctr}} = 6 P_{\text{elèctr}} t = 1975 \text{ kWh} \Rightarrow \text{cost} = E_{\text{elèctr}} c = 162,8 \text{ €}$$

$$c) P_h = \frac{W}{t} = p \cdot q = p \cdot \frac{V}{t} \Rightarrow p = \frac{W}{V} = \frac{4977 \cdot 10^6}{2540} = 19,60 \cdot 10^5 \text{ Pa} = 19,60 \text{ bar}$$

## OPCIÓ B

## Exercici 3

$$a) F_{\text{tan}} = \mu F_c = 12,8 \text{ kN} \Rightarrow \frac{F b}{F_{\text{tan}}} = \frac{60 \text{ kN/m} \cdot 2 \text{ m}}{12,8 \text{ kN}} = 9,375 \Rightarrow \text{es necessiten 10 cargols}$$

$$b) \sigma = \frac{F b}{e b} = \frac{F}{e} = \frac{60 \cdot 10^3}{5 \cdot 10^{-3}} = 12 \text{ MPa}$$

$$c) \varepsilon = \frac{\Delta l}{l} = \frac{\sigma}{E} = \frac{12 \cdot 10^6}{210 \cdot 10^9} = 57,14 \cdot 10^{-6}$$

## Exercici 4

$$a) P_{m-r} = \eta_{m-r} P_{\text{elèct}} = \eta_{m-r} UI = 956,8 \text{ W}$$

$$n_{m-r} = \frac{v}{\tau} \rightarrow \Gamma_{m-r} = \frac{P_{m-r}}{2\pi n_{m-r}} = \frac{P_{m-r}}{2\pi \frac{v}{\tau}} = 377,6 \text{ Nm}$$

$$b) P_{\text{sortida}} = \eta_{\text{pol}} P_{m-r} = mgv$$

$$m = \frac{\eta_{\text{pol}} P_{m-r}}{gv} = \frac{0,85 \cdot 956,8}{9,807 \cdot 0,4} = 207,3 \text{ kg}$$

$$c) \eta_{\text{tot}} = \eta_{m-r} \cdot \eta_{\text{pol}} = 0,65 \cdot 0,85 = 0,5525$$