



## SÈRIE 1

### Primera part

#### Exercici 1

Q1 a    Q2 c    Q3 c    Q4 d    Q5 b

#### Exercici 2

a)

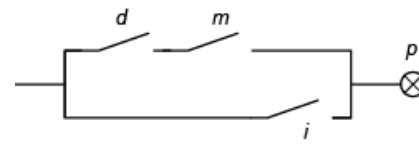
$d$	$m$	$i$	$p$
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

$$b) p = (d + m + i)(d + \bar{m} + i)(\bar{d} + m + i)$$

$$\text{o també } p = (\bar{d} \cdot \bar{m} \cdot i) + (\bar{d} \cdot m \cdot i) + (d \cdot \bar{m} \cdot i) + (d \cdot m \cdot \bar{i}) + (d \cdot m \cdot i)$$

$$p = d \cdot m + i$$

c)



### Segona part

#### OPCIÓ A

#### Exercici 3

$$a) P_{\text{vent}} = \frac{1}{2} A \cdot \rho \cdot v^3 = 955,2 \text{ kW}$$

$$b) P_{\text{útil}} = P_{\text{vent}} \cdot c_a \cdot \eta_{\text{aerog}} = 272,8 \text{ kW}$$

$$c) E_{\text{total}} = P_{\text{útil}} \cdot t \cdot n = 73,66 \cdot 10^9 \text{ Wh} = 265,2 \cdot 10^{12} \text{ J}$$

$$d) \text{Ingressos} = p_{\text{venda}} \cdot E_{\text{total}} = 5616 \text{ k€}$$

$$e) \text{Reducció} = (1 - 0,9^3) \cdot 100 = 27,1\%$$



### Exercici 4

$$a) \Gamma_{\text{motor}} = \frac{P_{\text{subm}}}{\omega} = 2,876 \text{ Nm}$$

$$b) v_{\text{pat}} = \omega \cdot d_{\text{roda}} / 2 = 5,563 \text{ m/s} = 20,03 \text{ km/h}$$

$$c) E_{\text{útil}} = E_{\text{bat}} \cdot \eta_{\text{mot}} = 222,5 \text{ Wh} = 801,0 \text{ kJ}$$

$$d) t_{\text{màx}} = \frac{E_{\text{útil}}}{P_{\text{subm}}} = 4005 \text{ s} = 1,113 \text{ h}; \quad s_{\text{màx}} = v_{\text{pat}} \cdot t_{\text{màx}} = 22,28 \text{ km}$$

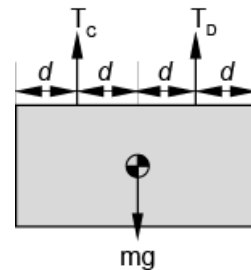
### OPCIÓ B

#### Exercici 3

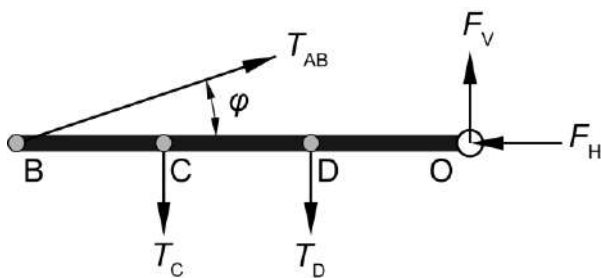
$$a) \sum F_{\text{verticals}} = 0 \rightarrow T_C + T_D = mg$$

$$\sum M(G) = 0 \rightarrow T_C \cdot d - T_D \cdot d = 0 \rightarrow$$

$$T_C = T_D = \frac{mg}{2} = 58,84 \text{ N}$$



b)



$$c) \varphi = \text{atan}\left(\frac{1}{3}\right) = 18,43^\circ$$

$$d) \sum M(O) = 0; \quad -T_{AB} \sin \varphi \cdot 3L + T_C \cdot 2L + T_D \cdot L = 0 \rightarrow T_{AB} = 186,1 \text{ N}$$

$$e) \sum F_{\text{horizontals}} = 0 \rightarrow F_H = T_{AB} \cdot \cos \varphi \rightarrow F_H = 176,5 \text{ N}$$

$$\sum F_{\text{verticals}} = 0 \rightarrow T_{AB} \sin \varphi + F_V = T_C + T_D \rightarrow F_V = 58,84 \text{ N}$$



#### Exercici 4

$$a) P_{\text{útil}} = \frac{E_{\text{útil}}}{t} = \frac{m \cdot c_e \cdot \Delta T}{t} = \frac{\rho_{\text{aigua}} \cdot V \cdot c_e \cdot \Delta T}{t} = \rho_{\text{aigua}} \cdot q_{\text{aigua}} \cdot c_e \cdot \Delta T$$

$$q_{\text{aigua}} = \frac{P_{\text{útil}}}{\rho_{\text{aigua}} \cdot c_e \cdot \Delta T} = 16,08 \text{ L/min}$$

$$b) P_{\text{cons}} = \frac{P_{\text{útil}}}{\eta_c} = 32,18 \text{ kW}; \quad q_{\text{comb}} = \frac{P_{\text{cons}}}{p_c} = 0,5191 \text{ g/s}$$

$$c) t = \frac{V}{q_{\text{aigua}}} = 6,22 \text{ min}; \quad m = t \cdot q_{\text{comb}} = 193,7 \text{ g}$$



## SÈRIE 4

### Primera part

#### Exercici 1

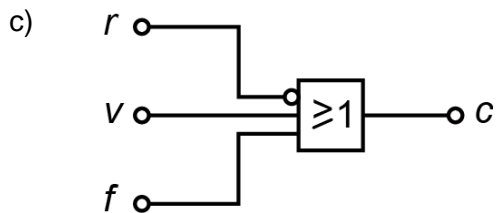
Q1 b    Q2 d    Q3 a    Q4 d    Q5 c

#### Exercici 2

a)

$r$	$v$	$f$	$c$
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

b)  $c = \bar{r} + v + f = r \cdot \bar{v} \cdot \bar{f}$





## Segona part

### OPCIÓ A

#### Exercici 3

$$a) R = \frac{3 U_{\text{pila}} - U_{\text{LED}}}{I_{\text{LED}}} = 110 \Omega$$

$$b) P_{\text{total}} = 3 U_{\text{pila}} \cdot 5 I_{\text{LED}} = 0,225 \text{ W} \Rightarrow E_{\text{total}} = P_{\text{total}} \cdot t = 4050 \text{ J} = 1,125 \text{ Wh}$$

$$c) t_{\text{piles}} = \frac{C_{\text{pila}}}{5 I_{\text{LED}}} = 22 \text{ h}$$

$$d) I_{\text{LED},2} = \frac{3 U_{\text{pila}} - U_{\text{LED},2}}{R} = 22,73 \text{ mA}$$

$$e) P_{\text{total},2} = 3 U_{\text{pila}} \cdot 5 I_{\text{LED},2} = 0,5114 \text{ W} \Rightarrow E_{\text{total},2} = P_{\text{total},2} \cdot t_{\text{encesa}} = P_{\text{total},2} \cdot \frac{2}{3} t = 6136 \text{ J} = 1,705 \text{ Wh}$$

#### Exercici 4

$$a) \eta_{\text{gen}} = \frac{P_{\text{elèctr}}}{P_2} \Rightarrow P_2 = \frac{P_{\text{elèctr}}}{\eta_{\text{gen}}} = 1149 \text{ kW}$$

$$\Gamma_2 = \frac{P_2}{\omega_2} = \frac{P_2}{n_2 \cdot (2\pi / 60)} = 7,317 \text{ kNm}$$

$$b) \eta_{\text{mult}} = \frac{P_2}{P_1} = \frac{\Gamma_2 \omega_2}{\Gamma_1 \omega_1} = 0,7840; \quad \tau = \frac{\omega_2}{\omega_1} = 150$$

$$c) P_{\text{diss}} = P_{\text{diss gen}} + P_{\text{diss mult}} = \frac{P_{\text{elèctr}}}{\eta_{\text{gen}}} (1 - \eta_{\text{gen}}) + \frac{P_{\text{elèctr}}}{\eta_{\text{gen}} \eta_{\text{mult}}} (1 - \eta_{\text{mult}}) = 466,1 \text{ kW};$$

$$\text{o bé: } P_{\text{diss}} = P_1 - P_{\text{elèctr}} = 466,1 \text{ kW}$$



## OPCIÓ B

### Exercici 3

$$a) V = 2 \cdot \left[ L_3 L_2 + \frac{1}{2} (L_3 + L_4) (L_1 - L_2) - \pi \left( \frac{d}{2} \right)^2 \right] s = 37,02 \cdot 10^{-6} \text{ m}^3; \quad m = \rho V = 46,27 \text{ g}$$

$$b) V = \pi r^2 L \Rightarrow L = \frac{V}{\pi r^2} = 5,237 \text{ m}$$

$$c) n = \frac{S}{e} = 75 \text{ capes}$$

### Exercici 4

$$a) q = v s_{\text{int}} = v \pi \left( \frac{d_{\text{int}}}{2} \right)^2 = 2,099 \text{ L/s}$$

$$\eta_b = \frac{P_h}{P_{\text{elèctr}}} \Rightarrow P_h = P_{\text{elèctr}} \eta_b = 4505 \text{ W}; \quad P_h = p q \Rightarrow p = \frac{P_h}{q} = 2,146 \text{ MPa}$$

$$b) F_{\text{ch}} = mg = 11,47 \text{ kN}; \quad F_{\text{ch}} = p_{\text{int}} s_{\text{int}} \Rightarrow p_{\text{int}} = \frac{F_{\text{ch}}}{s_{\text{int}}} = \frac{F_{\text{ch}}}{\pi \left( \frac{d_{\text{int}}}{2} \right)^2} = 1,804 \text{ MPa}$$

$$c) \eta_c = \frac{P_{\text{mec}}}{P_h} = \frac{F_{\text{ch}} v}{P_h} = 0,8405; \quad P_{\text{diss}} = P_{\text{elèctr}} - P_{\text{mec}} = 1514 \text{ W}$$