

SÈRIE 3

Primera part

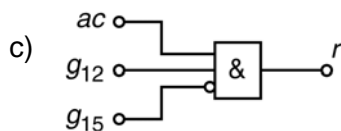
Exercici 1

Q1 d      Q2 c      Q3 b      Q4 b      Q5 a

Exercici 2

	ac	g <sub>12</sub>	g <sub>15</sub>	r
	0	0	0	0
	0	0	1	X ← No és possible
	0	1	0	0
a)	0	1	1	0
	1	0	0	0
	1	0	1	X ← No és possible
	1	1	0	1
	1	1	1	0

b) Amb X = 0     $r = ac \cdot g_{12} \cdot \bar{g}_{15}$



Segona part

OPCIÓ A

Exercici 3

a)  $\sum F_{\text{verticals}}|_{\text{cabina}} = 0 \rightarrow F_{\text{ch}} = mg = 980 \cdot 9,807 = 9611 \text{ N}$

$$\rho_{\text{int}} = \frac{F_{\text{ch}}}{s_{\text{int}}} = \frac{F_{\text{ch}}}{\pi \left( \frac{d_{\text{int}}}{2} \right)^2} = 1,385 \text{ MPa}$$

b)  $\sigma_{\text{tija}} = \frac{F_{\text{ch}}}{s_{\text{tija}}} = \frac{F_{\text{ch}}}{\pi \left( \frac{d_{\text{tija}}}{2} \right)^2} = 3,399 \text{ MPa}$

c)  $P_h = p \cdot q = 1,7 \cdot 10^6 \cdot 2,3 \cdot 10^{-3} = 3910 \text{ W}$

d)  $\eta = \frac{F_{\text{ch}} \cdot v}{P_h} = \frac{9611 \cdot 0,33}{3910} = 0,8111$

**Exercici 4**

a)  $m = a \cdot h \cdot \sigma = 3,2 \cdot 2,2 \cdot 12 = 84,48 \text{ kg}$

b)  $\Gamma_s = \frac{P_s}{\omega} = \frac{100}{12 \frac{2\pi}{60}} = 79,58 \text{ Nm}$

c)  $\eta = \frac{P_s}{U I} = \frac{100}{230 \cdot 1,7} = 0,2558$

d)  $E_{\text{elèc}} = P_{\text{elèc}} \cdot t = U \cdot I \cdot t = 230 \cdot 1,7 \cdot 20 = 7,82 \text{ kJ}$

$E_{\text{dis}} = E_{\text{elèc}} (1 - \eta) = 5,82 \text{ kJ}$

**OPCIÓ B**

**Exercici 3**

a)  $P_1 = \frac{P_{\text{elèc}}}{\eta_{\text{gen}} \cdot \eta_{\text{mult}}} = \frac{750}{0,87 \cdot 0,68} = 1268 \text{ kW}$

b)  $\Gamma_1 = \frac{P_1}{\omega_{\text{mín}}} = \frac{P_1}{n_{\text{mín}} \cdot \frac{2\pi}{60}} = 807,1 \text{ kNm}$

$\Gamma_2 = \Gamma_1 \frac{\eta_{\text{mult}}}{\tau} = \frac{P_1 \cdot \eta_{\text{mult}}}{\omega_{\text{mín}} \cdot \tau} = 7,518 \text{ kNm}$

c)  $P_{\text{mult}} = P_1 (1 - \eta_{\text{mult}}) = 405,7 \text{ kW}$

$P_{\text{gen}} = P_1 \eta_{\text{mult}} (1 - \eta_{\text{gen}}) = 112,1 \text{ kW}$

**Exercici 4**

a)  $E_1 = V \rho c_e (T_1 - T_0) = 0,5 \cdot 1 \cdot 4,18 \cdot 10^3 (105 - 25) = 167,2 \text{ kJ} = 46,44 \text{ W h}$

$E_2 = V \rho c_e (T_2 - T_1) = 0,5 \cdot 1 \cdot 4,18 \cdot 10^3 (125 - 105) = 41,8 \text{ kJ} = 11,61 \text{ W h}$

b)  $E_1 = P_1 t_1 \Rightarrow t_1 = E_1 / P_1 = 196,7 \text{ s}$

$E_2 = P_2 t_2 \Rightarrow t_2 = E_2 / P_2 = 83,6 \text{ s}$

c)  $E_{\text{elèc}} = E_1 + E_2 + P_3 t_3 = 46,44 + 11,61 + 250 \cdot 4 = 1058 \text{ W h} = 1,058 \text{ kW h}$

$c_{\text{eco}} = E_{\text{elèc}} \cdot c = 0,13 \text{ €}$

SÈRIE 1

Primera part

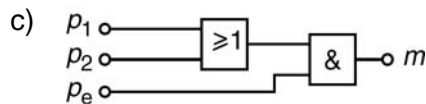
Exercici 1

Q1 d      Q2 b      Q3 a      Q4 b      Q5 a

Exercici 2

	$p_1$	$p_2$	$p_e$	$m$
	0	0	0	0
	0	0	1	0
	0	1	0	0
a)	0	1	1	1
	1	0	0	0
	1	0	1	1
	1	1	0	0
	1	1	1	1

b)  $m = \bar{p}_1 \cdot p_2 \cdot p_e + p_1 \cdot \bar{p}_2 \cdot p_e + p_1 \cdot p_2 \cdot p_e$   
 $m = (p_1 + p_2) \cdot p_e$



Segona part

OPCIÓ A

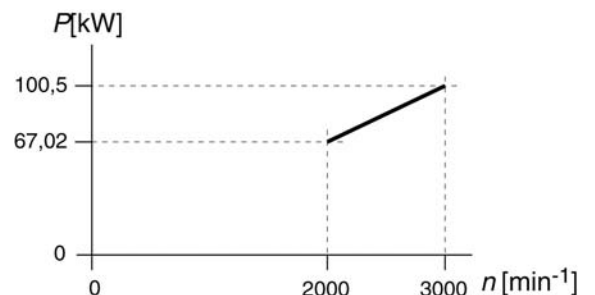
Exercici 3

a)  $E_m = \Delta E_c = \frac{1}{2} m v_2^2 = \frac{1}{2} 1725 \left( 100 \frac{1000}{3600} \right)^2 = 665,5 \cdot 10^3 \text{ J} = 665,5 \text{ kJ}$

b)  $\eta = \frac{E_m}{E_{\text{comb}}} = \frac{E_m}{m_{\text{comb}} \cdot p_c} \rightarrow m_{\text{comb}} = \frac{E_m}{\eta \cdot p_c} = 73,98 \text{ g}$

c)  $n_1 = 2000 \text{ min}^{-1} \rightarrow \omega_1 = 209,4 \text{ rad/s}$   
 $\rightarrow P_1 = 67,02 \text{ kW}$

$n_2 = 3000 \text{ min}^{-1} \rightarrow \omega_2 = 314,2 \text{ rad/s}$   
 $\rightarrow P_2 = 100,5 \text{ kW}$



**Exercici 4**

a)  $L_{\text{ext}} = 2b + 2h - 2r_1 + \frac{2\pi r_1}{4} = 2007 \text{ mm}$

b)  $t = \frac{L_{\text{ext}}}{v} = 0,4014 \text{ min} = 24,08 \text{ s}$

c)  $v_{\text{tall}} = n2\pi r_2 = 33,30 \text{ m/min} = 0,555 \text{ m/s}$

d)  $S = b \cdot h - r_1^2 + \frac{\pi r_1^2}{4} - 4\pi r_2^2 = 247,5 \cdot 10^3 \text{ mm}^2$

$m = \rho S e = 23,47 \text{ kg}$

**OPCIÓ B**

**Exercici 3**

a)  $R_{\text{ini}} = \left( \frac{1}{R_1} + \frac{1}{R_2} \right)^{-1} = \frac{R_1 \cdot R_2}{R_1 + R_2} = 59,18 \Omega$

b)  $I = \frac{U}{R_{\text{ini}}} = 3,886 \text{ A}$

c)  $P_1 = \frac{U^2}{R_{\text{ini}}} = \frac{230^2}{59,18} = 893,8 \text{ W}$  ;  $P_2 = \frac{U^2}{R_2} = \frac{230^2}{100} = 529 \text{ W}$

d)  $P_3 = \frac{U^2}{R_2 + R_3} \Rightarrow R_3 = \frac{U^2}{P_3} - R_2 = 76,33 \Omega$

**Exercici 4**

a)  $P_{h1} = q_1 \rho g h_1 = 5 \cdot 1 \cdot 9,807 \cdot 3 = 147,1 \text{ W}$

b)  $\eta = \frac{P_{h2}}{P_{h1}} = \frac{q_2 h_2}{q_1 h_1} = 0,5833$

c)  $V = (q_1 - q_2) t = 66960 \text{ L}$