

SÈRIE 3**Primera part****Exercici 1**

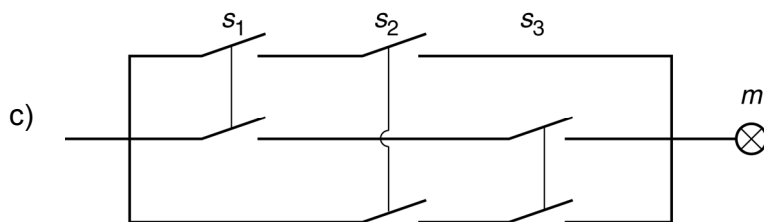
Q1 b Q2 c Q3 a Q4 d Q5 d

Exercici 2

	s_1	s_2	s_3	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	1
	1	1	1	1

$$b) \quad m = \bar{s}_1 \cdot s_2 \cdot s_3 + s_1 \cdot \bar{s}_2 \cdot s_3 + s_1 \cdot s_2 \cdot \bar{s}_3 + s_1 \cdot s_2 \cdot s_3$$

$$m = s_1 \cdot s_2 + s_1 \cdot s_3 + s_2 \cdot s_3$$

**Segona part****OPCIÓ A****Exercici 3**

$$a) \quad E_1 = V \rho c_e (T_1 - T_0) = 0,5 \cdot 1 \cdot 4,18 \cdot 10^3 (120 - 20) = 209,0 \text{ kJ} = 58,06 \text{ Wh}$$

$$b) \quad E_1 = P_1 t_1 \Rightarrow t_1 = E_1 / P_1 = 298,6 \text{ s}$$

$$c) \quad P = \frac{U^2}{R} \Rightarrow R_e = \frac{U^2}{P_1} = 75,57 \Omega$$

$$R_e + R_m = \frac{U^2}{P_2} \Rightarrow R_m = \frac{U^2}{P_2} - R_e = 127,9 \Omega$$

Exercici 4

$$a) \omega_{\text{roda}} = \frac{v}{r} = 15,15 \text{ rad/s} \qquad \omega_{\text{pedals}} = \frac{\omega_{\text{roda}}}{\tau} = 8,418 \text{ rad/s}$$

$$b) P_{\text{bici}} = mgv \sin \alpha = 887,0 \text{ W}$$

$$c) \eta = \frac{P_{\text{bici}}}{P_{\text{pedals}}} \Rightarrow P_{\text{pedals}} = \frac{P_{\text{bici}}}{\eta} = 933,6 \text{ W}$$

$$d) \Gamma_{\text{pedals}} = \frac{P_{\text{pedals}}}{\omega_{\text{pedals}}} = 110,9 \text{ Nm}$$

OPCIÓ B**Exercici 3**

a) Si el vol construir a base de quadrats ($b \times b$) cal utilitzar el tauler de gruix 12 mm ja que l'alçada h només és divisible per 12 mm. $\Rightarrow n_1 = h/e_1 = 25$ quadrats necessaris.

Si el vol construir a base de rectangles ($h \times b$) cal utilitzar el tauler de gruix 14 mm ja que la longitud b només és divisible per 14 mm. $\Rightarrow n_2 = b/e_2 = 10$ rectangles necessaris.

$$b) p_1 = 4 b n_1 = 4 b \frac{h}{e_1} = 14 \text{ m} \qquad p_2 = 2(b+h)n_2 = 2(b+h) \frac{b}{e_2} = 8,8 \text{ m}$$

$$c) s_1 = b^2 n_1 = b^2 \frac{h}{e_1} = 0,49 \text{ m}^2 \qquad s_2 = b h n_2 = b h \frac{b}{e_2} = 0,42 \text{ m}^2$$

$$d) c_1 = c_a p_1 + c_{b1} s_1 = 11,37 \text{ €} \qquad c_2 = c_a p_2 + c_{b2} s_2 = 8,18 \text{ €}$$

És més econòmic construir-lo a base de rectangles.

Exercici 4

$$a) \sum F_{\text{verticals}} = 0 \rightarrow 2F_{\text{ch}} = mg \rightarrow F_{\text{ch}} = \frac{mg}{2}$$

$$\rho_{\text{int}} = \frac{F_{\text{ch}}}{s_{\text{int}}} = \frac{mg}{2s_{\text{int}}} \Rightarrow m = \frac{2\rho_{\text{int}} s_{\text{int}}}{g} = \frac{2\rho_{\text{int}} \pi \left(\frac{d_{\text{int}}}{2}\right)^2}{g} = 4004 \text{ kg}$$

$$b) \sigma_{\text{tija}} = \frac{F_{\text{ch}}}{s_{\text{tija}}} = \frac{mg}{2s_{\text{tija}}} = \frac{mg}{2\pi \left(\frac{d_{\text{tija}}}{2}\right)^2} = 7,972 \text{ MPa}$$

$$c) \eta = \frac{F_{\text{ch}} v}{P_h} = \frac{mgv}{2P_h} \Rightarrow P_h = \frac{mgv}{2\eta} = 847,9 \text{ W}$$

$$d) P_h = pq \Rightarrow p = \frac{P_h}{q} = 2,840 \text{ MPa}$$