Generalitat de Catalunya
Consell Interuniversitari de Catalunya
Oficina d'Accés a la Universitat

Criteris de correcció

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PAU 2020

Tecnologia industrial

SÈRIE 1

Primera part

Exercici 1

Q1 b **Q2** c **Q3** c **Q4** b **Q5** a

Exercici 2

a)

v	c	l	a
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

b) $a = (v \cdot \bar{c} \cdot \bar{l}) + (v \cdot \bar{c} \cdot l) + (v \cdot c \cdot \bar{l})$

Simplificant:

$a = v(\bar{c} + \bar{l})$

c)
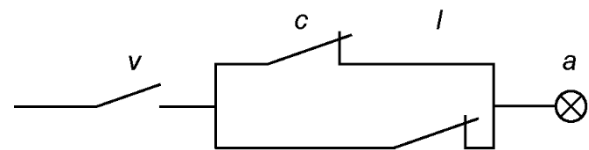
Exercici 3

a) $\omega_r = \dfrac{v}{d/2} = 10{,}28 \text{ rad/s};$ $\qquad \omega_{\text{mot}} = \omega_r / \tau = 128{,}5 \text{ rad/s};$

b) $P_{\text{subm}} = P_{\text{cons}}\, \eta_{\text{red}}\, \eta_{\text{mot}} = 61{,}99 \text{ W}$

c) $\Gamma = P_{\text{cons}}\, \eta_{\text{mot}} / \omega_{\text{mot}} = 507{,}9 \text{ Nmm}$

d) $t = E_{\text{bat}} / P_{\text{cons}} = 3{,}2 \text{ h};$ $\qquad s_{\text{rec}} = v\, t = 11{,}84 \text{ km}$
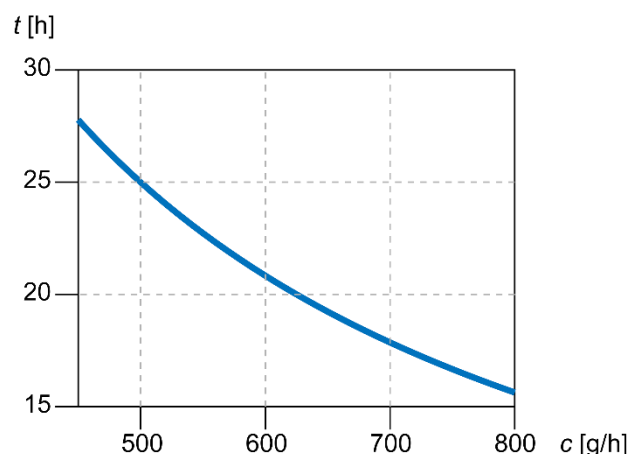
Exercici 4

a) $P_{\text{mín}} = p_b\, c_{\text{mín}} = 6{,}201 \text{ kW}$

$P_{\text{màx}} = p_b\, c_{\text{màx}} = 11{,}02 \text{ kW}$

b) $t_{\text{màx}} = m_b / c_{\text{mín}} = 27{,}78 \text{ h}$

d) $m_{CO2} = c_{\text{màx}}\, n\, t_{\text{bar}}\, FE = 71{,}04 \text{ kg}$

c)

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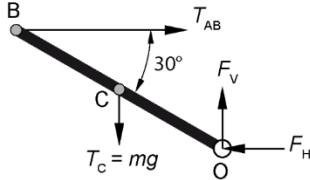**Criteris de correcció**

Tecnologia industrial

Exercici 5

a)

b)

$$\sum M(O) = 0 \;\rightarrow\; m\,g\,L\cos(30) - T_{AB}\,2L\,\sin(30) = 0 \;\rightarrow\; T_{AB} = m\,g\frac{\sqrt{3}}{2} = 254{,}8\text{ N}$$

c)

$$\sigma_{AB} = \frac{T_{AB}}{\pi d^2/4} = 20{,}28\text{ MPa}$$

d) $\sum F_{\text{horitzontals}} = 0 \;\rightarrow\; F_H = T_{AB} \qquad\qquad \rightarrow\; F_H = 254{,}8\text{ N}$

   $\sum F_{\text{verticals}} = 0 \qquad \rightarrow\; F_V = m\cdot g \qquad\qquad \rightarrow\; F_V = 294{,}2\text{ N}$

e)

$$d' = 1\text{ mm} \;\rightarrow\; \sigma'_{AB} = \frac{T_{AB}}{\pi d'^2/4} = 324{,}4\text{ MPa}$$

Com que σ'_{AB} és superior al límit elàstic del material, el tirant es deformaria permanentment i de manera irreversible. No podria mantenir la posició d'equilibri estudiada.

Exercici 6

a) $R_1 = R_2 = \rho\dfrac{L}{\pi d^2/4} = 40{,}74\;\Omega$

b) $R_{\text{màx}} = R_1 + R_2 = 81{,}49\;\Omega$

$$R_{\text{mín}} = \frac{1}{\dfrac{1}{R_1} + \dfrac{1}{R_2}} = 20{,}37\;\Omega$$

c) $P_{\text{màx}} = \dfrac{U^2}{R_{\text{mín}}} = 2{,}597\text{ kW}$

d) $t = 1\,\dfrac{\text{h}}{\text{dia}}\,30\,\dfrac{\text{dies}}{\text{mes}}; \;\rightarrow\; c = p\,t\,P_{\text{màx}} = 11{,}69\;€$

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SÈRIE 3

Exercici 1

Q1 a   **Q2** a   **Q3** d   **Q4** c   **Q5** b

Exercici 2

a)

x_1	x_2	x_3	c
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

b)

$$c = (\overline{x_1} \cdot \overline{x_2} \cdot \overline{x_3}) + (\overline{x_1} \cdot x_2 \cdot \overline{x_3}) + (x_1 \cdot \overline{x_2} \cdot x_3) + (x_1 \cdot x_2 \cdot x_3)$$
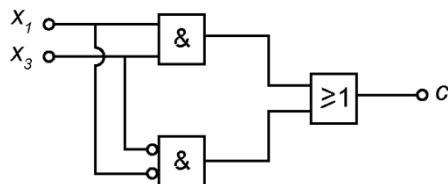
o també

$$c = (x_1 + x_2 + \overline{x_3}) \cdot (x_1 + \overline{x_2} + \overline{x_3}) \cdot (\overline{x_1} + x_2 + x_3) \cdot (\overline{x_1} + \overline{x_2} + x_3)$$

simplificant:

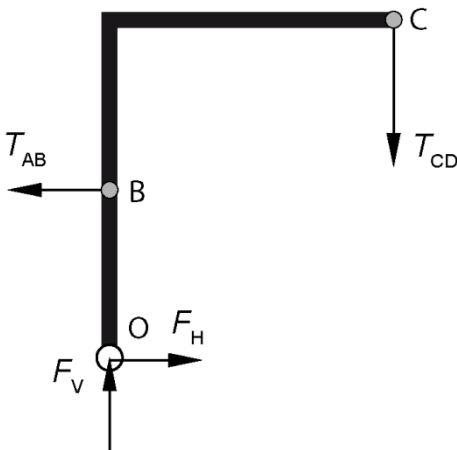$$c = x_1 \cdot x_3 + \overline{x_1} \cdot \overline{x_3}$$

c)

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Exercici 3

a) $m_2 \, g \, L = m_3 \, g \, 2L \rightarrow m_3 = m_2/2 = 0{,}1 \text{ kg}$

$m_4 \, g \, 3L = (m_2 + m_3) \, g \, 2L \rightarrow m_4 = 2(m_2 + m_3)/3 = 0{,}2 \text{ kg}$

$m_1 \, g \, 3L = (m_2 + m_3 + m_4) \, g \, 4L \rightarrow m_1 = 4(m_2 + m_3 + m_4)/3 = \dfrac{2}{3} \text{ kg}$

$T_{CD} = \sum m_i \, g = 11{,}44 \text{ N}$

b)

c) $\sum M(O) = 0 \qquad \rightarrow \quad T_{AB} \, 5L - T_{CD} \, 8L = 0 \rightarrow T_{AB} = 8\,T_{CD}/5 = 18{,}31 \text{ N}$

d) $\sum F_{\text{horitzontals}} = 0 \rightarrow F_H = T_{AB} = 18{,}31 \text{ N}$

$\sum F_{\text{verticals}} = 0 \qquad \rightarrow \quad F_V = T_{CD} = 11{,}44 \text{ N}$

Exercici 4

a) $E_{\text{útil}} = \dfrac{1}{2} m(v_2^2 - v_1^2); \qquad P_{\text{útil}} = \dfrac{E_{\text{útil}}}{t} = 73{,}81 \text{ kW}$

b) $E_{\text{cons}} = \dfrac{E_{\text{útil}}}{\eta} = 1273 \text{ kJ}$

c) $V = \dfrac{E_{\text{cons}}}{p \cdot \rho} = 38{,}44 \text{ cm}^3$

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Exercici 5

a) $P_{cons} = \dfrac{P_{mec}}{\eta}$; $P_{mec} = m \cdot g \cdot v \sin(\alpha_1);$ $P_{cons} = 334{,}0 \, \text{W}$

b) $E_{bat} = c \cdot U = 888 \, \text{W·h} = 3197 \, \text{kJ}$

c) $t = \dfrac{E_{bat}}{P_{cons}} = 2{,}659 \, \text{h};$ $s_1 = v \cdot t = 13{,}29 \, \text{km}$

d) $s_2 = s_1 \dfrac{\sin(6)}{\sin(10)} = 8{,}003 \, \text{km}$; $\Delta s = |s_2 - s_1| = 5{,}292 \, \text{km}$

Exercici 6

a) $t = 4 \dfrac{\text{h}}{\text{dia}} \cdot 170 \dfrac{\text{dies}}{\text{any}}$; $E_{subm} = P_{subm} \cdot t = 1195 \, \text{MW·h} = 4{,}304 \cdot 10^{12} \, \text{J}$

$E_{cons} = \dfrac{E_{subm}}{\eta_c} = 1314 \, \text{MW·h} = 4{,}729 \cdot 10^{12} \, \text{J}$

b) $V = \dfrac{E_{cons}}{p_c \cdot \rho_{gasoil}} = 124{,}2 \, \text{m}^3$

c) $c_{tot} = c_{gasoil} \cdot V = 110{,}9 \, \text{k€}$

d) $m_{CO2} = FE \cdot V = 346{,}5 \cdot 10^3 \, \text{kg}$