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Cuaderno de Examen

TEC | Tecnológico de Costa Rica

Prueba:

- ☐ Examen Corto
- ☒ Parcial
- ☐ Final
- ☐ Reposición:
- ☐ Otro:

Estudiante: [redacted]

Carné: [redacted]

Curso: Diseño Lógico

Grupo: 2

Profesor: Carlos Badilla

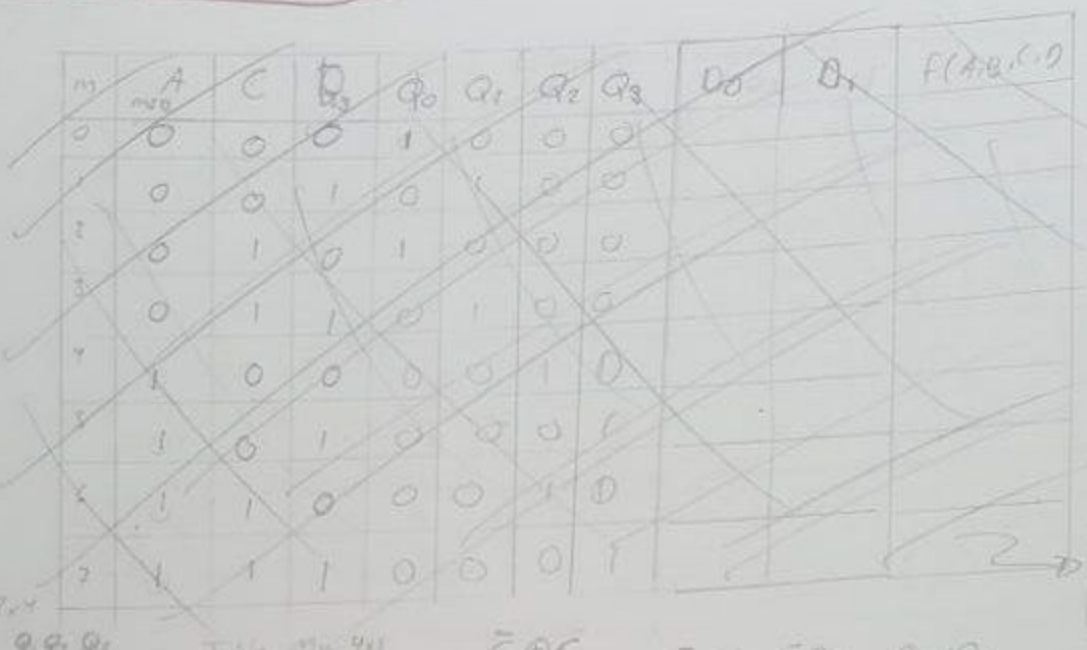
Fecha: 26/09/18

Calificación:

1	Decos y MUX	40	/40
2	CTRL depósito agua	40	/40
3	Álgebra Boole	20	/20
	Total	100	/100

Ejemplo #1 | Decod y MUX

a)



m	A (MSB)	C	D (LSB)	Q_0	Q_1	Q_2	Q_3	D_0	D_1	$F(A,B,C,D)$
0	0	0	0	1	0	0	0			
1	0	0	1	0	1	0	0			
2	0	1	0	0	0	1	0			
3	0	1	1	0	0	0	1			
4	1	0	0	0	0	0	0			
5	1	0	1	0	0	0	0			
6	1	1	0	0	0	0	0			
7	1	1	1	0	0	0	0			

→ No

Tabla de verdad

S_1	S_0	Q_0	Q_1	Q_2	Q_3
x	x	0	0	0	0
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

Tabla MUX 4x1

En	S_1	S_0	Y
0	x	x	x
1	0	0	Q_0
1	0	1	Q_1
1	1	0	Q_2
1	1	1	Q_3

$\bar{C} \oplus C$

Tabla MUX 2x1

En	S	Y
0	x	1
1	0	$\bar{C}$
1	1	C

$\bar{C}$	C	$\bar{C} \oplus C$
1	0	1
0	1	1

Q_2	Q_1	Q_0
0	0	0
0	0	1
0	1	0
0	1	1

Q_3	Q_2	Q_1	Q_0
0	0	0	0
0	0	0	1
0	0	1	0
0	0	1	1

Tabla Bloque N°1

Tabla de verdad F(A,B,C,D) (+1p)

a)

EN DEC	m	A (MSB)	B	C	D (LSB)	Q_0	Q_1	Q_2	Q_3	En MUX	D_0	D_1	S	f(A,B,C,D)	
0	x	x	x	x	x	0	0	0	0	x	x	x	x	x	
1	0	0	0	0	0	1	0	0	0	1	0	1	0	0	
1	1	0	0	0	1	0	1	0	0	1	1	0	0	1	
1	2	0	0	1	0	0	0	1	0	1	0	1	0	0	D
1	3	0	0	1	1	0	0	0	1	1	1	0	0	1	
1	4	0	1	0	0	1	0	0	0	1	0	1	1	1	
1	5	0	1	0	1	0	1	0	0	1	1	0	1	0	$\bar{D}$
1	6	0	1	1	0	1	0	0	0	1	0	1	1	1	
1	7	0	1	1	1	0	1	0	0	1	1	0	1	0	
1	8	1	0	0	0	0	0	1	0	1	0	1	0	0	
1	9	1	0	0	1	0	0	0	1	1	1	0	0	1	
1	10	1	0	1	0	0	0	1	0	1	0	1	0	0	D
1	11	1	0	1	1	0	0	0	1	1	1	0	0	1	
1	12	1	1	0	0	0	0	1	0	1	0	1	1	1	
1	13	1	1	0	1	0	0	0	1	1	1	0	1	0	$\bar{D}$
1	14	1	1	1	0	0	0	1	0	1	0	1	1	0	
1	15	1	1	1	1	0	0	0	1	1	1	0	1	0	

Tabla Bloque N°2 — Tabla de verdad G(A,B,C,D) (+10)

En	m	A	B	C	D	O_0	O_1	O_2	O_3	G(A,B,C,D)
0	x	x	x	x	x	x	x	x	x	x
1	0	0	0	0	0	0	0	0	0	0
1	1	0	0	0	1	0	0	0	0	0
1	2	0	0	1	0	0	0	0	0	0
1	3	0	0	1	1	0	0	0	0	0
1	4	0	1	0	0	0	1	0	1	0
1	5	0	1	0	1	0	1	0	1	1
1	6	0	1	1	0	0	1	0	1	0
1	7	0	1	1	1	0	1	0	1	1
1	8	1	0	0	0	0	0	0	1	0
1	9	1	0	0	1	0	0	0	1	0
1	10	1	0	1	0	0	0	0	1	0
1	11	1	0	1	1	0	0	0	1	1
1	12	1	1	0	0	1	1	1	1	1
1	13	1	1	0	1	1	1	1	1	1
1	14	1	1	1	0	1	1	1	1	1
1	15	1	1	1	1	1	1	1	1	1

$O_0 = O_2 = A \cdot B$ $O_1 = B$ $O_3 = A \cdot B$

A	B	$A \cdot B = O_0$
0	0	0
0	1	0
1	0	0
1	1	1

A	B	$A \cdot B$
0	0	0
0	1	1
1	0	1
1	1	1

Tabla Mux 4:1

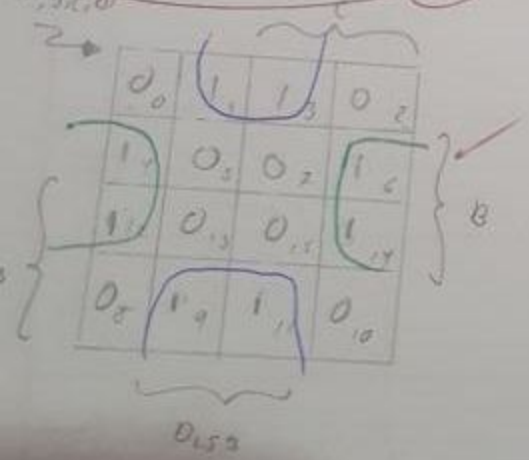
En	S_1	S_0	Y
0	x	x	x
1	0	0	I_0
1	0	1	I_1
1	1	0	I_2
1	1	1	I_3

$C = S_1$

$D = S_0$

b) Mapa K Bloque N°1 (+5)

f(A,B,C,D) =



$f(A,B,C,D) = \bar{B}D + B\bar{D}$

Mapa K Bloque N°2 (+5)

G(A,B,C,D) =

$G(A,B,C,D) = A\bar{B} + BD + A\bar{C}D$

Continuación problema #1

c) $f(A,B,C,D) \Rightarrow NOR$

$\Rightarrow \bar{B}D + B\bar{D}$

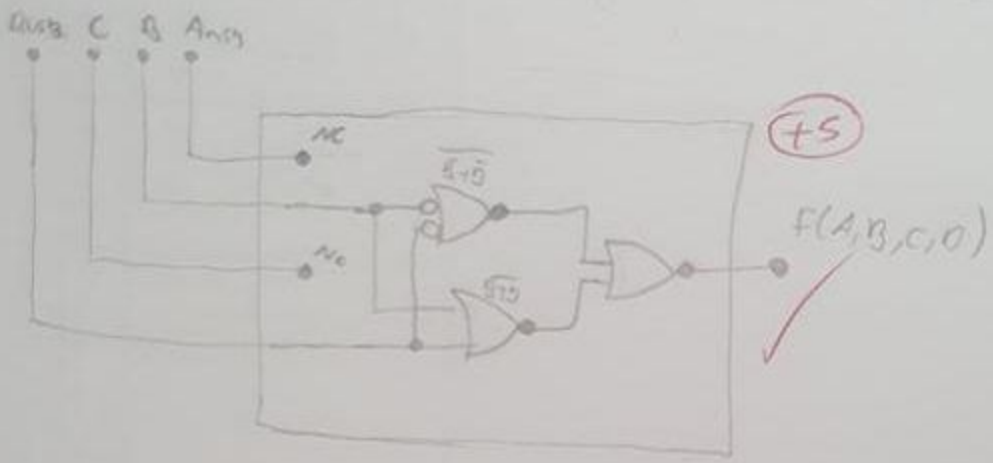
$\Rightarrow \overline{B+\bar{D}} + \overline{\bar{B}+D}$; $\bar{x}\bar{y} = x+y$ ✓

$\Rightarrow \overline{(B+\bar{D})\cdot(\bar{B}+D)}$; $x(y+z) = xy+xz$

$\Rightarrow \overline{B\bar{B} + BD + \bar{B}D + D\bar{D}}$ $x+\bar{x}=0$ $x+0=x$

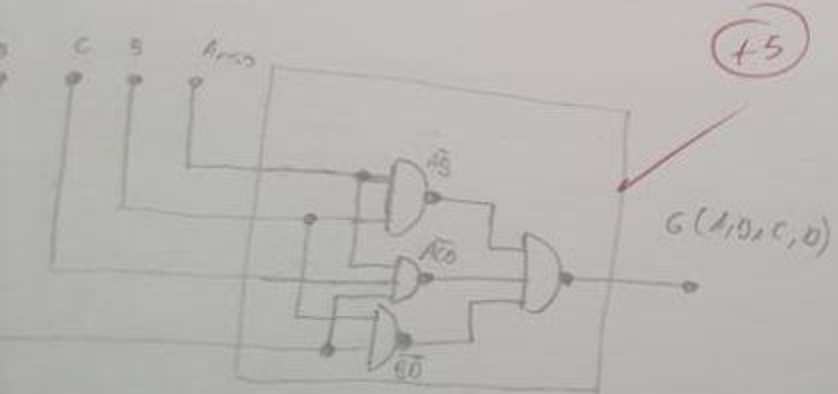
$\Rightarrow \overline{BD + \bar{B}\bar{D}}$

$\Rightarrow \overline{\overline{\bar{B}+\bar{D}} + \overline{B+D}}$ ✓



$AB + BD + ACD$ $\bar{x}\bar{y} = \bar{x}+\bar{y}$

$\overline{\bar{A}\bar{B}\ \bar{B}\bar{D}\ \bar{A}\bar{C}\bar{D}}$



Problema #2 Control depósito agua

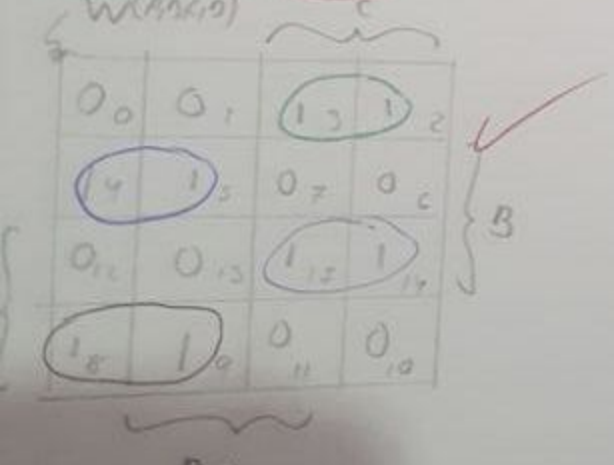
Válvula 1 = abierta
0 = cerrada

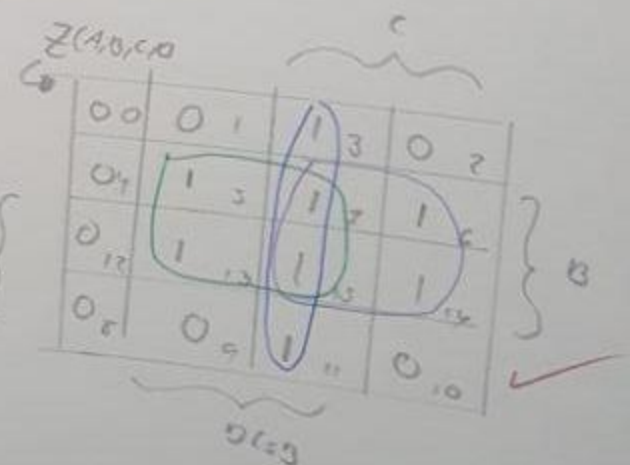
Tabla de verdad (+10)

	5l	10l	20l	40l				
m	A	B	C	D	w	x	Y	z
0	0	0	0	0	0	0	0	0
1	0	0	0	1	0	1	1	0
2	0	0	1	0	1	0	1	0
3	0	0	1	1	1	1	0	1
4	0	1	0	0	1	1	0	0
5	0	1	0	1	1	0	0	1
6	0	1	1	0	0	0	0	1
7	0	1	1	1	0	1	1	1
8	1	0	0	0	1	0	0	0
9	1	0	0	1	1	1	1	0
10	1	0	1	0	0	1	1	0
11	1	0	1	1	0	0	1	1
12	1	1	0	0	0	0	1	0
13	1	1	0	1	0	1	0	1
14	1	1	1	0	1	0	0	1
15	1	1	1	1	1	1	1	1

Valor incorrecto!

Mapas K (+10)





$w(A,B,C,D) = A\bar{B}C + \bar{A}B\bar{C} + ABC + A\bar{B}\bar{C}$

$z(A,B,C,D) = B\bar{D} + C\bar{D} + BC$

5 Implementación de X con Dec 2x4 (+10)

Tabla Dec 2x4

m	A	B	C	D	X	f(D)	f(C,D)
0	0	0	0	0	0	0	D
1	0	0	0	1	1		
2	0	0	1	0	0	D	
3	0	0	1	1	1		
4	0	1	0	0	1	$\bar{D}$	$C\bar{D}+\bar{C}D$
5	0	1	0	1	0		XNOR
6	0	1	1	0	0	D	
7	0	1	1	1	1		
8	1	0	0	0	0	0	$C\bar{D}+\bar{C}D$ XOR
9	1	0	0	1	1		
10	1	0	1	0	1	$\bar{D}$	
11	1	0	1	1	0		
12	1	1	0	0	0	0	
13	1	1	0	1	1		
14	1	1	1	0	0	1 D	
15	1	1	1	1	1		

Valor incorrecto!

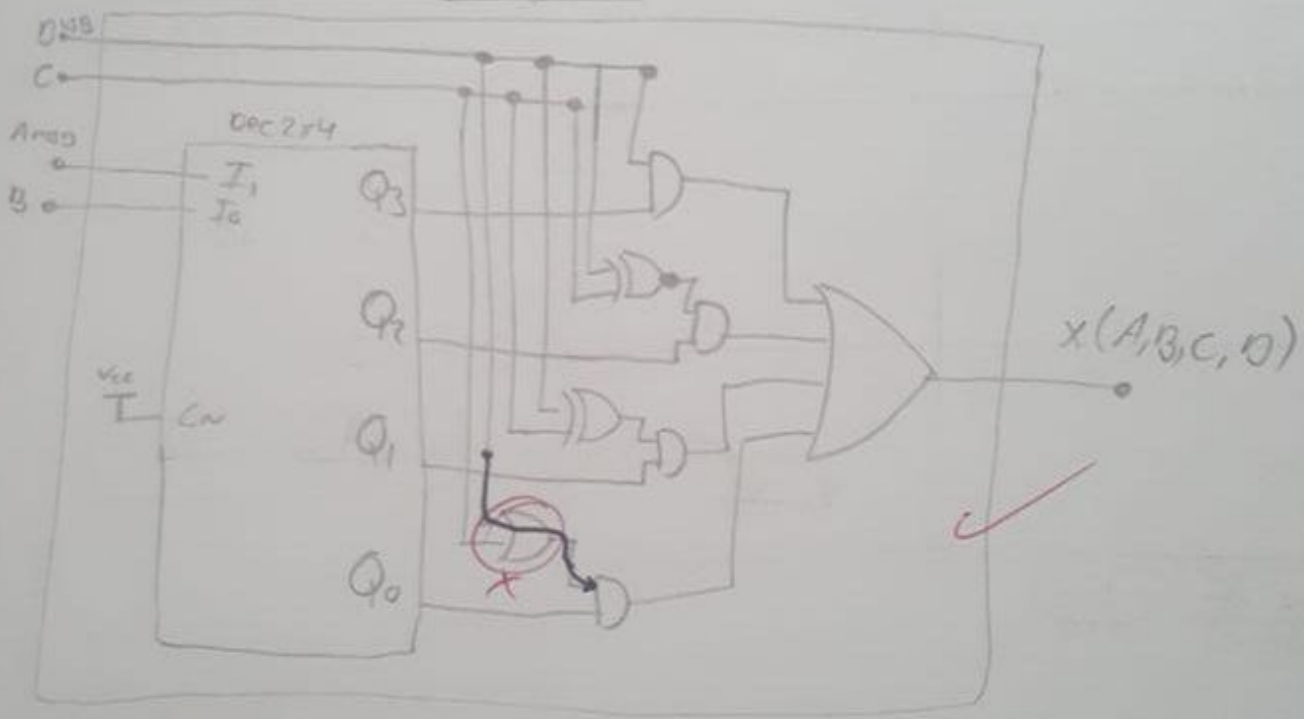
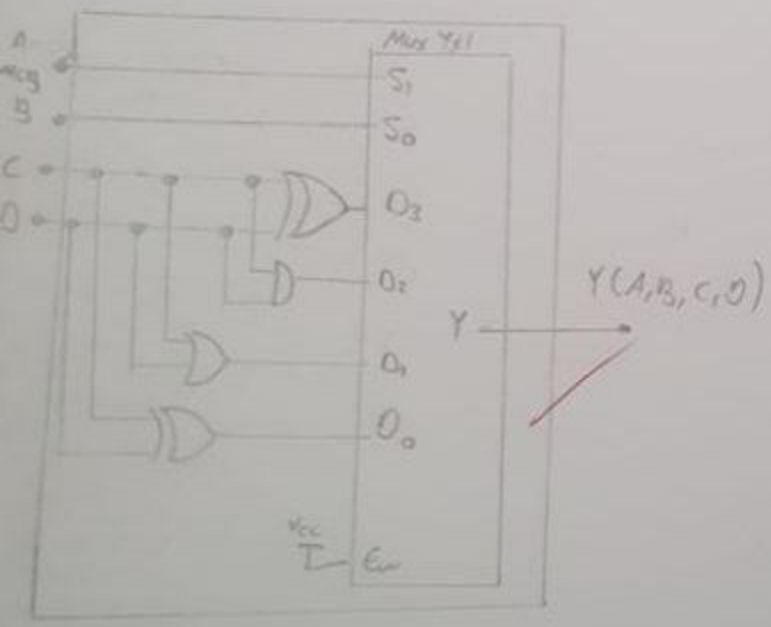


Tabla Mux 4x1

	A	B	C	D	Y	f(D)	f(C,D)
0	0	0	0	0	0	0	
1	0	0	0	1	1		
2	0	0	1	0	1	D̄	C D̄ + C̄ D
3	0	0	1	1	0		XOR
4	0	1	0	0	0	0	
5	0	1	0	1	0		C D
6	0	1	1	0	0	0	
7	0	1	1	1	1		
8	1	0	0	0	0	D	
9	1	0	0	1	1		
10	1	0	1	0	1	1	C + D
11	1	0	1	1	1		
12	1	1	0	0	1	D̄	C D + C̄ D̄
13	1	1	0	1	0		
14	1	1	1	0	0	0	XNOR
15	1	1	1	1	1		

Continuación Problema #2

d) Implementación de Y con MUX 4x1 (+10)



Problema #3. Álgebra Booleana

x	y	x ⊕ y
0	0	0
0	1	1
1	0	1
1	1	0

$x\bar{y} + \bar{x}y$

(+10) a) $[\overline{(a \oplus b) + \bar{b}}] \cdot (a+b)$; $x \oplus y = x\bar{y} + \bar{x}y$

(No) Incluir notas de borrador en su respuesta

- $[\overline{(a\bar{b} + \bar{a}b) + \bar{b}}] \cdot (a+b)$; $x+(y+z) = (x+y)+z$; $xy = yx$
- $[\overline{(\bar{b} + \bar{b}a) + \bar{a}b}] \cdot (a+b)$; $x + xy = x$; $xy = yx$
- $[\overline{\bar{b} + b\bar{a}}] \cdot (a+b)$; $x + \bar{x}y = x + y$
- $[\overline{\bar{b} + \bar{a}}] \cdot (a+b)$; $\overline{x+y} = \bar{x}\bar{y}$; $\bar{\bar{x}} = x$; $xy = yx$
- $ab \cdot (a+b)$; $x \cdot (y+z) = xy + xz$
- $aab + abb$; $x \cdot x = x$
- $ab + ab$; $x + x = x$
- ab

(+10) b) $\bar{a}b + [\overline{\bar{b}c} \cdot \bar{a}] + (a\bar{c})$; $\overline{x \cdot y} = \bar{x} + \bar{y}$

- $\bar{a}b + [(\bar{b} + \bar{c}) \cdot \bar{a}] + (a\bar{c})$; $x(y+z) = xy + xz$; $xy = yx$
- $\bar{a}b + \bar{a}\bar{b} + \bar{a}\bar{c} + a\bar{c}$; $x(y+z) = xy + xz$
- $\bar{a}(b+\bar{b}) + \bar{c}(\bar{a}+a)$; $x + \bar{x} = 1$
- $\bar{a} + \bar{c}$

$= \overline{ac}$