Sistemas Numéricos

DEC	CUA	OCT	HEX	BIN	Gray	COMP1	-COMP2
0	0	0	0	0000	0000	1111	00000
1	1	1	1	0001	0001	1110	11111
2	2	2	2	0010	0011	1101	11110
3	3	3	3	0011	0010	1100	11101
4	10	4	4	0100	0110	1011	11100
5	11	5	5	0101	0111	1010	11011
6	12	6	6	0110	0101	1001	11010
7	13	7	7	0111	0100	1000	11001
8	20	10	8	1000	1100	0111	11000
9	21	11	9	1001	1101	0110	10111
10	22	12	A	1010	1111	0101	10110
11	23	13	B	1011	1110	0100	10101
12	30	14	C	1100	1010	0011	10100
13	31	15	D	1101	1011	0010	10011
14	32	16	E	1110	1001	0001	10010
15	33	17	F	1111	1000	0000	10001

Tablas de Verdad

	XOR	NOR	NAND	XNOR
00	0	1	1	1
01	1	0	1	0
10	1	0	1	0
11	0	0	0	1

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	XOR	NOR	NAND	XNOR
000	0	1	1	1
001	1	0	1	0
010	1	0	1	0
011	0	0	1	1
100	1	0	1	0
101	0	0	1	1
110	0	0	1	1
111	1	0	0	0

Tablas de Diseño de Flip-Flops

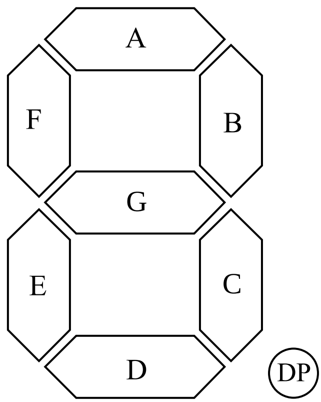
Flip-Flop SR				
Q(t)	→	Q($t+1$)	S	R
0	→	0	0	x
0	→	1	1	0
1	→	0	0	1
1	→	1	x	0

Flip-Flop JK				
Q(t)	→	Q($t+1$)	J	K
0	→	0	0	x
0	→	1	1	x
1	→	0	x	1
1	→	1	x	0

Flip-Flop D			
Q(t)	→	Q($t+1$)	D
0	→	0	0
0	→	1	1
1	→	0	0
1	→	1	1

Flip-Flop T			
Q(t)	→	Q($t+1$)	T
0	→	0	0
0	→	1	1
1	→	0	1
1	→	1	0

Display de Siete Segmentos



DEC	BCD	SEGMENTOS
0	0000	ABCDEF
1	0001	BC
2	0010	ABDEG
3	0011	ABCDG
4	0100	BCFG
5	0101	ACDFG
6	0110	ACDEFG
7	0111	ABC
8	1000	ABCDEFG
9	1001	ABCFG

Notación de Suma

$$f\,(\underbrace{A,B,C,D}_{\textit{Variables}})=\underbrace{\sum m(0,4,5,6)}_{\text{Valores de activación}}+\underbrace{\sum d(9,14)}_{\text{Redundancía}}$$

Álgebra Booleana

Teoremas de Múltiples Variables

$$x+y=y+x$$
$$x\cdot y=y\cdot x$$
$$x+(y+z)=x+y+z$$
$$x(yz)=xyz$$
$$x(y+z)=xy+xz$$
$$(w+x)(y+z)=wy+xy+wz+xz$$
$$x+xy=x$$
$$x+\overline{x}y=x+y$$
$$\overline{x}+xy=\overline{x}+y$$

Teoremas de Morgan

$$\overline{x+y}=\overline{x}\cdot\overline{y}$$
$$\overline{x\cdot y}=\overline{x}+\overline{y}$$

Teoremas de una Variable

AND	OR
$x\cdot 0=0$	$x+0=x$
$x\cdot 1=1$	$x+1=1$
$x\cdot x=x$	$x+x=x$
$x\cdot\overline{x}=0$	$x+\overline{x}=1$

Números Binarios

Binario a Decimal

$$\begin{array}{ccccc} 2^4 & 2^3 & 2^2 & 2^1 & 2^0 \\ 1 & 0 & 0 & 1 & 1 \end{array} = 19$$

Formato Signo Magnitud

$$\underbrace{1}_{\text{Signo}}\ \underbrace{10011}_{\text{Magnitud}}=-13$$

Complemento 1

$$C_1^N=\begin{array}{cccccc} 1 & 0 & 0 & 1 & 1 & 1 \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 0 & 1 & 1 & 0 & 0 & 0 \end{array}$$

Complemento 2

$$C_2^N=C_1^N+1$$

Construcción del Mapa-K

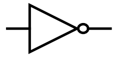
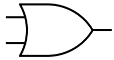
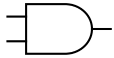
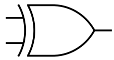
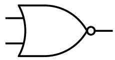
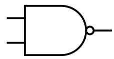
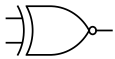
CD

AB		00	01	11	10
	00	0	1	3	2
	01	4	5	7	6
	11	12	13	15	14
	10	8	9	11	10

Distribución

ABCD		ABCD	
0000	0	1000	8
0001	1	1001	9
0010	2	1010	10
0011	3	1011	11
0100	4	1100	12
0101	5	1101	13
0110	6	1110	14
0111	7	1111	15

Circuitos Lógicos

Operación		Definición	Compuerta
NOT	‘	$\overline{x}$	
OR	+	$x+y$	
AND	·	$x\cdot y$	
XOR	⊕	$(x+y)\,(\overline{x}+\overline{y})$ $x\,\overline{y}+\overline{x}\,y$	
NOR	↓	$\overline{(x+y)}$ $\overline{x}\cdot\overline{y}$	
NAND	↑	$\overline{(x\cdot y)}$ $\overline{x}+\overline{y}$	
XNOR	⊙	$(x+\overline{y})\,(\overline{x}+y)$ $xy+\overline{x}\,\overline{y}$	

Universalidad de Compuertas

Operación		NAND	NOR
NOT	‘	$\overline{(x\cdot x)}$	$\overline{(x+x)}$
OR	+	$\overline{(\overline{x}\cdot\overline{y})}$	$\overline{\overline{(x+y)}}$
AND	·	$\overline{\overline{(x\cdot y)}}$	$\overline{(\overline{x}+\overline{y})}$
XOR	⊕	$\overline{\overline{(x\cdot\overline{y})}\;\overline{(\overline{x}\cdot y)}}$	$\overline{\overline{(x+y)}+\overline{(\overline{x}+\overline{y})}}$
NOR	↓	$\overline{\overline{(\overline{x}\cdot\overline{y})}}$	~
NAND	↑	~	$\overline{\overline{(\overline{x}+\overline{y})}}$
XNOR	⊙	$\overline{\overline{(x\cdot y)}\;\overline{(\overline{x}\cdot\overline{y})}}$	$\overline{\overline{(x+\overline{y})}+\overline{(\overline{x}+y)}}$