Date :- 28/5/2020 | Name :- Poojary sushant
Course :- Logic design | USN :- 4AL18EC400
Title:- Boolean eq for digital ckt · combinational ckt | Sem :- 6th sem 'B' sec

Boolean Algebra

"In 1854, George Boole developed an algebraic system now called Boolean algebra"

-> Boolean algebra is a system mathematical logic'
-> "It is a defined with set of element, a set of operators & a no of axioms or postulate
-> sets of element (0,1)
-> Two binary operator - OR (+) & AND (·)
-> unary operator - NOT (~)

Boolean Algebra — $A+A = A$ $\quad 1+1=1$
$A \cdot A = A$ $\quad 1 \cdot 1 = 1$

Ordinary Algebra $A+A = 2A$ $\quad 1+1=2$
$A \cdot A = A^2$ $\quad 1 \cdot 1 = 1$

Binary number system $1+1 = (10)$ $\quad 1.1 = 1$

Axioms (or) Postulates

-> $A+0 = A$
-> $A+1 = 1$
-> $A+A = A$
-> $A+\bar{A} = 1$
-> $\bar{\bar{A}} = A$

$A \cdot 0 = 0$
$A \cdot 1 = A$
$A \cdot A = A$
$A \cdot \bar{A} = 0$

Laws of Boolean Algebra

1) commutative law

$$A + B = B + A$$
$$A \cdot B = B \cdot A$$

2) Associative law

$$A + (B + C) = (A + B) + C$$
$$A \cdot (B \cdot C) = (A \cdot B) \cdot C$$

3) Distributive law

$$A \cdot (B + C) = AB + AC$$
$$A + (BC) = A + B \cdot A + C$$
$$= A \cdot A + AC + AB + BC$$
$$= A[1 + C + B] + BC$$
$$= A + BC$$

Theorems of Boolean algebra

1) Absorption theorem

a) $x + xy = x$

$\rightarrow x(1 + y)$

$\rightarrow x \cdot 1$

$= x$

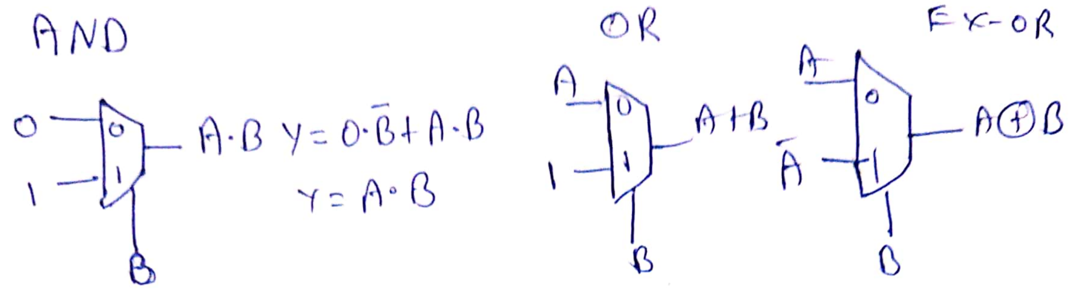
b) $A + \bar{A}B = A + B$

$(A + \bar{A})(A + B)$

$1(A + B) = A + B$

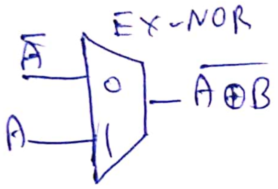
Mux to logic gates

1. Nand & Nor - universal gate

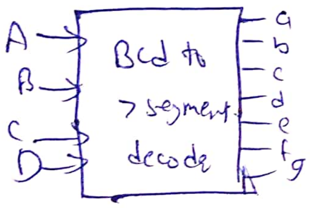


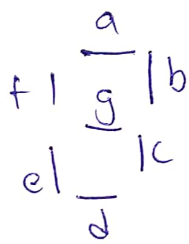
$Y = 0 \cdot \bar{B} + A \cdot B$

$Y = A \cdot B$

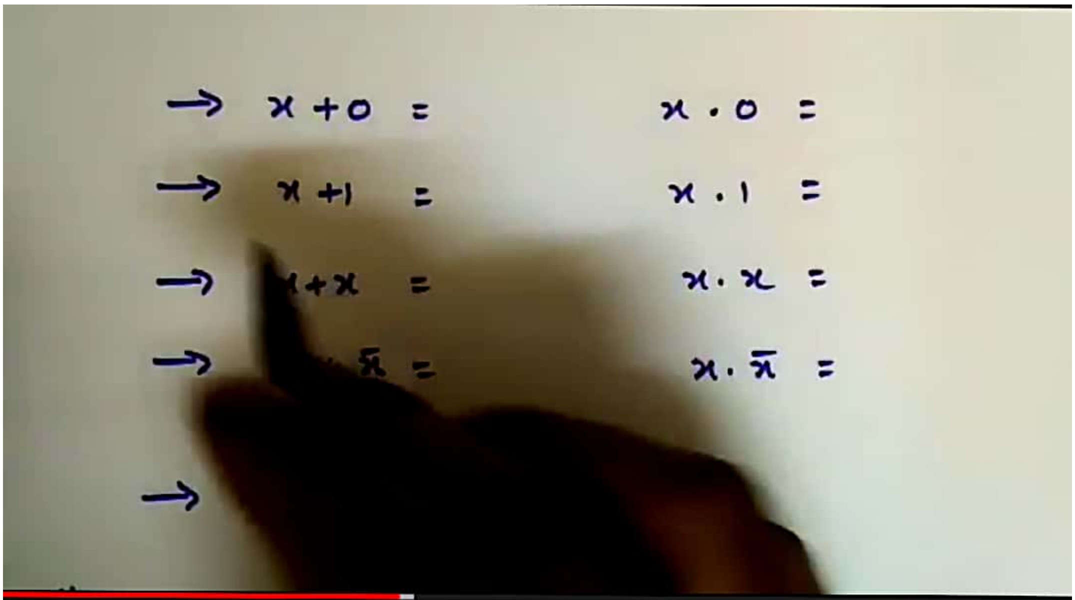


7 segment decoder

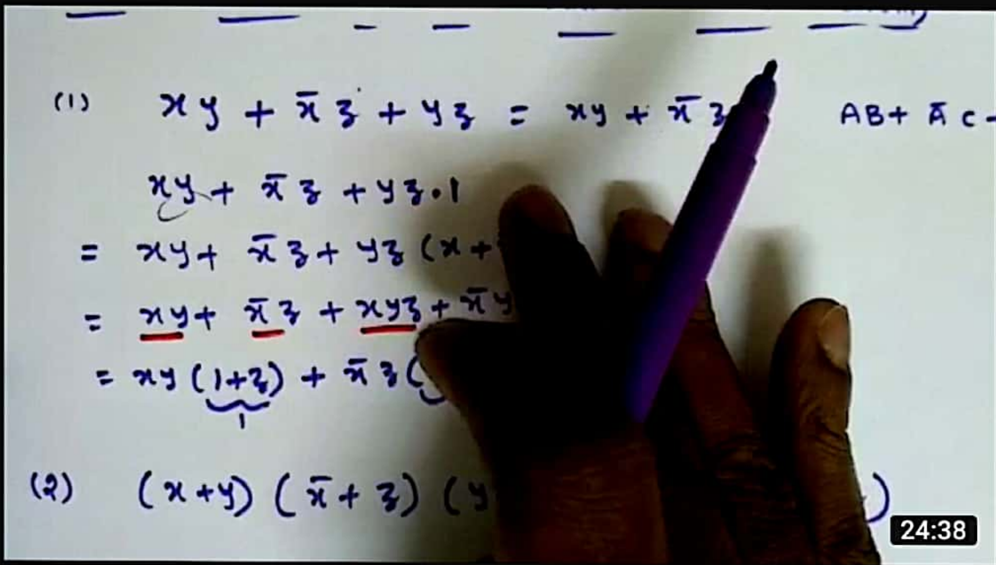




A	B	C	D	a	b	c	d	e	f	g
0	0	0	0	1	1	1	1	1	1	0
0	0	0	1	0	1	1	0	0	0	0
0	0	1	0	1	1	0	1	1	0	1
0	0	1	1	1	1	1	1	0	0	1
0	1	0	0	0	1	1	0	0	1	1
0	1	0	0	1	0	1	1	0	1	1
0	1	1	0	1	0	1	1	1	1	1
0	1	1	1	1	1	1	0	0	0	0
1	0	0	0	1	1	1	1	1	1	1
1	0	0	1	1	1	1	1	0	1	1



All · Boolean algebra · Related



Digital Circuits Lecture-13: Boolean algebra (Part-2)

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