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- Logic Design:

Boolean algebra:

'0' or '1'

→ cost of the circuit.

→ Simple realization of a circuit.

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

→ "Boolean algebra is a system of mathematical logic"

→ It is defined with set of elements, a set of operators, and a no. of axioms or postulate.

→ Set of elements - (0,1)

→ Two binary operators - OR & AND
'(or)(∪)(or)∨(+)' (•) (or) ∩ (or) ∧

→ Unary operator - NOT (or) Invert.

- Axioms And Laws of Boolean algebra:

→ Axioms or postulates of Boolean algebra are a logical expressions upon which we can build useful theorems.

"AND operation" "OR operation"
"NOT operation"

→ $0.0 = 0$
→ $0.1 = 0$
→ $1.0 = 0$
→ $1.1 = 1$
} And operation.

→ $0+0 = 0$
→ $0+1 = 1$
→ $1+0 = 1$
→ $1+1 = 1$
} OR operation

→ A' (or) $\bar{A}$

→ $\bar{0}$ or $0' = 1$

→ $\bar{1}$ or $1' = 0$

- Difference b/w Boolean algebra, ordinary algebra and binary number system:

→ In Boolean algebra.

$A+A=A$ & $A.A=A$

$1+1=A=1$ & $1.1=1$

→ In ordinary algebra:

$A+A=2A$ $A.A=A^2$

$1+1=2$ $1.1=1$

→ In Binary number system:

$1+1=(10)$ $1.1=1$

- Axioms (or) Postulates:

→ $x+0=x$ $x.0=0$

→ $x+1=1$ $x.1=x$

→ $x+x=x$ $x.x=x$

→ $x+\bar{x}=1$ $x.\bar{x}=0$

→ $\overline{(\bar{x})}$ (or) $(x')'=x$

- Identity Element:

	OR operation	AND operation
Additive identity = 0	$=x+0=x$	$x.1=x=1.x$
Multiplicative identity = 1		

$x+0=x$
$0+x=x$

- Laws of Boolean Algebra:

(i) Commutative Law: $x+y=y+x$

$A+B=B+A$ | $x.y=y.x$ | $A.B=B.A$

(ii) Associative Law:

$x+(y+z)=(x+y)+z$ $x.(y.z)=(x.y).z$

$A+(B+C)=(A+B)+C$ $A.(B.C)=(A.B).C$

3. Distributive Law:

① $x(y+z) = xy+xy$
$A(B+C) = AB+AC$ → $A=0, B=1, C=0$

LHS $A(B+C) = 0(1+0) = 0$

RHS $AB+AC = 0$.

② $x+yz = (x+y)(x+z)$
$A+BC = (A+B)(A+C)$

① $x+yz = (x+y)(x+z)$
$= x.x + xz + xy + yz$
$= x + xz + xy + yz$
$= x(1+z+y) + yz$
$= x + yz$ Hence proved.

- Theorems of Boolean algebra:

① Absorption theorem: $x+xy = x$, $A+AB = A$
→ $x(1+y) = x.1 = x$

(b) $x+\bar{x}y = x+y$
$(x+\bar{x})(x+y) = 1.(x+y) = (x+y)$

(c) $A+BC = (A+B)(A+C)$
$= A.A + A.C + B.A + B.C$
$= A + AC + AB + B.C$
$= A(1+C) + AB + BC$
$= A + BC$

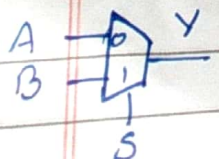
$A+\bar{A}B = A+B$

- MUX to logic gates:

① NAND, NOR - Universal gates.
② "Universal logic"
③ MUX and decoder are called "Universal logic".
④ ~~Now we will see how~~

- Multiplexier: It is a device that selects one of several analog or digital signals and it will forward to o/p line i.e single o/p line.

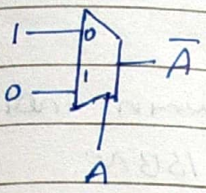
$2^n - 1 \Rightarrow 2^n$ → inputs
n → selection lines.



S	O/P(Y)
0	A
1	B

$\Rightarrow Y = A\bar{S} + BS$ with help of K-map

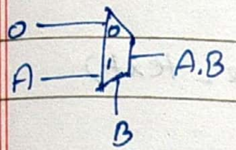
· Inverter designs help of mux:



$Y = A\bar{S} + BS$

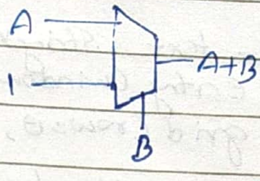
$= 1\bar{A} + 0A$

$\boxed{Y = \bar{A}}$



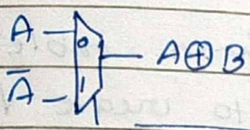
$Y = 0.\bar{B} + A.B$

$\boxed{Y = A.B}$

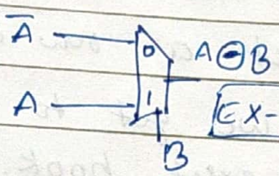


$Y = A+B$

or gate

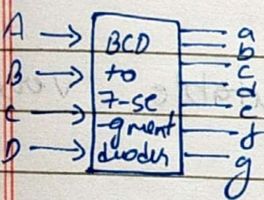


EX-OR

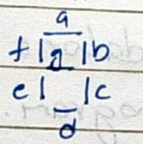


EX-NOR

· BCD to 7-segment decoder:



4 i/p lines and 7 o/p lines.



} light emitting diode

· **Phython:**

Application 5: Build a Desktop Database Application.

a) Desktop database App - How the o/p will look like.

→ How to build a program which is used store the information of books.

→ User Interface Design: user

→ Build a graphical user interface.

→ Fronted Interface

We use grid method. make things easier.

1. from tkinter import*
2.
3. window= TK( )
4.
5. window.main loop( )

```
l1 = Label(window, text="Title")
l1.grid(row=0, column=0)
```

copy for more row and column indicating "Title", "Author", "Year", "ISBN".

```
title_text = StringVar()
e1 = Entry(window, textvariable=title_text)
e1.grid(row=0, column=1)
```

this should be applied for Author, Year, ISBN.

to get a row and column table

→ Backend: we got to know to create table or exist book.

→ Connecting the Frontend to the Backend.
→ Fixing the Bug.
→ Creating a standalone Executable version of the program.