



# **COMPUTER SCIENCE & ENGINEERING**

## **INFORMATION TECHNOLOGY**

### **Digital Systems**

*Hand Notes For GATE, PSUs & Competitive Exam*

### **Hand Notes**

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**Note :** We also providing GATE, PSUs & Competitive Exam Materials [Handnotes, Shortnotes & Books], All Reports [Seminar Reports & PPT]

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## Digital System

- ① - Boolean expressions, laws, k-maps, Hazards in digital system
- ② - Multiplexer, Decoder, Encoder
- ③ - Flip-flop, interconnection, counters, shift registers
- ④ - Number systems, representation, fixed point & floating point arithmetic.

### ① Combinational circuits

$$y = f(x)$$

In this current output depends on current input.  
Its ckt. of sequential elements.

### ② Sequential circuits

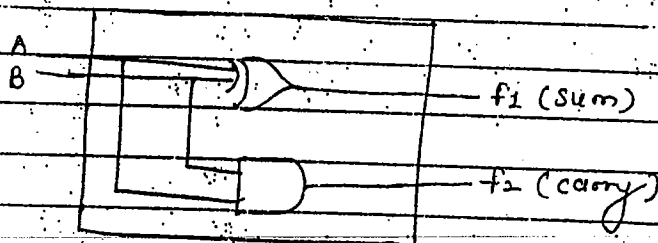
$$y = f(x, s) \quad ; \quad s \rightarrow \text{state (previous output)}$$

In this current output depends on current input & previous output i.e. state. ex:  $\rightarrow$  flip flop

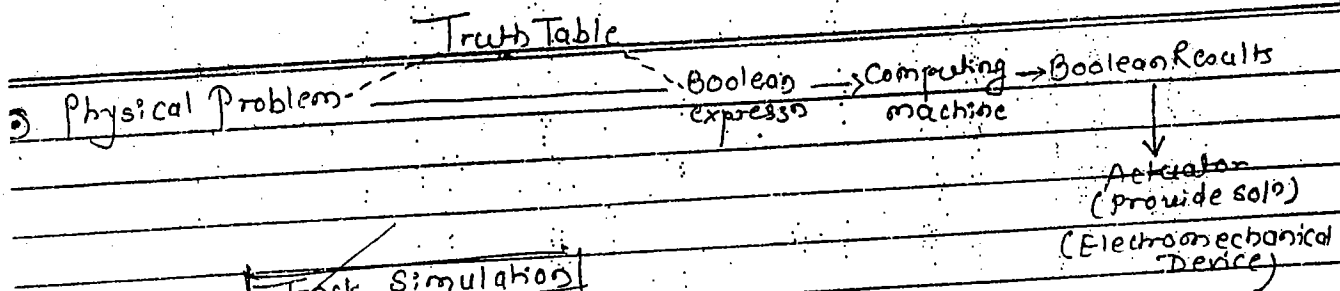
formula for number of flip-flop required  $\equiv \log_2 n$

### ③ Combinational function

- $\rightarrow$  Multi input & single o/p system ex:  $\rightarrow$  XOR gate
- $\rightarrow$  Multi input & multi o/p system ex:  $\rightarrow$  Half Adder

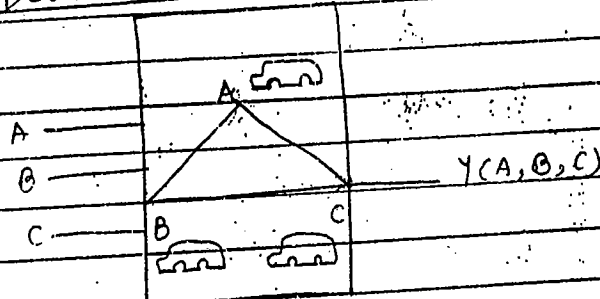


Half Adder



Track Simulation

ex:  $\rightarrow$



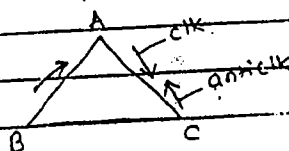
- Track laid in form of equilateral triangle.
- Three vehicles moving with same velocity are present at three vertices.
- System should generate output 1 as when any two vehicles meet together.

0  $\rightarrow$  clockwise movement

1  $\rightarrow$  anticlockwise movement

minterms: - product of i/p such that product is 1 i.e.  $A'B'C$

	A	B	C	Y
0	0	0	0	0
1	0	0	1	1
2	0	1	0	1
3	0	1	1	1
4	1	0	0	1
5	1	0	1	1
6	1	1	0	1
7	1	1	1	1



max terms

max terms  $\rightarrow$  sum of i/p such that total value of sum is 0  $\rightarrow A+B+C$

$$0 + 0 + 0 \rightarrow 0$$