

***DIGITAL ELECTRONICS:***  
***HALF ADDER***





# SNS COLLEGE OF ENGINEERING

Kurumbapalayam (PO), Coimbatore – 641 107

**An Autonomous Institution**

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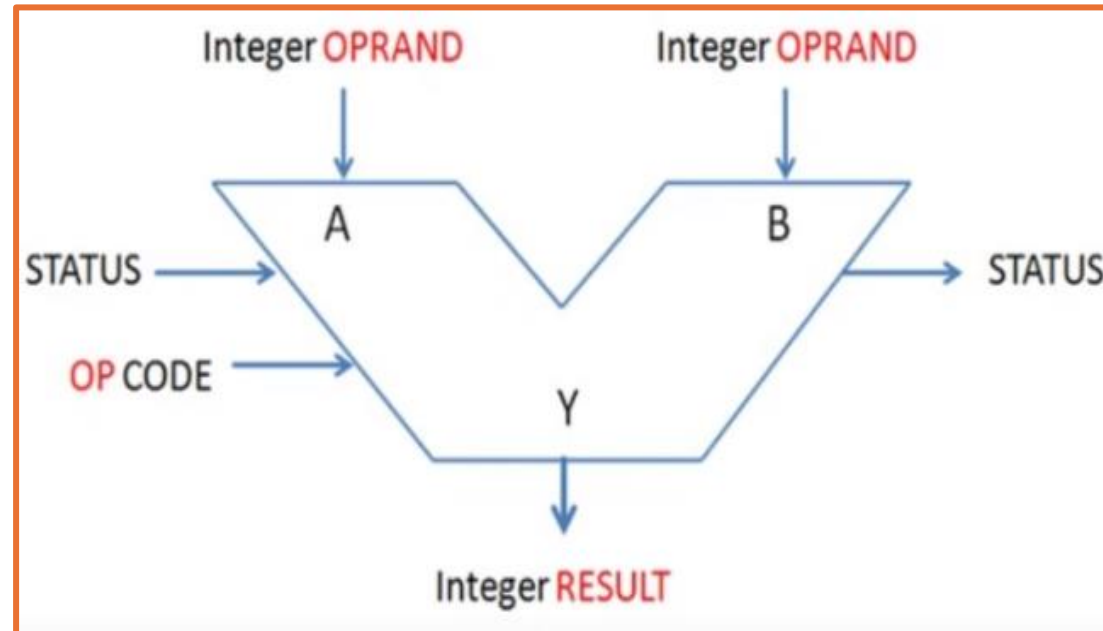
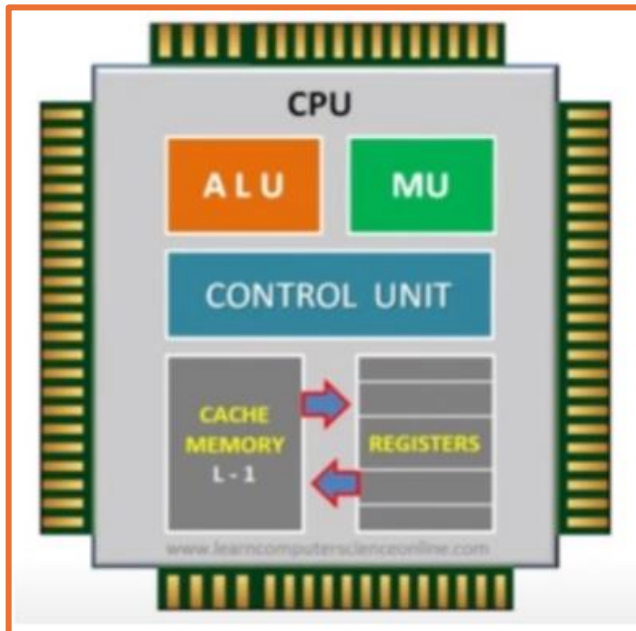
## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

### HALF ADDER

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# ADDERs

- ✓ Adders are used to make arithmetical and logical Units(ALU).
- ✓ Types of Adders : Half Adders and Full Adders.



# HALF ADDERS

- ✓ A combinational logic circuit which is designed to add two binary digits is called as a **half adder**.
- ✓ It has two input terminals and two output terminals for sum and carry.
- ✓ The half adder circuit is designed by connecting an EX-OR gate and one AND gate.

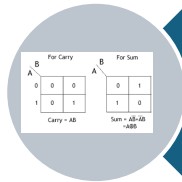


Block Diagram of Half Adder

# DESIGN OF HALF ADDER

Truth Table			
Input		Output	
A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

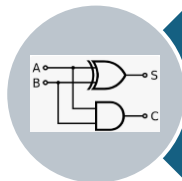
Step 1 : Write the Truth Table



Step 2 : Draw K-Map

Sum (S) =  $A \oplus B$   
Carry (C) =  $A \cdot B$

Step 3 : Form the Boolean Expression



Step 4 : Draw the circuit Diagram

# HALF ADDER-TRUTH TABLE

A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

# HALF ADDER - K MAP

For Carry

	B		
A			
0		0	0
1		0	1

$$\text{Carry} = AB$$

For Sum

	B		
A			
0		0	1
1		1	0

$$\begin{aligned} \text{Sum} &= \bar{A}B + A\bar{B} \\ &= A \oplus B \end{aligned}$$

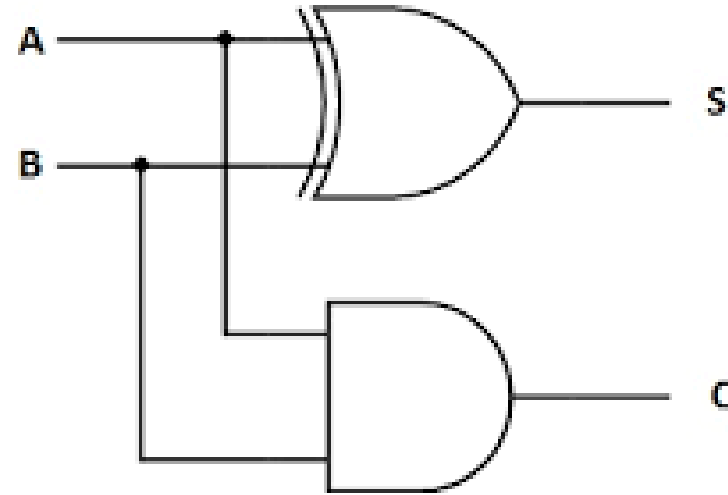
A	B	Sum	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

# HALF ADDER - CIRCUIT

## Boolean Expression

$$\begin{aligned}\text{Sum} &= A\bar{B} + \bar{A}B \\ &= A \oplus B\end{aligned}$$

$$\text{Carry} = AB$$







# APPLICATIONS

- Half adder is used in ALU (Arithmetic Logic Unit) of computer processors to add binary bits.
- Half adder is used to realize full adder circuit.
- Half adder is used in calculators.
- Half adder is used to calculate addresses and tables.



# Assessment

1. How many variable K-Map is required to realize a half adder?

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2. Write the equation for sum and carry of half adder.

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*Thank  
you*

