DIGITAL ELECTRONICS:
HALF SUBTRACTOR

SNS COLLEGE OF ENGINEERING

Kurumbapalayam (PO), Coimbatore – 641 107

An Autonomous Institution

Accredited by NAAC – UGC with 'A' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

HALF SUBTRACTOR

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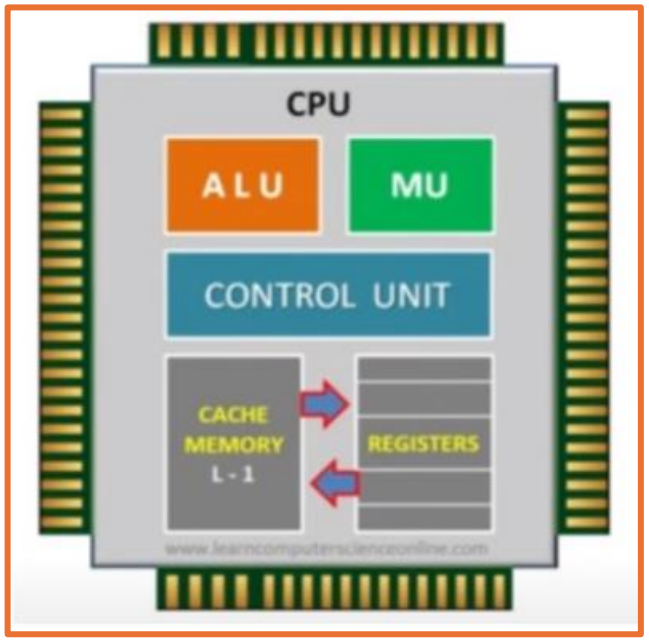
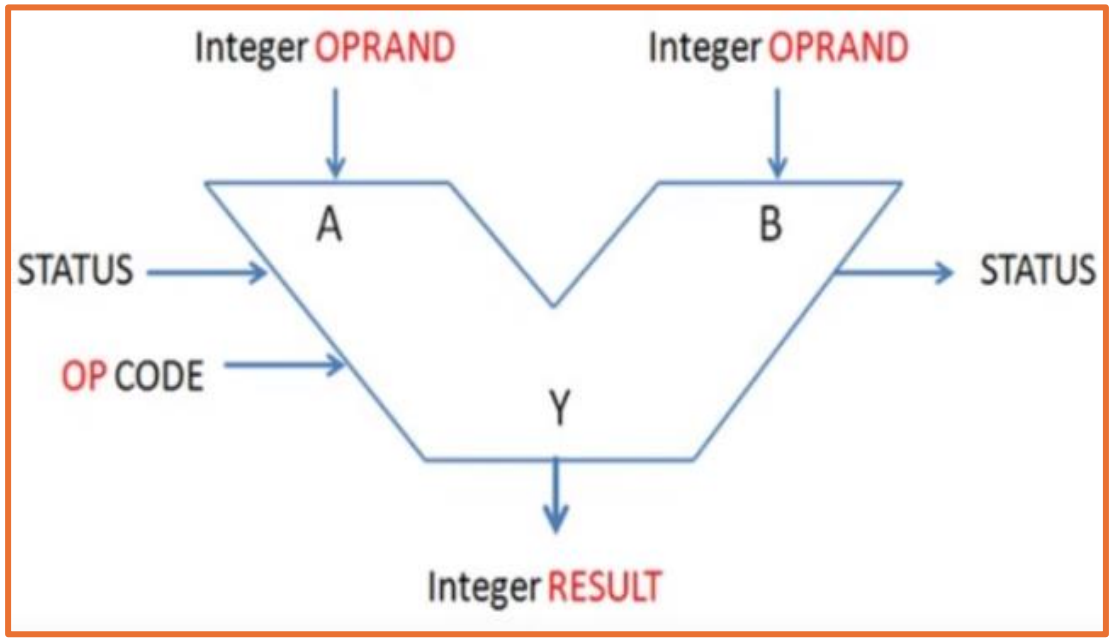
SUBTRACTORS

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





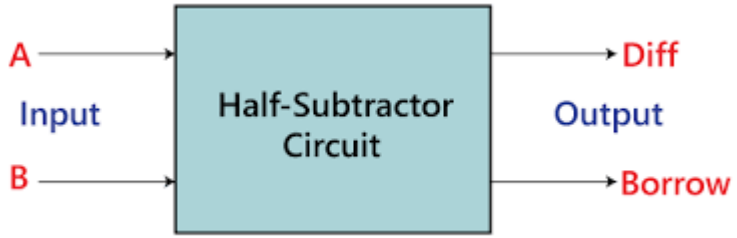
SUBTRACTORS

APPLICATIONS

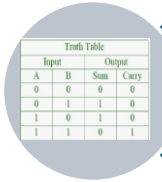
- ✓ Half subtractor is used to reduce the force of audio or radio signals
- ✓ It can be used in amplifiers to reduce the sound distortion
- ✓ Half subtractor is used in ALU of processor
- ✓ It can be used to increase and decrease operators and also calculates the addresses

HALF SUBTRACTOR

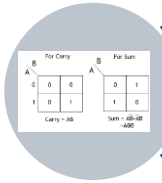
- ✓ A combinational logic circuit which is designed to subtract two binary digits is called as a **half subtractor.**
- ✓ It has two input terminals and two output terminals for difference and borrow.
- ✓ The half subtractor circuit is designed by connecting an one EX-OR gate, one AND and one NOT gate.



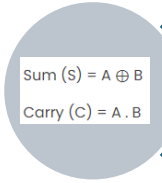
DESIGN OF HALF SUBTRACTOR



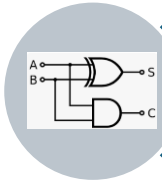
Step 1 : Write the Truth Table



Step 2 : Draw K-Map



Step 3 :Form the Boolean Expression



Step 4 :Draw the circuit Diagram

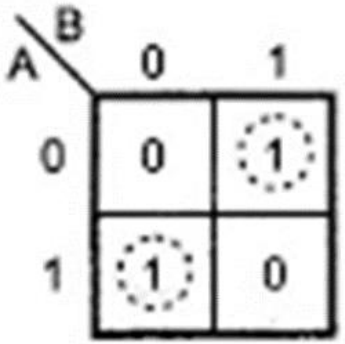
HALF SUBTRACTOR-TRUTH TABLE

Inputs		Outputs	
A	B	Diff	Borrow
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

HALF SUBTRACTOR – K MAP

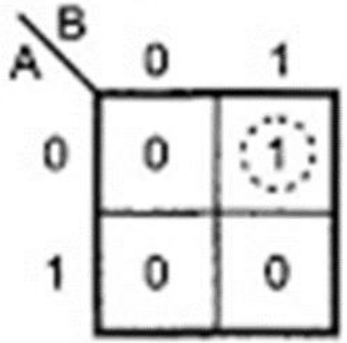
Inputs		Outputs	
A	B	Diff	Borrow
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

For Difference



Difference = $A\overline{B} + \overline{A}B$
= $A \oplus B$

For Borrow



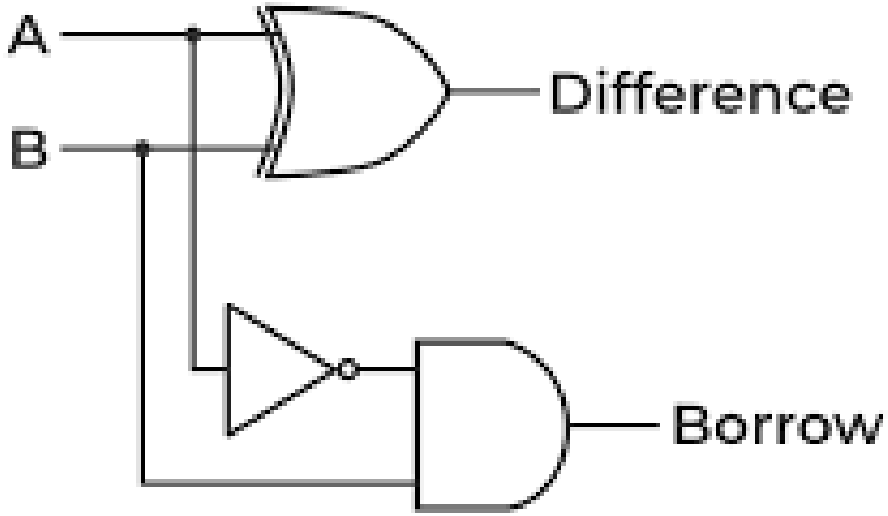
Borrow = $\overline{A}B$

HALF SUBTRACTOR- CIRCUIT

Boolean Expression

$$\text{Difference} = A\overline{B} + \overline{A}B$$
$$= A \oplus B$$

$$\text{Borrow} = \overline{A}B$$



Assessment

1. How many gates are required to realize a half subtractor?

2. Write the equation for difference and borrow of half subtractor.

Thank
you