DIGITAL ELECTRONICS:
FULL 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

FULL SUBTRACTOR

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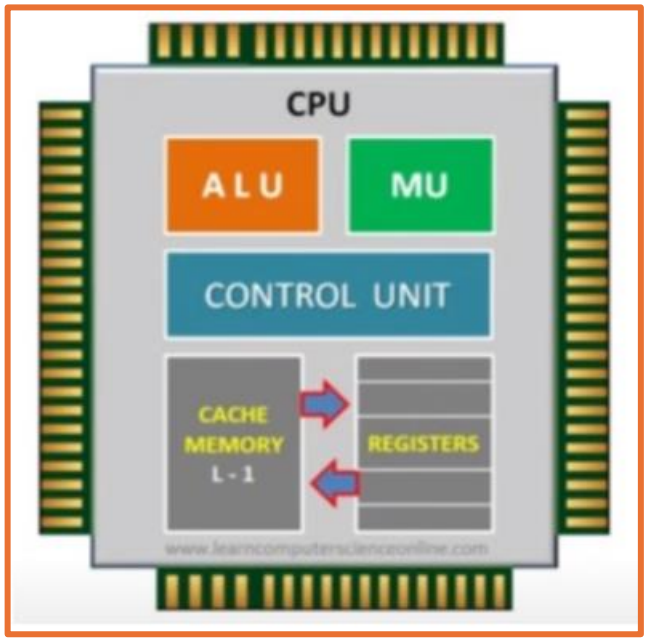
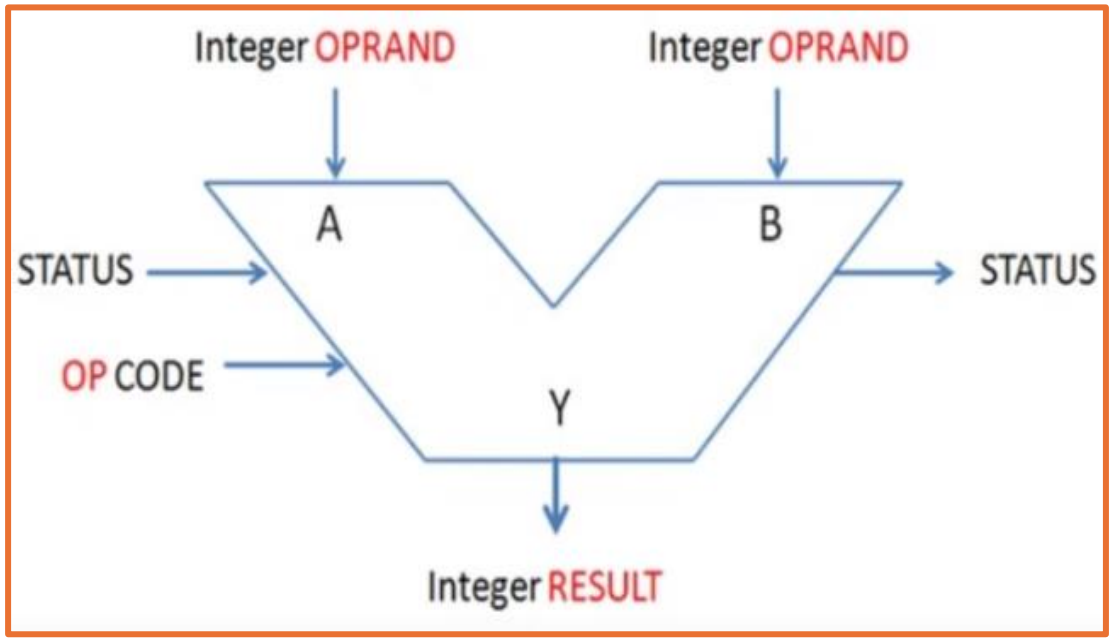
SUBTRACTOR

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





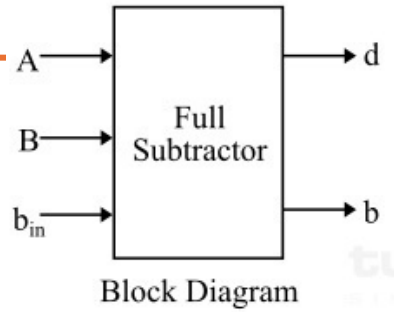
FULL SUBTRACTOR

APPLICATIONS

- Full subtractors are used in ALU (Arithmetic Logic Unit) in computers CPUs.
- Full subtractors are extensively used to perform arithmetical operations like subtraction in electronic calculators and many other digital devices.
- Full subtractors are used in different microcontrollers for arithmetic subtraction.
- They are used in timers and program counters (PC).
- Full subtractors are also used in processors to compute addresses, tables, etc.
- Full subtractors are also used in DSP (Digital Signal Processing) and networking based systems.

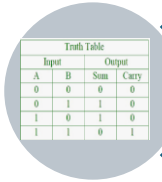
FULL SUBTRACTOR

- ✓ A combinational logic circuit that can subtract two binary digits (bits) and a borrow bit, and produces a difference bit and a borrow bit as output is known as a full-subtractor.
- ✓ It has three input terminals and two output terminals for difference and borrow.
- ✓ The full subtractor circuit is designed by connecting two EX-OR gates two AND gates, two NOT and one OR gate.

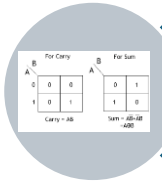


Block Diagram

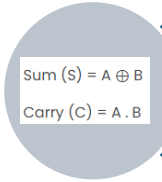
DESIGN OF FULL SUBTRACTOR



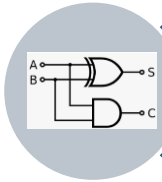
Step 1 : Write the Truth Table



Step 2 : Draw K-Map



Step 3 :Form the Boolean Expression



Step 4 :Draw the circuit Diagram

FULL SUBTRACTOR-TRUTH TABLE

Input			Output	
A	B	C	d	b
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

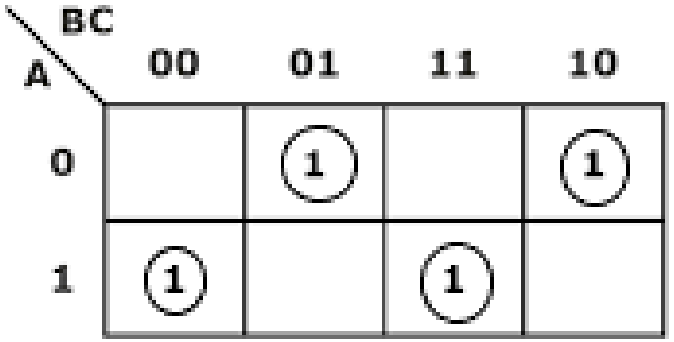
Truth Table for full subtractor

FULL SUBTRACTOR – K MAP

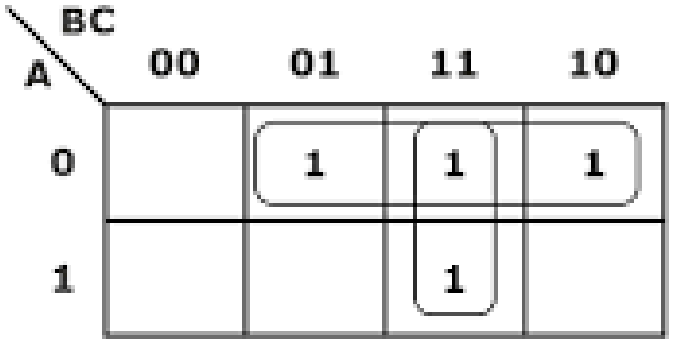
Input			Output	
A	B	C	d	b
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

Truth Table for full subtractor

K-map for Difference



K-map for Borrow



Difference (D) = A'B'C + A'BC' + AB'C' + ABC

Difference (D) = A ⊕ B ⊕ C

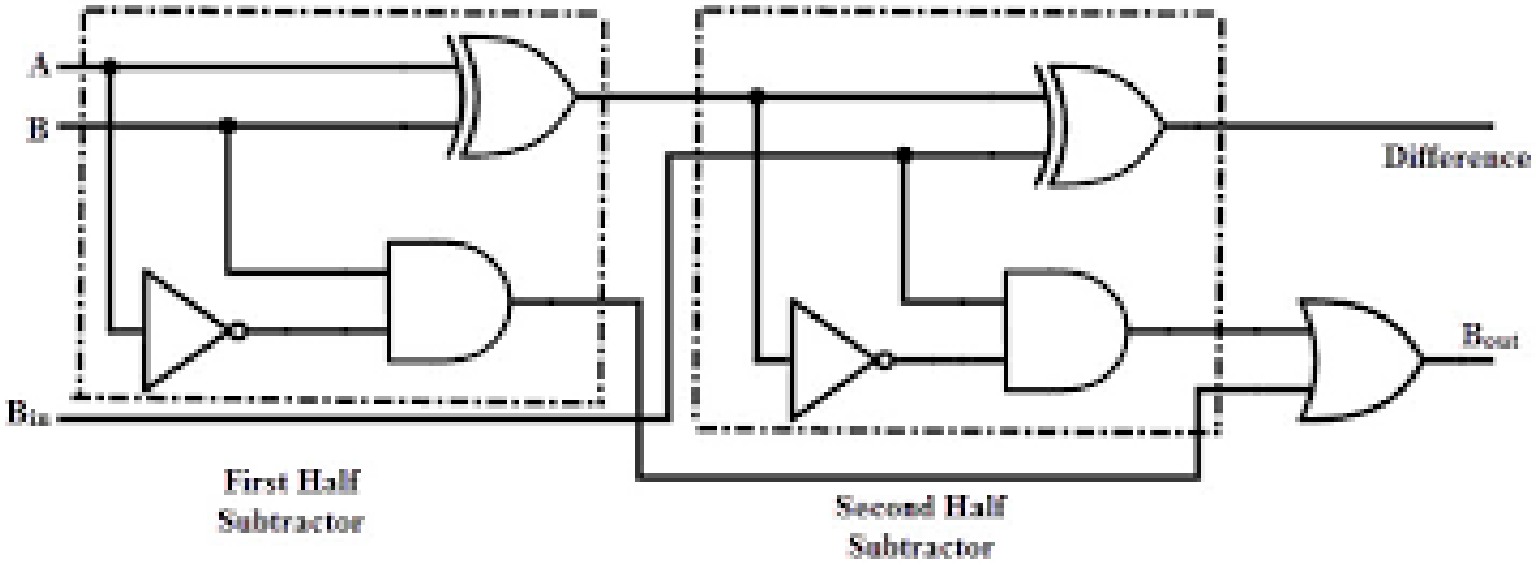
Borrow = A'B + BC + A'C

FULL SUBTRACTOR - CIRCUIT

Boolean Expression

Difference (D) = A ⊕ B ⊕ C

Borrow = A'B + BC + A'C



Assessment

1. How many half adders are required to realize a full adder?

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

Thank
you