4bit ALU performing addition and subtraction and their display in 7segment .

FOR 4BIT BINARY ADDITION:

The inputs be:

- a: First operand bit.
- b: Second operand bit.
- cin: Carry-in from the previous bit.

Outputs:

- s: Sum output.
- cout : Carry-out to the next bit.

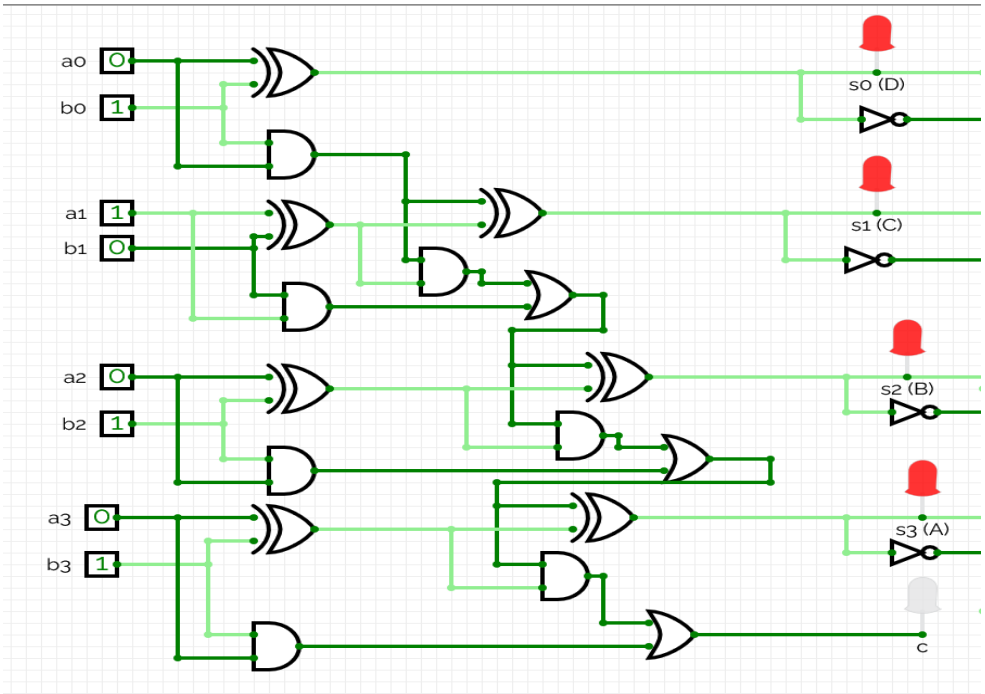
The logical equations for outputs be:

- $s=a \oplus b \oplus cin$

(Sum is the XOR of a, b, and cin)

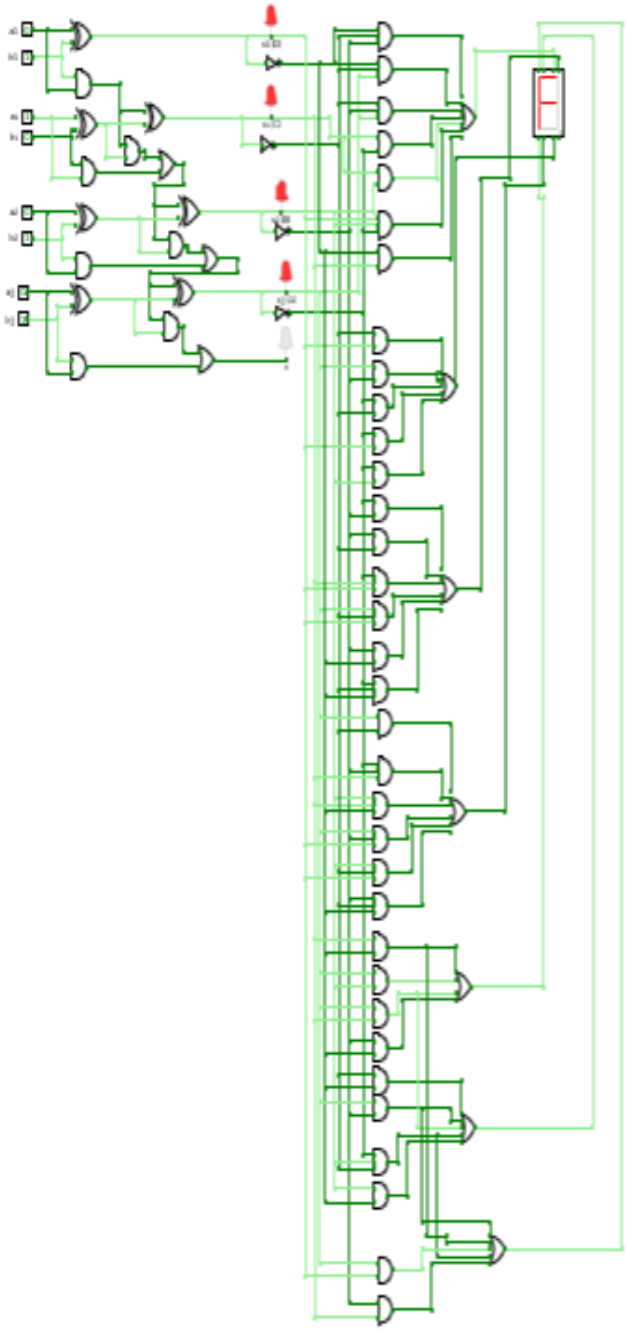
- $cout=(a \cdot b)+(b \cdot cin)+(a \cdot cin)$

A parallel adder made of 4full adders is used for 4 bit binary addition.



The outputs are then displayed in 7segment display. Where the logical expressions of each display line are found by using kmaps taking the inputs from the truth table.

Finally the whole circuit looks like,



Similarly in case of a subtractor:

The logical expressions differ for difference and borrow as

- **Difference** (d):

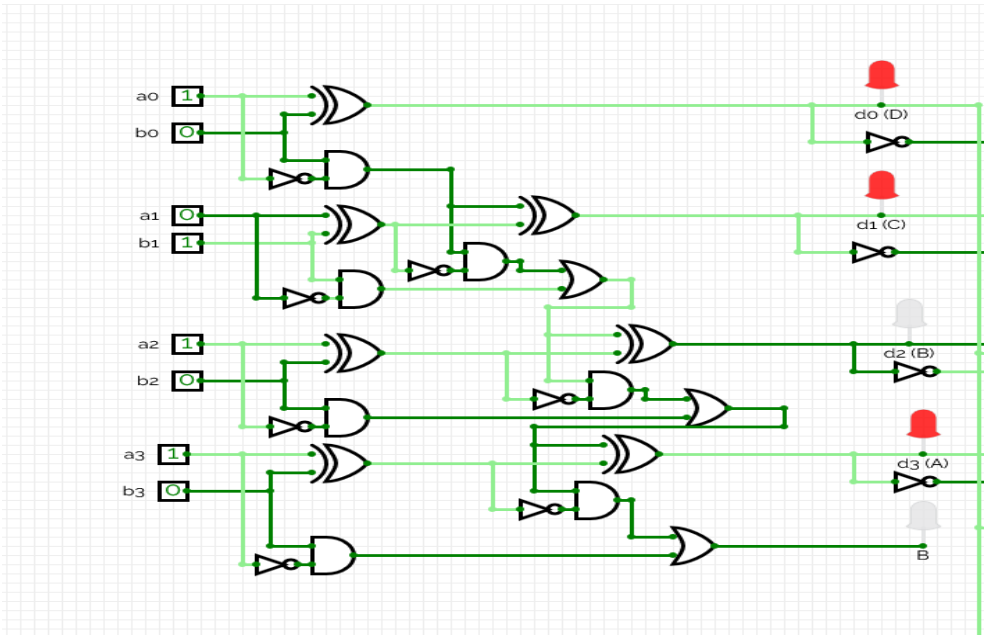
$d=a \oplus b \oplus B$

- **Borrow/Carry-Out** :

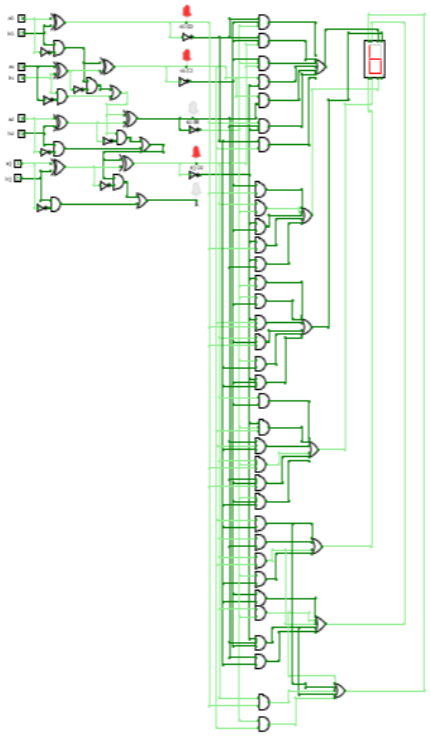
$cout=(\bar{a} \cdot b)+(b \cdot B)+(\bar{a} \cdot B)$

A parallel subtractor made of 4full subractors is used for 4 bit binary subtraction.

The circuit diagram is as follows:



For the display of binary out in hexadecimal 7 segment the circuit is designed as:



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