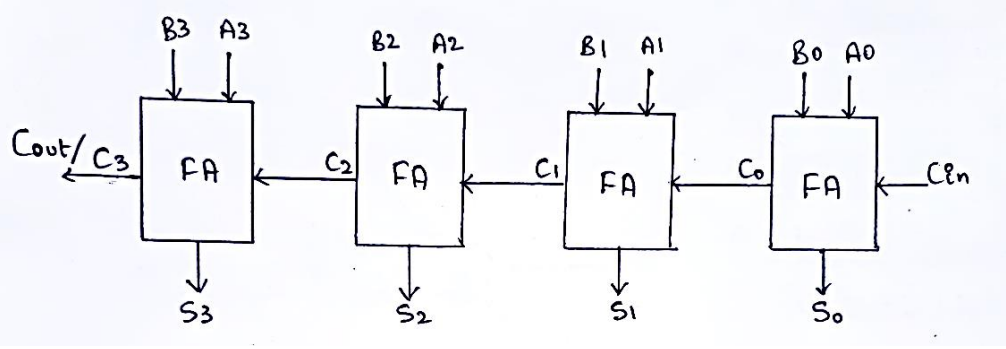
Experiment-2

Design a 4-bit full adder and subtractor and simulate the same using basic gates.

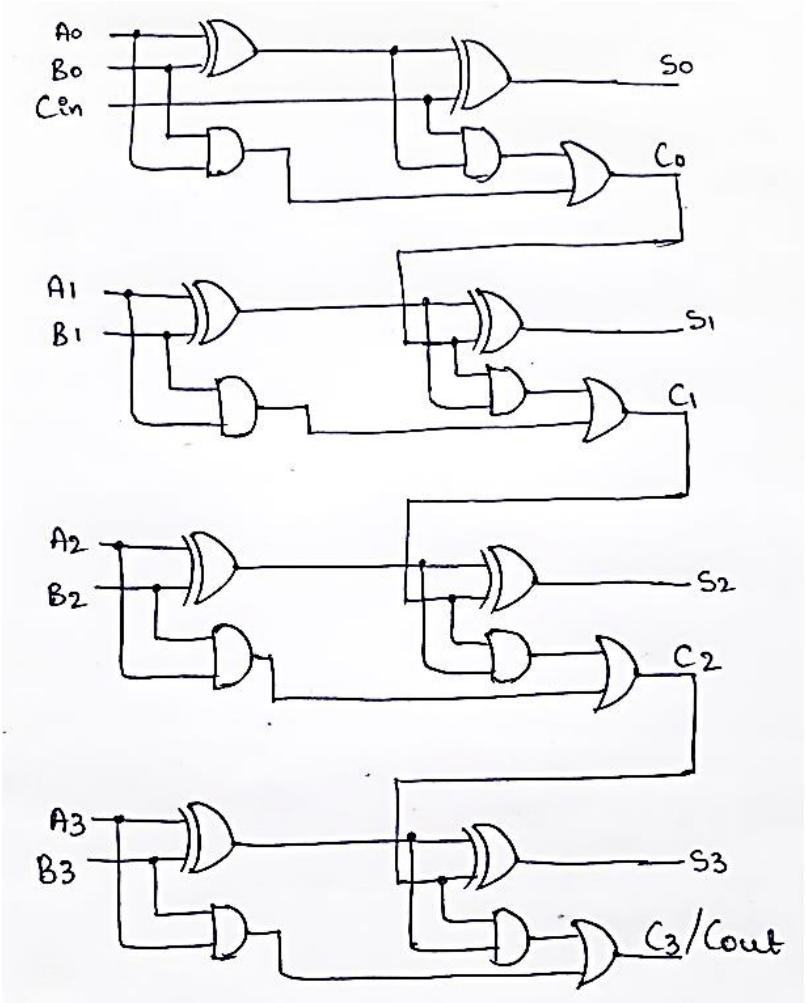
Aim: To design 4-bit adder, 4-bit subtractor and 4-bit adder-subtractor and to simulate the same using logic gates.

4-bit adder

Block diagram



Logic diagram



1

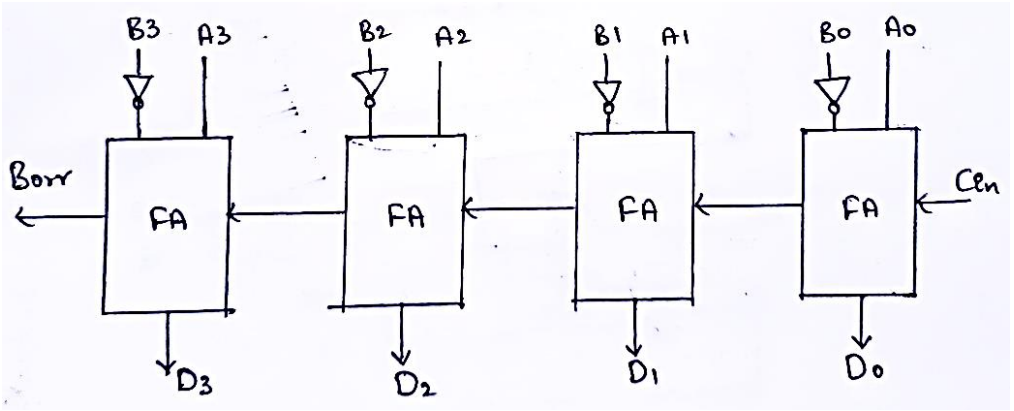
A -> 1 0 0 1

B -> + 0 0 0 1

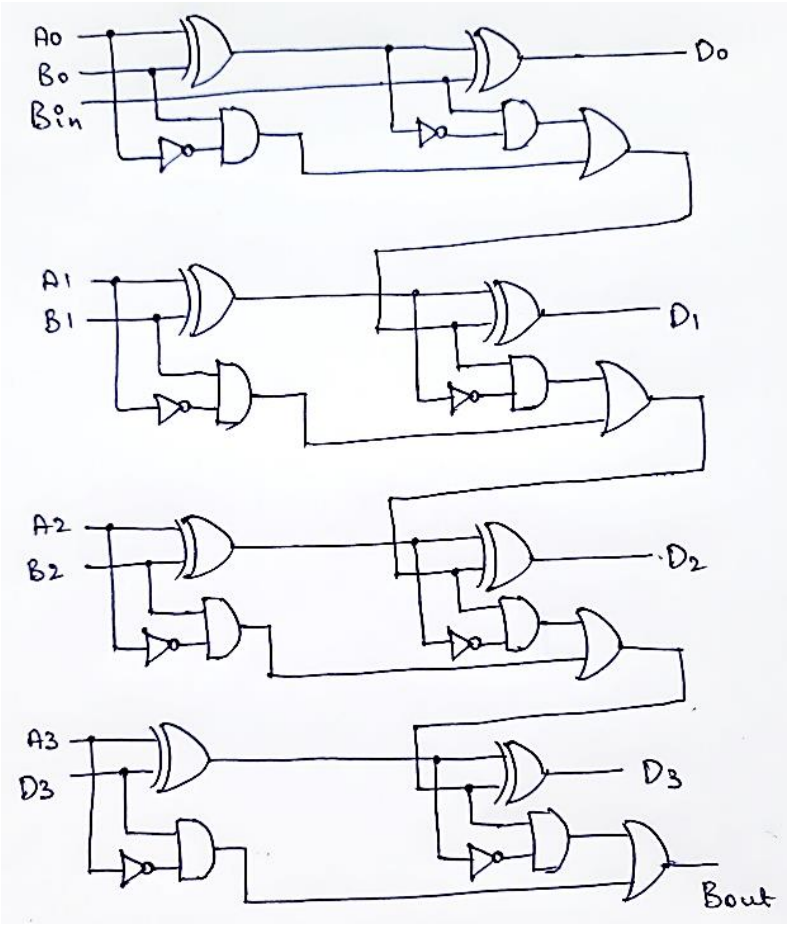
0 1 0 1 0

4-bit subtractor

Block diagram



Logic diagram



A -> 1 0 0 1
B -> 0 0 0 1
1's Complement of B -> 1 1 1 0
2's Complement of B -> 1's Complement of B + 1 -> 1 1 1 1

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                1 1 1 1
A ->              1 0 0 1
2's Complement of B -> +  1 1 1 1
                1 1 0 0 0
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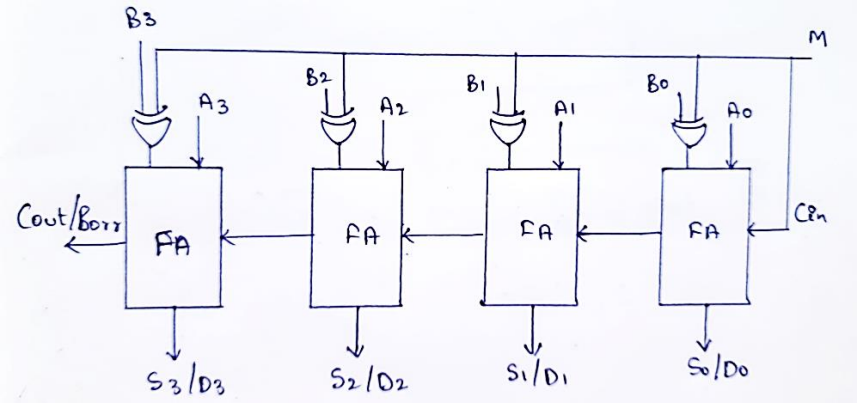
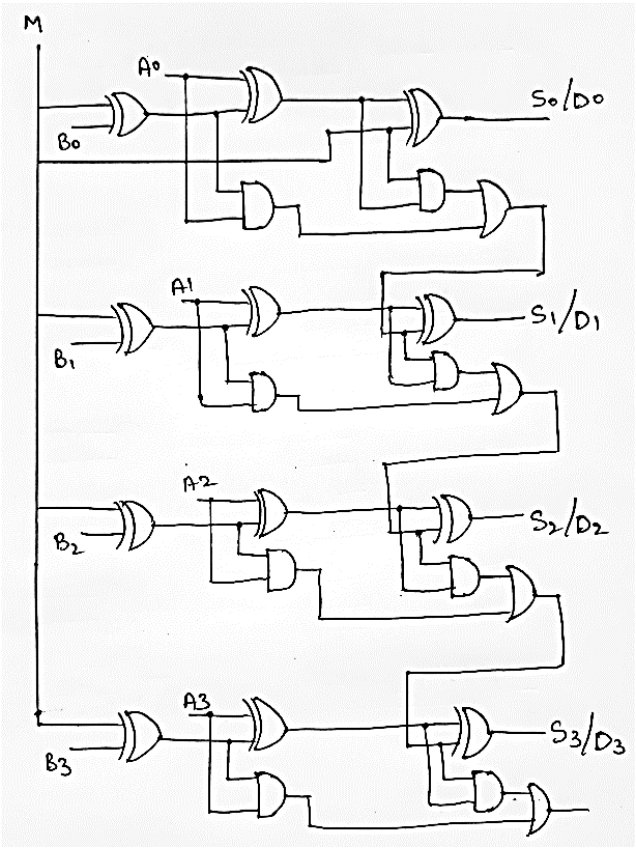
4-bit adder-subtractor

Block diagram



Logic diagram



M=0, Adder

M=1, Subtractor

Result: 4-bit adder, 4-bit subtractor and 4-bit adder-subtractor circuits are designed and simulated using logic gates.