

LAB 5

ADDER AND SUBTRACTOR

OBJECTIVES

After completing this experiment, you will be able to:

- Design and construct half adder, full adder, half subtractor and full subtractor circuits
- Verify their truth tables using logic gates

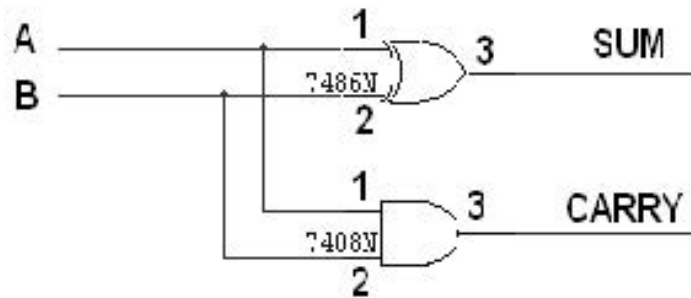
COMPONENTS REQUIRED

- 7430 or 7408 quad 2-input AND gates
- 7432 quad 2-input OR gates
- 7404 hex inverters
- 7486 quad 2-input XOR gates
- 520 Ω / 1k Ω resistors
- DIP Switch
- LEDs

THEORY

A digital adder circuit adds binary signals & a subtractor subtracts binary signals. Half Adder/Subtractor is a basic circuit that adds / subtracts 2 bits and generates Sum or Difference along with Carry / Borrow. Unlike Half Adder or Subtractor a Full Adder / Subtractor has the provision to take consideration of previous Carry / Borrow also.

LOGIC DIAGRAM HALF ADDER

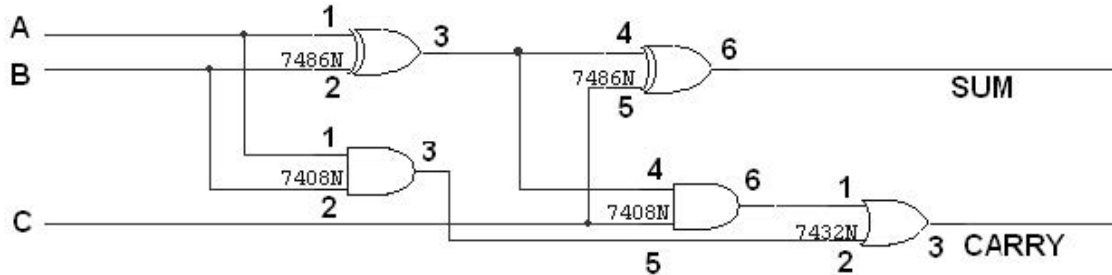


TRUTH TABLE

A	B	CARRY	SUM
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

LOGIC DIAGRAM FULL ADDER

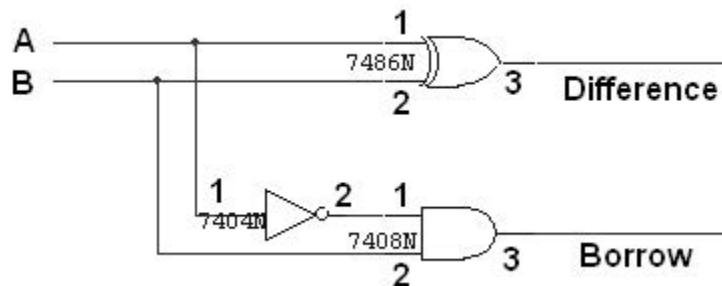
FULL ADDER USING TWO HALF ADDER



TRUTH TABLE

A	B	C	CARRY	SUM
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

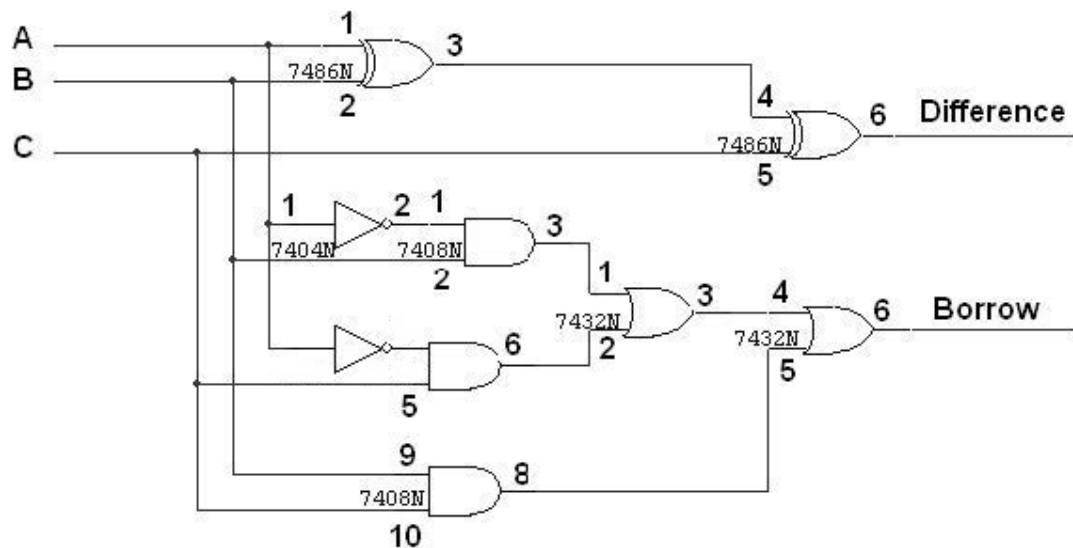
LOGIC DIAGRAM HALF SUBTRACTOR



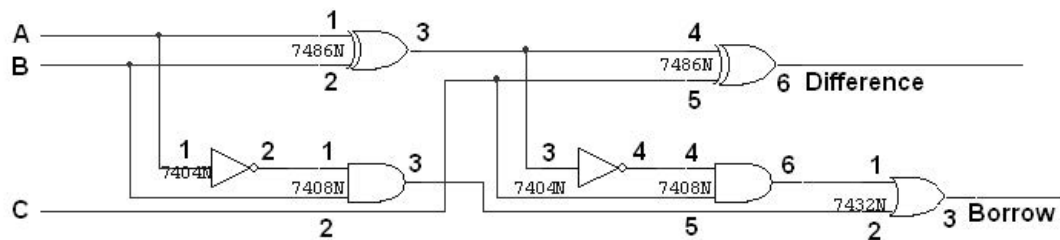
TRUTH TABLE

A	B	BORROW	DIFFERENCE
0	0	0	0
0	1	1	1
1	0	0	1
1	1	0	0

LOGIC DIAGRAM FULL SUBTRACTOR



FULL SUBTRACTOR USING TWO HALF SUBTRACTOR



TRUTH TABLE

A	B	C	BORROW	DIFFERENCE
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	1	0
1	0	0	0	1
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

PROCEDURE

- Connections are given as per circuit diagram.
- Logical inputs are given as per circuit diagram.
- Observe the output and verify the truth table.