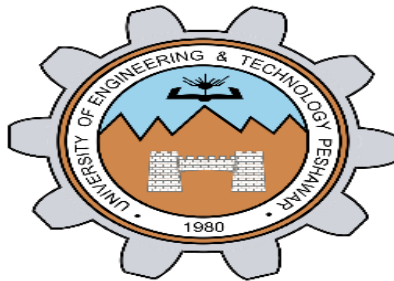


LAB REPORT NO 5



CSE-202L Digital logic design lab

Submitted by: **Muhammad Ali**

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Class Section: A

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Submitted to:

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Data:(1,1,2021)

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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

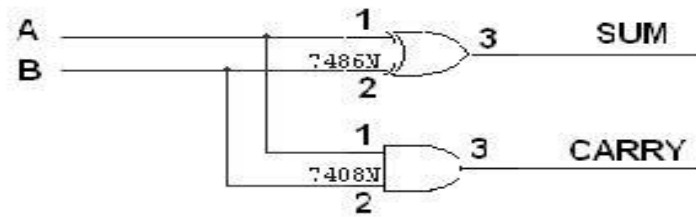
COMPONENTS REQUIRED

- 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

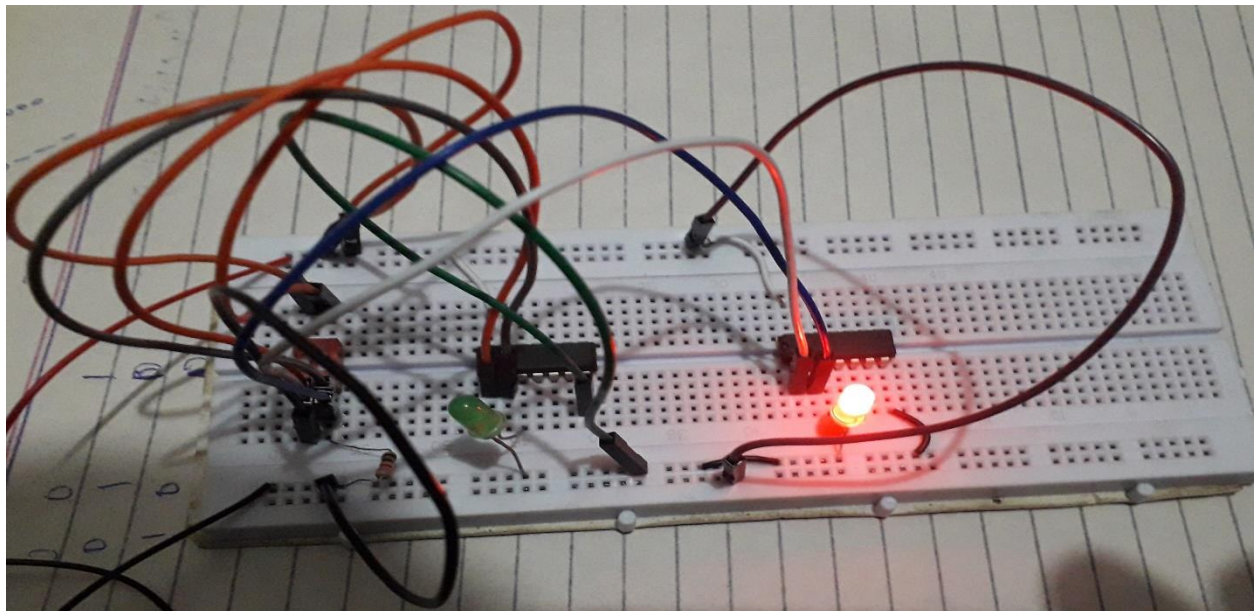


TRUTH TABLE

| A | B | CARRY | SUM |
|---|---|-------|-----|
| 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 |

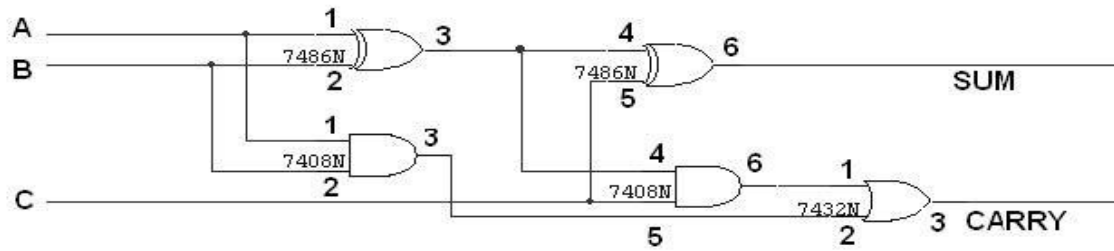
Circuit image:- (for A=0,B=1)

Carry=Green led and Sum=Red led



LOGIC DIAGRAM FULL ADDER

FULL ADDER USING TWO HALF ADDER

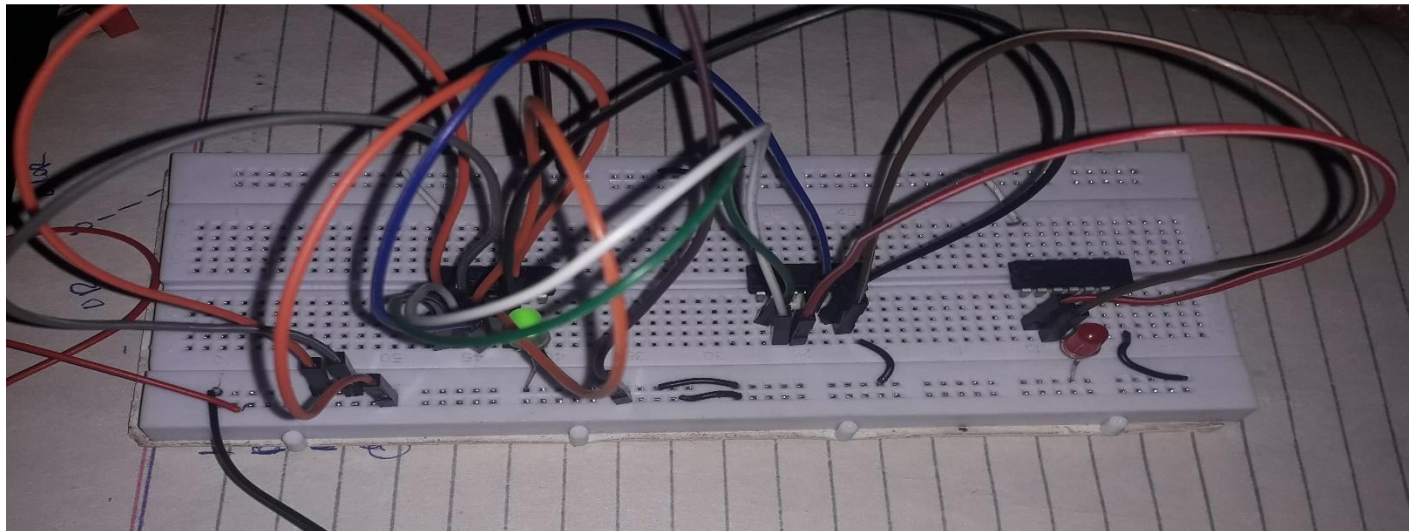


TRUTH TABLE

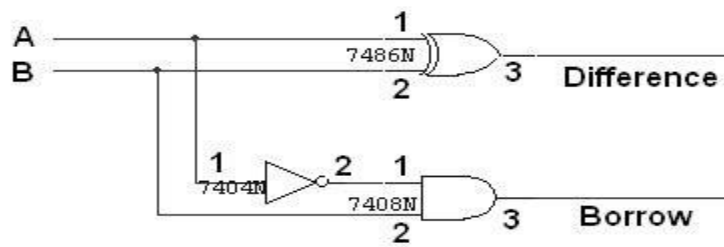
| A | B | C | CARRY | SUM |
|---|---|---|-------|-----|
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 |

Circuit image:- :- (for A=0,B=0,C=1)

Carry=Red led and Sum=Green led



LOGIC DIAGRAM HALF SUBTRACTOR

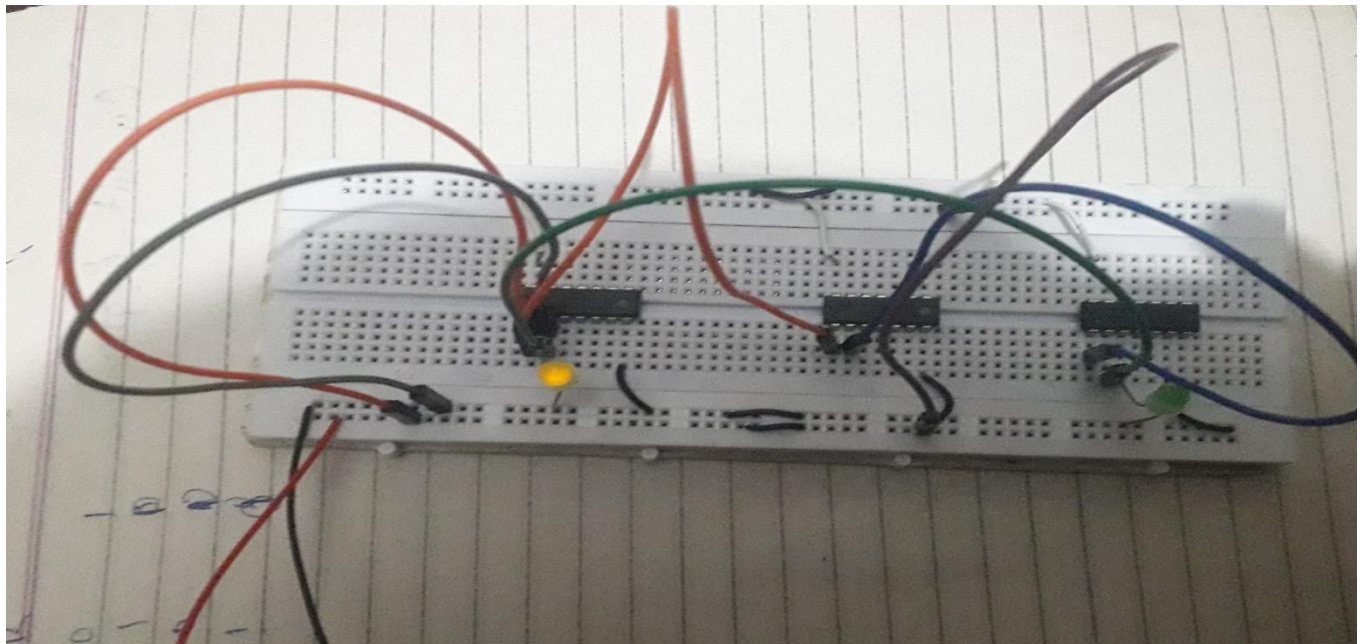


TRUTH TABLE

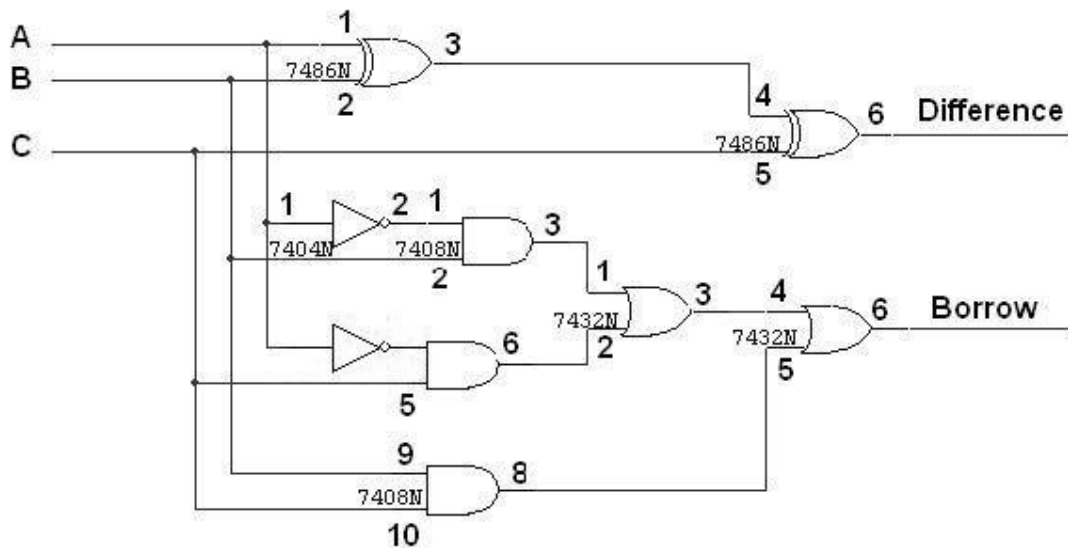
| A | B | BORROW | DIFFERENCE |
|---|---|--------|------------|
| 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | 1 |

Circuit image:- :- (for A=1,B=0)

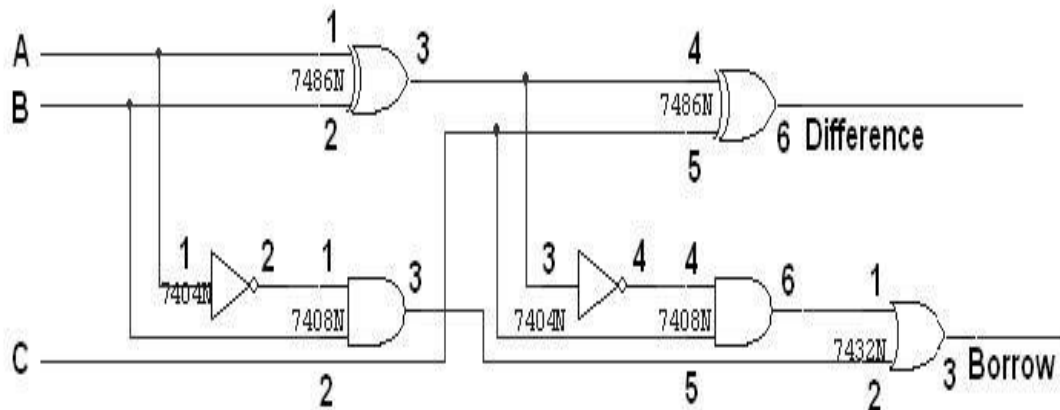
Difference = Yellow led and Borrow = Green led



LOGIC DIAGRAM FULL SUBTRACTOR

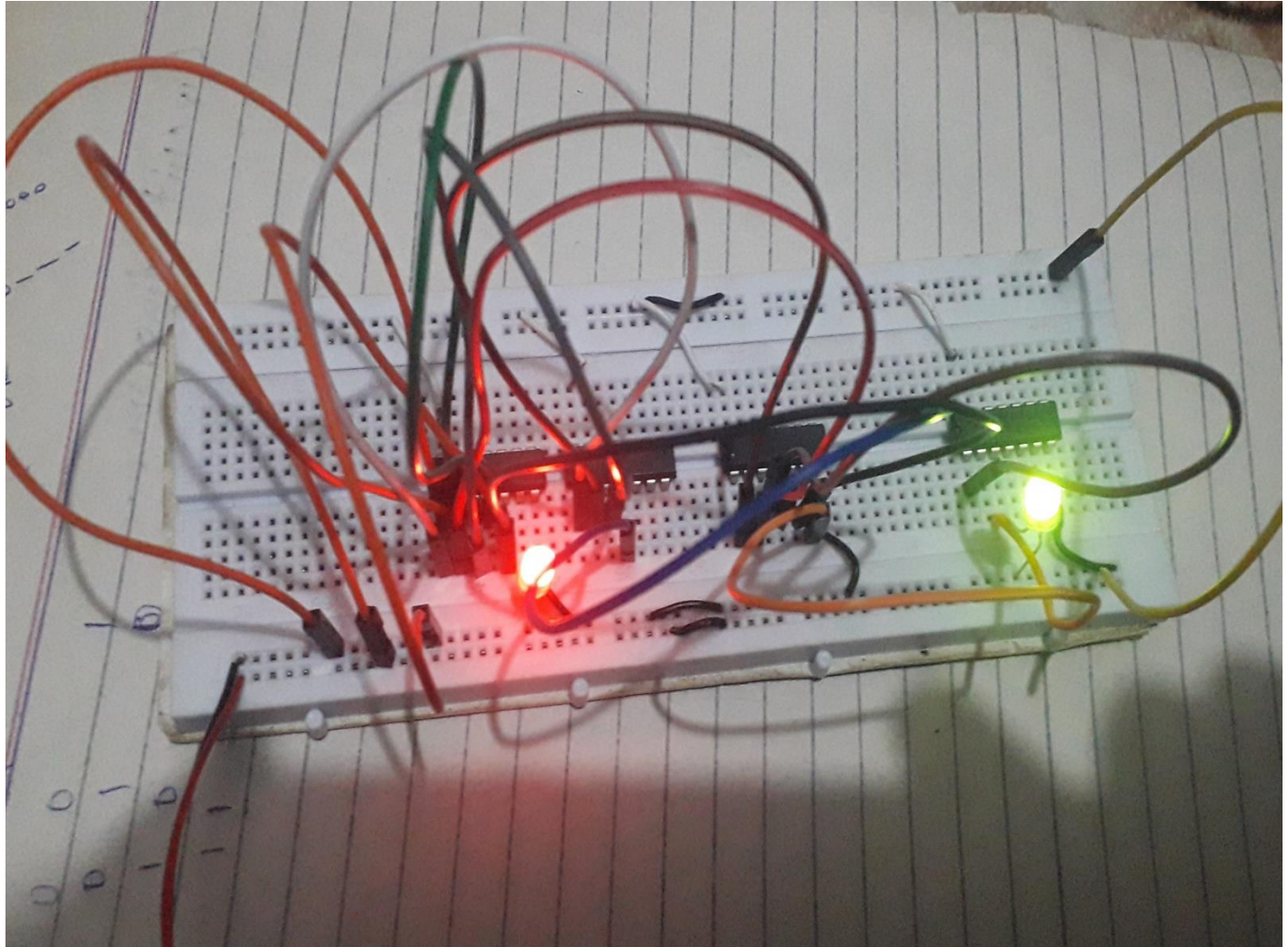


FULL SUBTRACTOR USING TWO HALF SUBTRACTOR



Circuit image:- :- (for A=0,B=1,C=0)

Difference = Red led and Borrow = Green led



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.