North South University

Department of Electrical & Computer Engineering

LAB REPORT

Course Code : EEE211

Course Title: Digital Electronics

Section: 01

Experiment Number: 05

Experiment Name: Binary Arithmatic

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Submitted To: Fatema Zahra

Experiment Name:

Binary Arithmatic.

Objectives:

→ Minimize combinational logic circuits using K-maps.

→ Learn various numerical representations systems.

→ Implement circuit using 1st & 2nd canonical minimal forms.

→ Implement circuit using universal logic.

Theory:

The addition & subtraction of the binary number system are similar to that of the decimal number system. The only difference is that decimal number system consists the digit from 0-9 & their base 10 whereas the binary number system consists only two digits (0 & 1) which make operation easier.

Apparatus:

- Trainer board.
- 1 x 7483IC (4 bit binary adder).
- 1 x 7486IC (quadruple 2-input XOR gates).

Circuit Diagram:

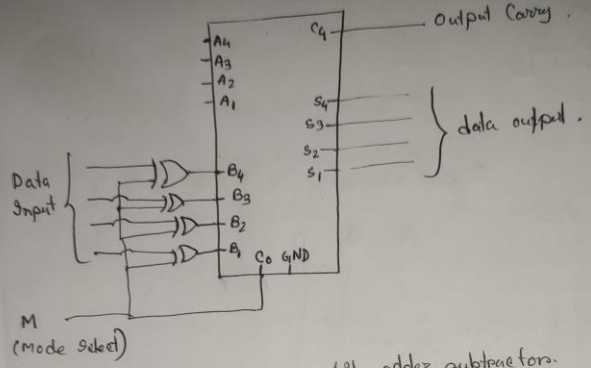
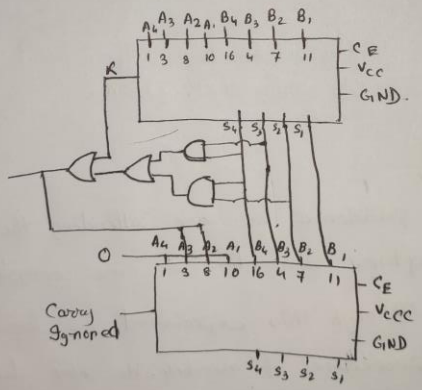


Figure: 4-bit adder subtractor.



~~Here~~ : ~~input~~ =

Table :

Operation	M	A	B	C_4	$S_4 S_3 S_2 S_1$
7+5	0	0 111	0101	0	1100
4+6	0	0100	0110	0	1010
9+11	0	1001	1011	1	0100
15+15	0	1111	1111	1	1110
7-5	1	0111	0101	1	0010
4-6	1	0100	0110	0	1110
11-2	1	1011	0010	1	1001
15-15	1	1111	1111	1	0000

Operation	A	B	Over flow Carry	Sum
7+5	0111	0101	0	1100
18+19	10010	100 11	1	00101
72+83	1001000	101 0011	1	00 11 011
129+255	10000001	11 11 1111	1	100 00 000

Operation	A	B	Overflow carry	Sum
9+0	1001	0000	0	1001
9+1	1001	0001	1	00000
9+2	1001	0010	1	0001
9+3	1001	0011	1	0010
9+4	1001	0100	1	0011
9+5	1001	0101	1	0100
9+6	1001	0110	1	0101
9+7	1001	0111	1	0110
9+8	1001	1000	1	0111
9+9	1001	1001	1	1000

Observation Report:

Here M bit used a mode select which control the mode in this circuit. For M=0, the circuit executes addition & for M=1, the circuit executes subtraction.

M is connected as input in XOR. Truth Table for the XOR gates is:

A	B	output
0	0	0
0	1	1
1	0	1
1	1	0

Here, when B=M=0, then output would is A = 0/1 either 0 or 1. And, for M=1=B, output is A'=0 or 1.

Discussion:

Due pandemic we could not attend in practical lab session. But through software simulation we have completed this lab. We have learned binary addition & subtraction ~~within~~ at a time using adder-subtractor. Besides, we also learned BCD addition in cases where decimal number are larger than 9 is are being used.

Simulation: