

Computer Circuit Fundamentals (Lab 6)

Half & Full Adder Experiments

Leonardo Fusser, 1946995

Experiment Performed on **18 October 2019**
Report Submitted on **1 November 2019**

Department of Computer Engineering Technology
Computer Circuit Fundamentals
Subash Handa

TABLE OF CONTENTS

Objectives	3
Design	3
Schematics.....	3
Questions.....	4

OBJECTIVES

- Implement half & full adder circuits using logic gates.
- Implement Boolean Algebra theorems in simplifying circuit design.
- Implement truth tables in simplifying circuit design.
- Understand and differentiate half & full adder concepts.
- Understand binary addition fundamentals.

DESIGN

Half Adder Experiment

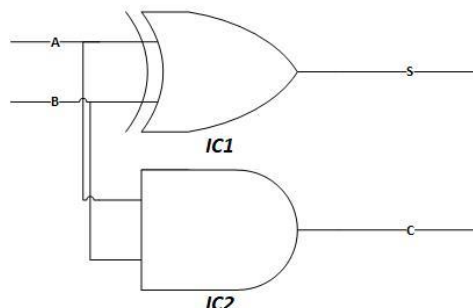
- **Part 1** experiment consisted of building a half adder logic circuit using 1 XOR gate (using the 7486-Quad 2-input) and 1 AND gate (using the 7408-Quad 2-input). Since this is a half adder circuit, there are two inputs (A & B) which in turn leads to four possible outcomes (output of S & C). The result of this half adder experiment could be expressed as $S = A+B$ and $C = AB$. Refer to 'Half Adder Circuit Diagram' under 'Schematics' for reference.

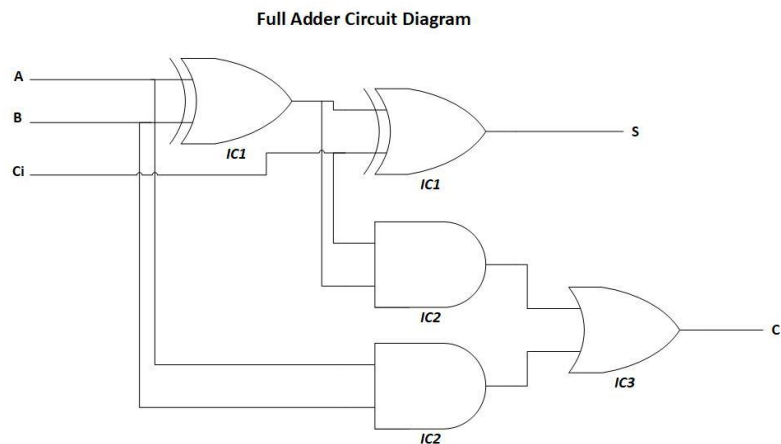
Full Adder Experiment

- **Part 2** experiment consisted of building a full adder logic circuit using 2 XOR gates (using the 7486-Quad 2-input), 2 AND gates (using the 7408-Quad 2-input) and 1 OR gate (using the 7432-Quad 2-input). Since this is a full adder circuit, there are three inputs (A, B & Ci) which in turn leads to eight possible outcomes (output of S & Co). The result of this full adder experiment could be expressed as $S = A+B+Ci$ and $Co = AB+Ci(A+B)$. Refer to 'Full Adder Circuit Diagram' under 'Schematics' for reference.

SCHEMATICS

Half Adder Circuit Diagram





QUESTIONS

**For Half & Full Adder Experiment
(Observation Table:)**

Half Adder: Input Variable: A, B

Output Variable: S, C

INPUTS		OUTPUTS (LEDs)	
A	B	Sum S	Carry C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Full Adder: Input Variable: A, B, Ci

Output Variable: SUM(S), Carry (Co)

INPUTS			OUTPUTS (LEDs)	
A	B	Ci	Sum S	Carry C
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1