



# *North South University*

## *Department of Electrical & Computer Engineering*

### Lab Report

Experiment No: 02

Experiment Title: Design of a 2-bit Arithmetic unit.

Course Code: CSE332L

Section: 10

Course Name: Computer Organization & Architecture Lab

Lab Group #: 03

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Objective:

- To implement a 2-bit Arithmetic Unit.
- To understand the operations and the functionalities of two bit Arithmetic Unit. Such as add, subtract, transfer, increment, decrement etc.

Equipment List:

- 1x IC 7404
- 1x IC 7483
- 1x IC 74F153
- Trainer board
- Wires for connection.

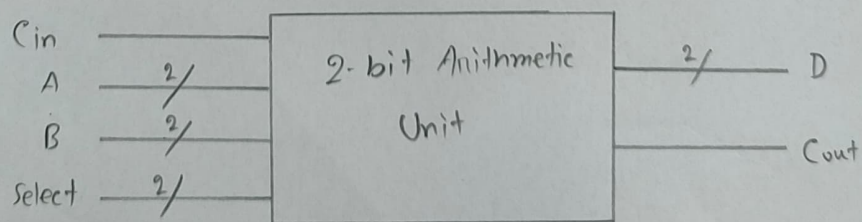
Block Diagram:

Fig 2.1: Block diagram of 2-bit Arithmetic Unit

Truth Table:

$S_1$	$S_0$	$C_{in}$	$A_0$	$A_1$	$B_1$	$B_0$	$D_1$	$D_0$	$C_{out}$	Microoperation
0	0	0	0	0	0	1	0	1	0	Add
0	0	1	0	1	0	1	0	0	1	Add with Carry
0	1	0	1	0	0	0	0	0	1	Subtract with Borrow
0	1	1	1	0	1	1	1	0	0	Subtract
1	0	0	1	1	0	1	1	1	0	Transfer A
1	0	1	0	1	1	0	1	1	0	Increment A
1	1	0	1	1	0	0	1	0	1	Decrement A
1	1	1	0	1	0	0	1	0	1	Transfer A

Table 2.1: Function Table of 2-bit Arithmetic unit.



### Circuit Diagram:

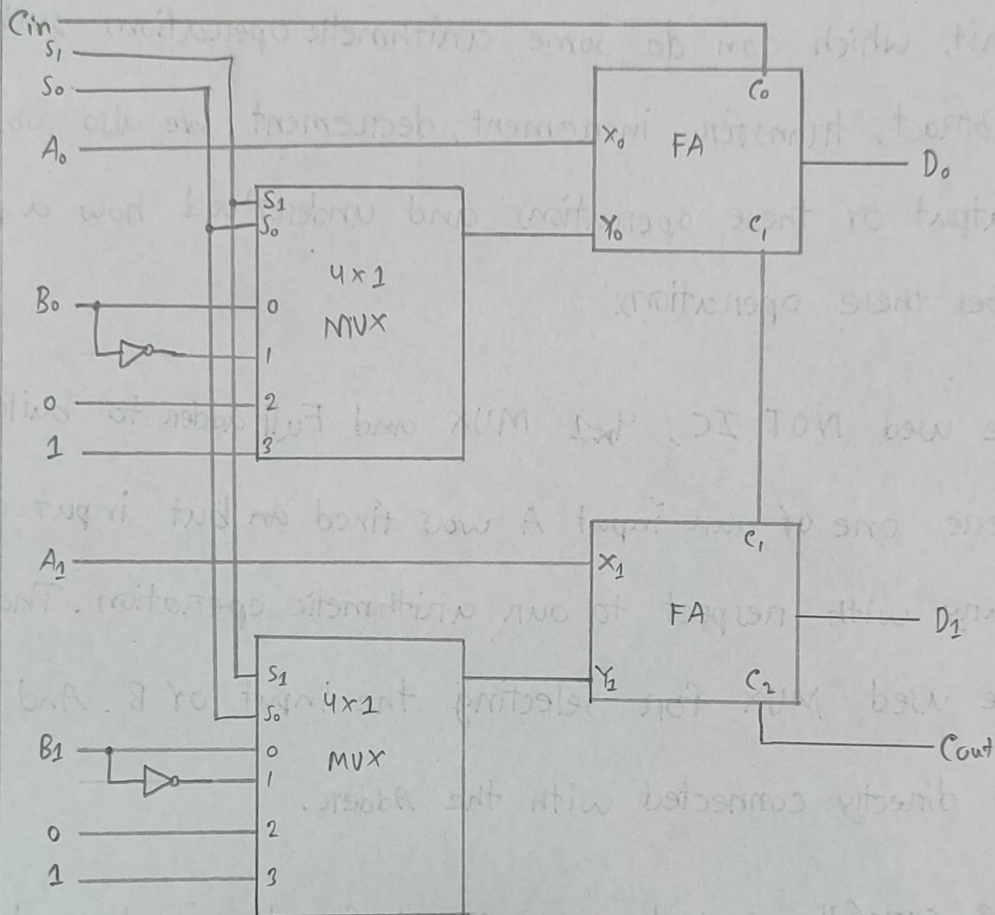


Fig 2-2: Circuit Diagram of 2-bit Arithmetic Unit.

### Discussion:

In this experiment, we learnt to implement a two-bit arithmetic unit, which can do some arithmetic operations such as add, subtract, transfer, increment, decrement. We also observed the output of these operations and understood how a processor does these operations.

We used NOT IC,  $4 \times 1$  MUX and Full adder to build this unit. Here one of our input A was fixed ~~an~~ but input of B will vary with respect to our arithmetic operation. That's why we used MUX for selecting the input of B. And input of A directly connected with the Adder.

We carefully checked every IC before the implementation. Every IC was working perfectly. Then, we implement the circuit by using the pin diagram as given in figure 2.2. But the output of our circuit did not match the truth table. Then we rechecked every connection three times, but still it was wrong. Then, the instructor also checked some of the wire connections but didn't find any fault. It might be a problem with the IC on wires. But in Logisim we successfully built the circuit and it worked perfectly.



