North South University

Department of Electrical & Computer Engineering

Lab Report

Experiment No:	1
Experiment Title:	Design of a 2-Bit Logic Unit
Course Code:	**CSE332L**
Course Name:	**Computer Organization & Architecture Lab**
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Date of Experiment:	3.3.2021
Date of Submission:	3.3.2021

★ Objectives:

- Understanding the individual components of a 2-bit ALU
- Understanding the theory of 2-bit ALU and implementing it using logic gates.
- Verifying outputs of ALU unit using truth table.

★ Equipment:

- Trainer board
- IC 7404, IC 7408, IC 7432, IC 7486, IC 74F153
- Connecting wires

★ Block diagram:

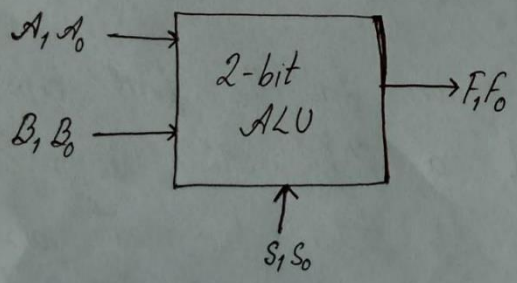


Fig. 1: Block diagram of 2-bit ALU

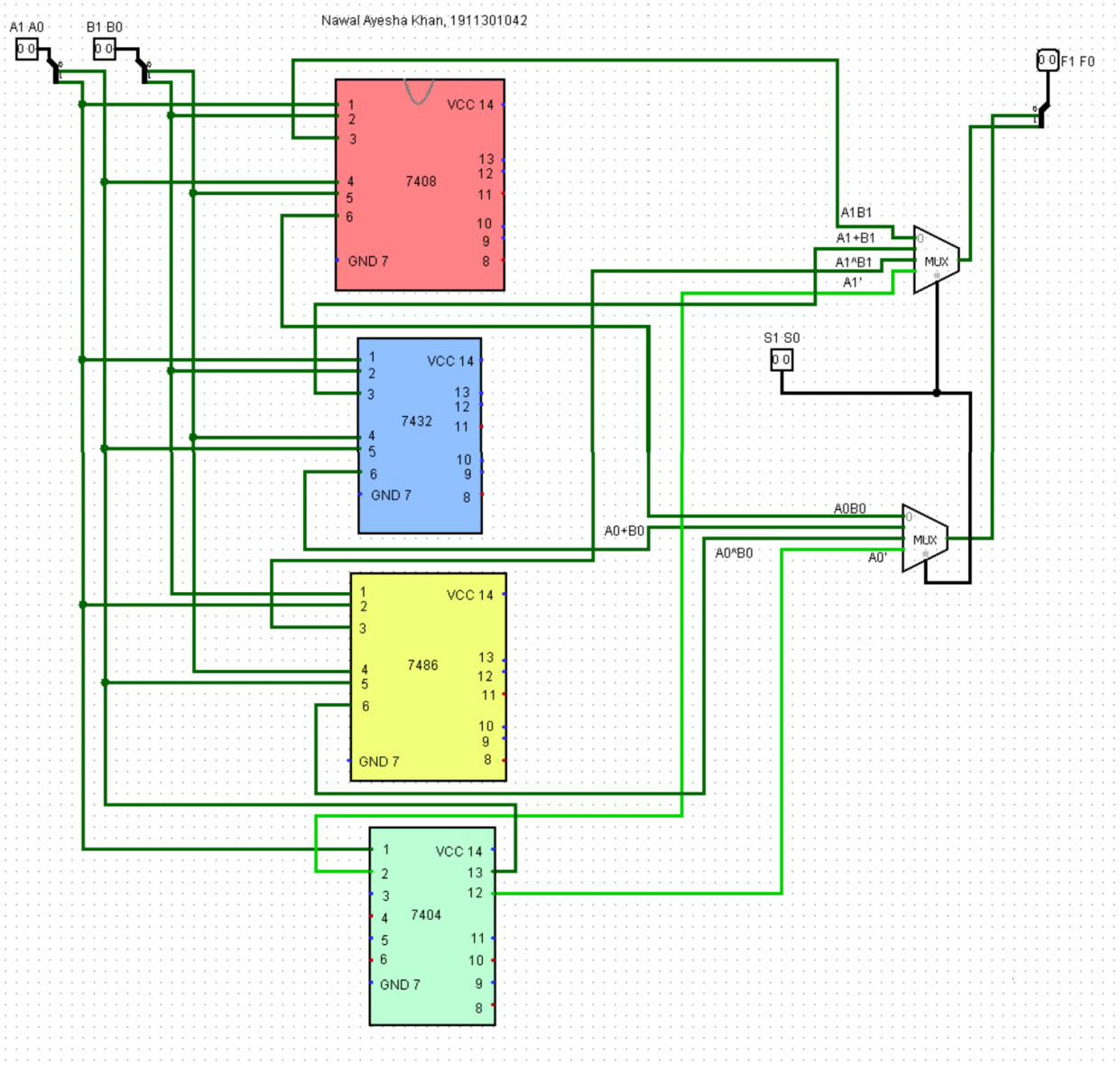
* Truth table

Table 1: 2-bit ALU truth table

A_1	A_0	B_1	B_0	AND_1	AND_0	OR_1	OR_0	XOR_1	XOR_0	NOT_1	NOT_0
0	0	0	0	0	0	0	0	0	0	1	1
0	0	0	1	0	0	0	1	0	1	1	1
0	0	1	0	0	0	1	0	1	0	1	1
0	0	1	1	0	0	1	1	1	1	1	1
0	1	0	0	0	0	0	1	0	1	1	0
0	1	0	1	0	1	0	1	0	0	1	0
0	1	1	0	0	0	1	1	1	1	1	0
0	1	1	1	0	1	1	1	1	0	1	0
1	0	0	0	0	0	1	0	1	0	0	1
1	0	0	1	0	0	1	1	1	1	0	1
1	0	1	0	1	0	1	0	0	0	0	1
1	0	1	1	1	0	1	1	0	1	0	1
1	1	0	0	0	0	1	1	1	1	0	0
1	1	0	1	0	1	1	1	1	0	0	0
1	1	1	0	1	0	1	1	0	1	0	0
1	1	1	1	1	1	1	1	0	0	0	0

Circuit diagram:

Fig 2:



★ Discussion: During the lab session for the first lab experiment, we learned how to build a 2-bit ALU using logic gates and a 4:1 multiplexer. We tested the inputs, and validated them according to the truth table. The ICs for AND, OR, XOR, and NOT gates are being used to carry out the operations, while the 4:1 multiplexer is used to select which operation to implement. The ICs were placed on a trainer board, and checked using input switches and output LEDs. Various combinations of inputs are applied, outputs were observed, and are verified according to the truth table. As outputs match those in the truth table, the 2-bit ALU works as designed, and experiment is successful.