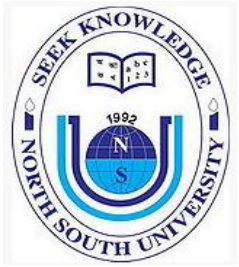


North South University

Department of Electrical & Computer Engineering

Lab Report

Experiment No:	**01**
Experiment Title:	**Design of a 2-bit Logic Unit**
Course Code:	**CSE332L**
Section:	**07**
Course Name:	**Computer Organization & Architecture Lab**
Lab Group #:	**02**
Written By:	**Sudipto Roy**
Date of Experiment:	**6th February, 2025**
Date of Submission:	**13th February, 2025**

Group Members ID:	Group Members Name:
2222756042	Sudipto Roy
2212773042	Md.Muntasir Abid
2212923042	Md. Nifat Hossain
2131206	Mohammad Abdul Mannan Sami

Objective :

① To understand the design and functionality of a logic unit as a fundamental component of an Arithmetic Logic Unit (ALU).

② To implement basic logic micro-operations (AND, OR, XOR, and NOT) using a 2-bit logic unit.

③ To construct and test 2-bit logic unit circuit on a trainer board by making appropriate connections and verifying the outputs.

④ To analyze the behavior of the circuit by comparing the experimental results with the expected truth table.

⑤ To implement a designed circuit using Logisim and document the simulation results for verification.

⑥ To develop problem-solving and troubleshooting skills by identifying and rectifying errors in circuits connections and logic implementation.

Equipment List:

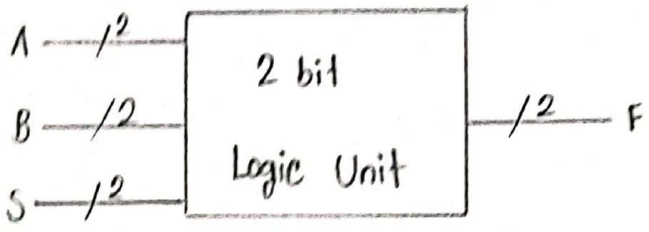
① Trainer Board

② ICs :

i) IC 7404 (Inverters)
ii) IC 7408 (2-input AND)
iii) IC 7432 (2-input OR)
iv) IC 7486 (2-input X-OR)
v) IC 74F153 (Dual 4X1 Multiplexer)

③ Wires for connection.

Block Diagram :

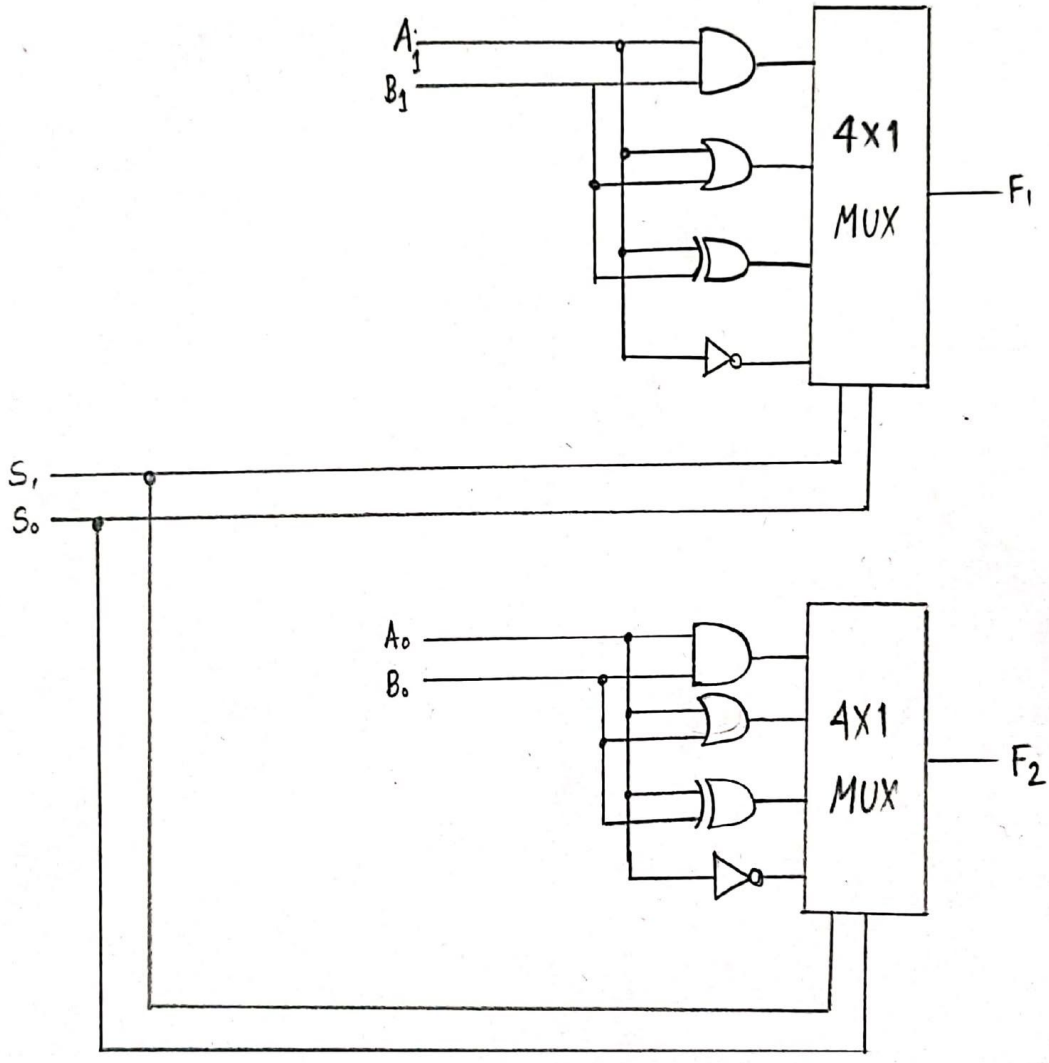


Truth Table :

A1	A0	B1	B0	AND1	AND0	OR 1	OR 0	XOR 1	XOR 0	NOT A1	NOT A0
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:



Discussion:

In this experiment, we designed and implemented a 2-bit logic unit capable of performing AND, OR, XOR, and NOT operations. Before constructing the circuit, we tested all the ICs individually to ensure if they were working fine or not. Our team divided the task: one member worked on the logisim simulation, I did the truth table part, and the remaining two focused on setting up the circuit on the trainer board.

During the implementation, we encountered an issue when adding the XOR IC (7486). The trainer board became cluttered with wires, making it difficult to manage connections. Despite carefully cross-checking everything, we did not get all the expected outputs correctly. Our lab instructor suggested that the problem could be with either the breadboard or the trainer board. The instructor then checked all the connections throughly and questioned us about how we had wired each component to understand our approach. However, even after verification, the XOR operation still did not functioned as expected.

After multiple troubleshooting attempts, rechecking connections, and recognizing the wiring, we were still unable to obtain the connect outputs for the XOR operation. Even the proper wiring, the issue remained unsolved. We concluded that the problem could be due to a faulty XOR IC (7486) or an issue with the trainer board itself, which prevented us from achieving the expected results.