



## Lab Manual

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Experiment No: 1

Experiment Name: Design of a 2-bit Logic unit.

### Introduction:

In this experiment you will construct a 2-bit logic unit which is actually a part of an ALU. This logic unit will have 4 micro-operations which are AND, OR, XOR and NOT operations. Logic micro operations are very useful for manipulating individual bits or a portion of a word stored in a register. They can be used to change bit values, delete a group of bits or insert a new set of bits in a register. As we are going to design a 2-bit logic unit, we will have two outputs which is one output for each of the 2 bits.

### Equipments:

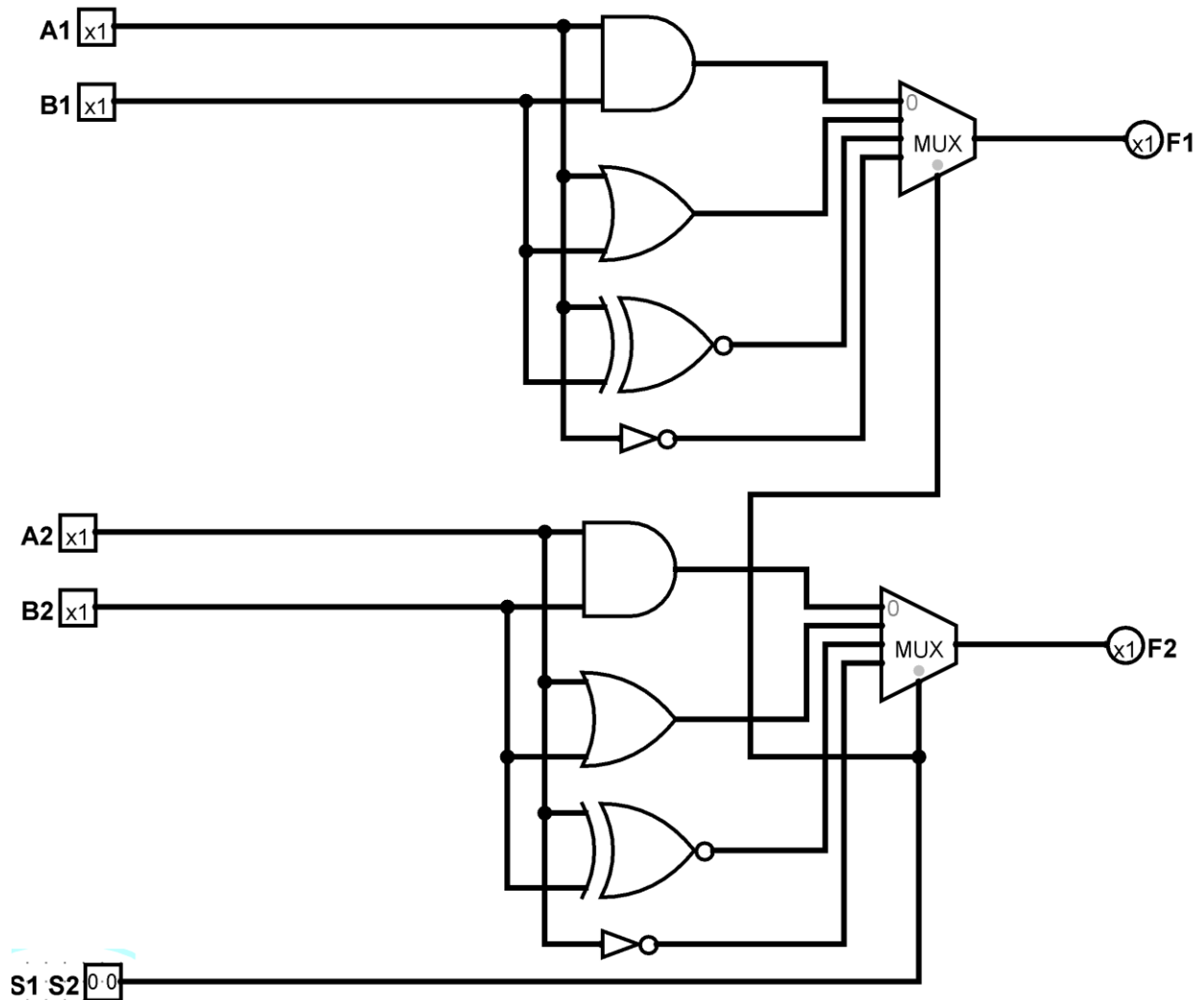
- ☐ Trainer board
- ☐ IC 7404, 7408, 7432, 7486, 74F153
- ☐ Wires for connection.

### Truth Table:

Complete the Truth Table according to your theoretical knowledge.

A1	A2	B1	B2	AND1	AND2	OR1	OR2	XOR1	XOR2	NOT A1	NOT A2
0	0	0	0								
0	0	0	1								
0	0	1	0								
0	0	1	1								
0	1	0	0								
0	1	0	1								
0	1	1	0								
0	1	1	1								

A1	A2	B1	B2	AND1	AND2	OR1	OR2	XOR1	XOR2	NOT A1	NOT A2
1	0	0	0								
1	0	0	1								
1	0	1	0								
1	0	1	1								
1	1	0	0								
1	1	0	1								
1	1	1	0								
1	1	1	1								

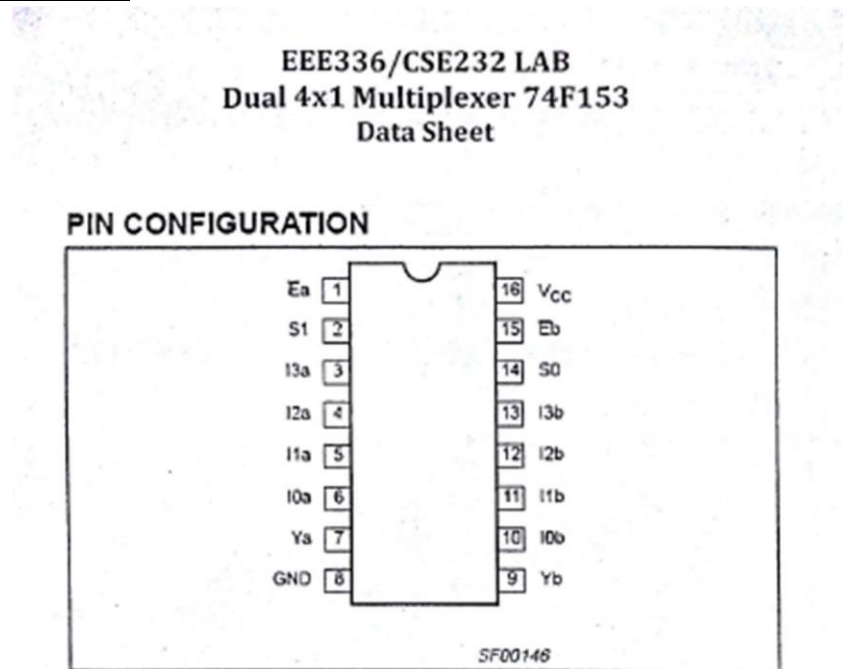
Logic Diagram:

Procedure:

- 1) Place the ICs on the trainer board.
- 2) Connect  $V_{cc}$  and ground to the respective pins of IC.
- 3) Connect the inputs with the switches and the outputs with LEDs.
- 4) Apply various combinations of inputs and observe the outputs.
- 5) Verify the experimental outputs with the Truth Table.

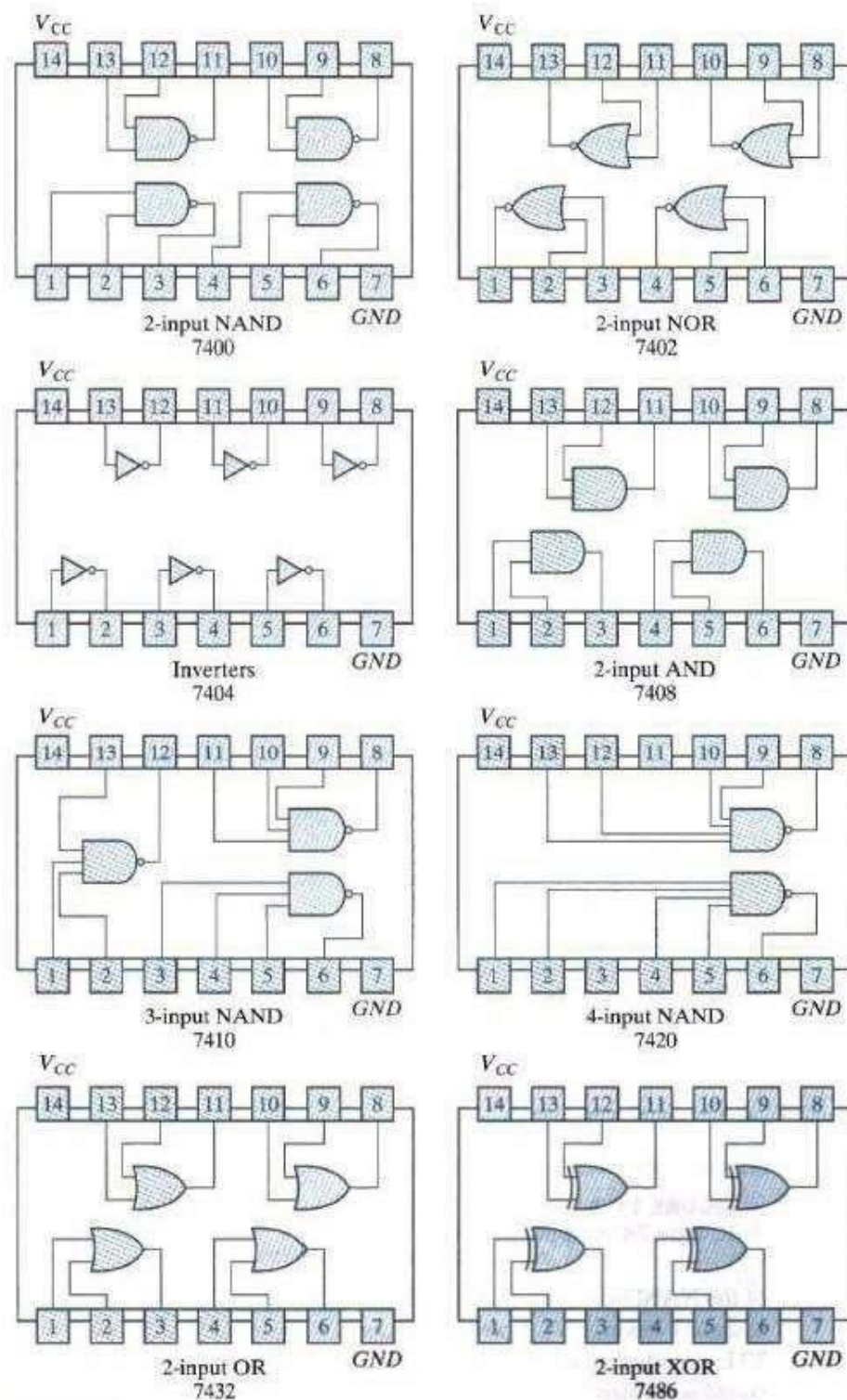
Assignment:

- 1) Prepare the lab report.
- 2) Implement the circuit in Logisim. Take a screenshot and include it in your lab report.

Pin configuration of ICs:**INPUT AND OUTPUT LOADING AND FAN-OUT TABLE**

PINS	DESCRIPTION
I0a – I3a	Port A data inputs
I0b – I3b	Port B data inputs
S0, S1	Common Select inputs
Ea	Port A Enable input (active Low)
Eb	Port B Enable input (active Low)
Ya, Yb	Port A, B data outputs

## Section 11.1 Introduction to Experiments 513



**FIGURE 11.1**  
Digital gates in IC packages with identification numbers and pin assignments