**Lab Manual**
**Department of Electrical and Computer Engineering**
**School of Engineering and Physical Sciences**
**North South University, Bashundhara, Dhaka-1229, Bangladesh**

**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.**

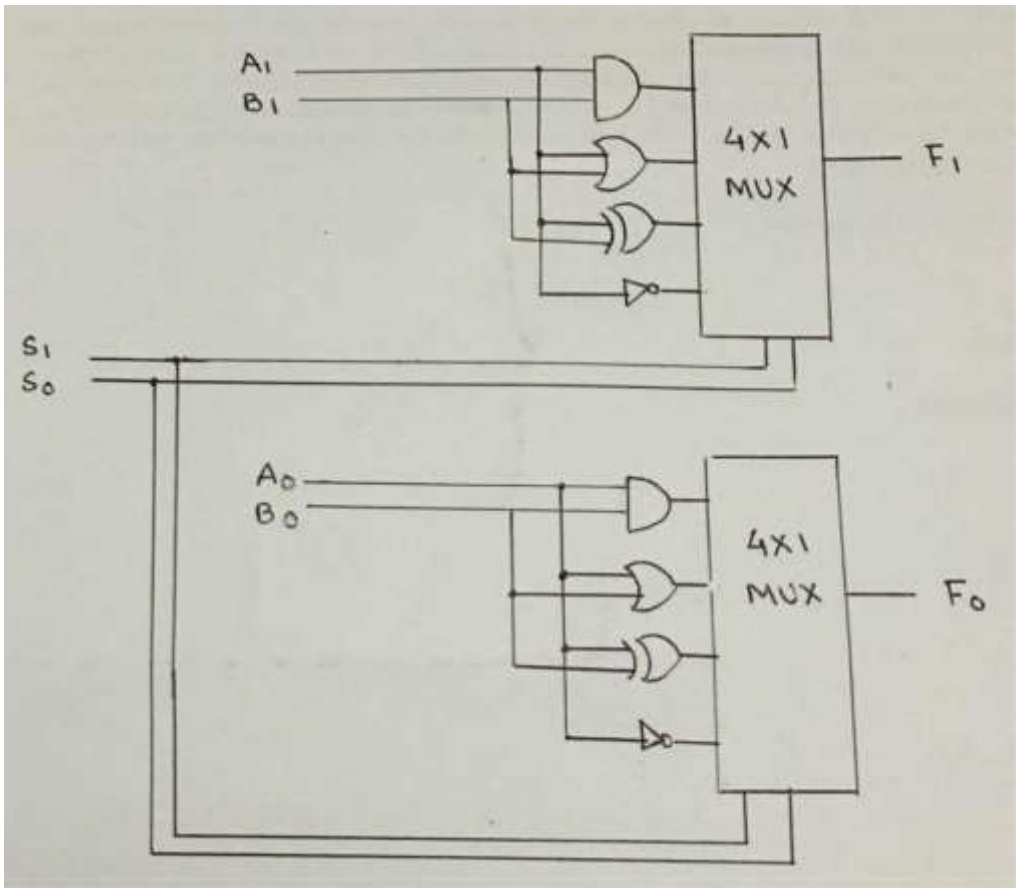
## Truth Table:

**Complete the Truth Table according to your theoretical knowledge.**

| A1 | A0 | B1 | B0 | AND1 | AND0 | OR1 | OR0 | XOR1 | XOR0 | NOT A1 | NOT A0 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | | | | | | | | |
| 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: (hardware)**

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/Task:**

1. **Implement the circuit in Logisim. Submit logisim (.circ) file + the screenshots of the circuits within the given time by your lab instructor.**

2. **Prepare and submit the lab report by the end of the class individually.**

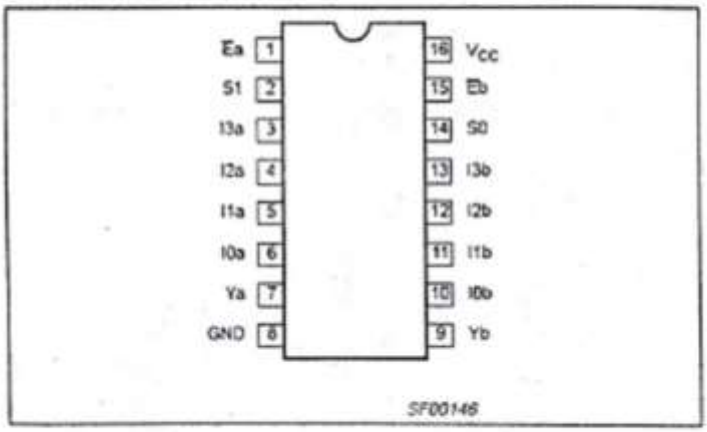
****Plagiarism and late submission will not be acceptable.**

**Pin configuration of ICs:**



**EEE336/CSE232 LAB**
**Dual 4x1 Multiplexer 74F153**
**Data Sheet**

**PIN CONFIGURATION**




**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 |

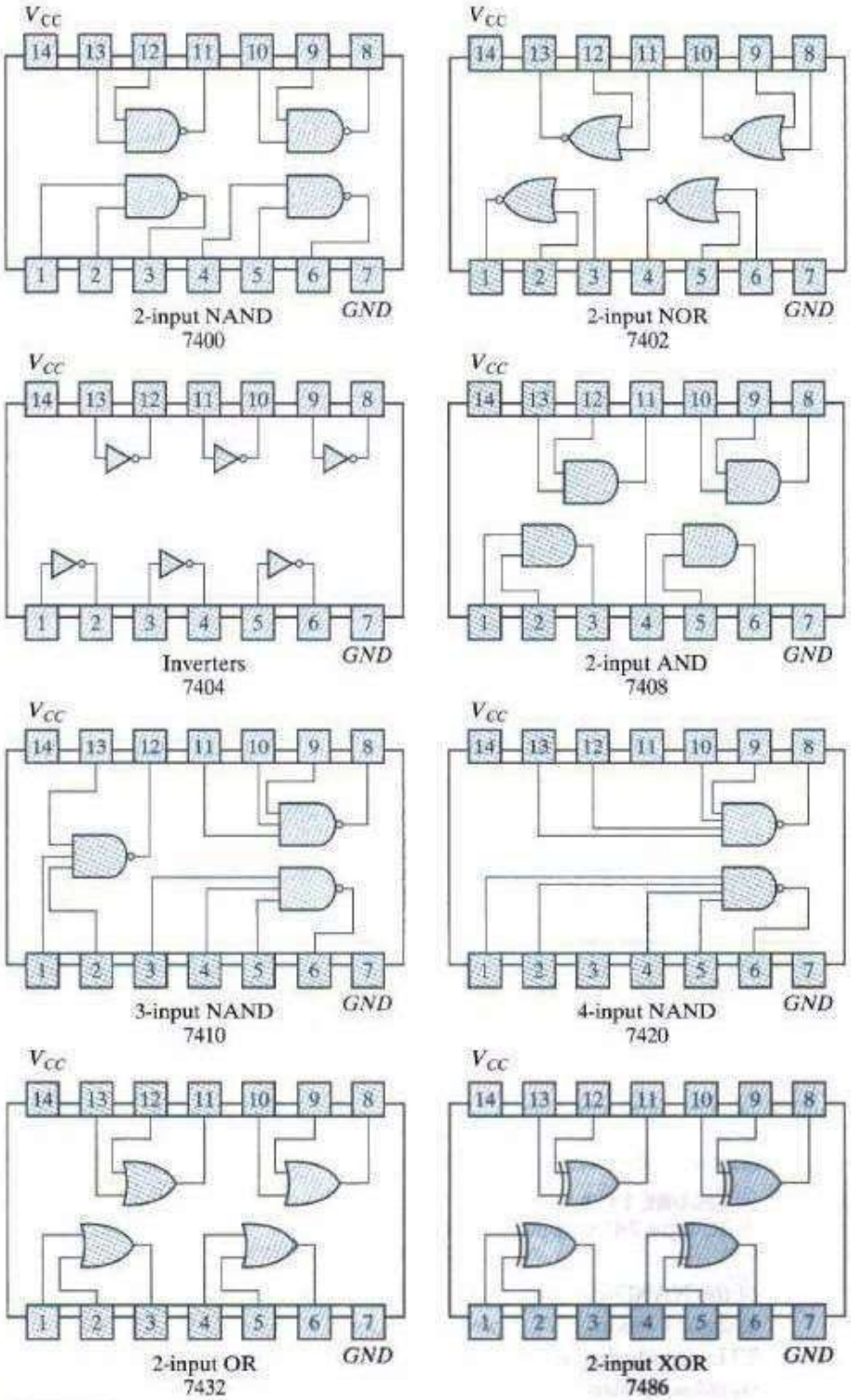



**FIGURE 11.1**
Digital gates in IC packages with identification numbers and pin assignments