Lab 6: Multiplexer

6.1 Aim

To the Truth Table of 4:1 Multiplexer using IC 74153.

6.2 Objective:

- To get familiar with the concept of multiplexing
- To get familiar with MSI (medium scale integration) technology.

6.3 Apparatus Required:

- Prototyping board (breadboard)
- DC Power Supply 5V
- Light Emitting Diode (LED)
- Digital ICs:74153:Dual 4:1 MUX
- Connecting Wires

6.4 Apparatus Requirement:

- Prototyping board (breadboard)
- DC Power Supply 5V
- Light Emitting Diode (LED)
- Digital ICs:
  - 7408 :Quad 2 input AND

- 7486: Quad 2 input XOR
- 7432 :Quad 2 input OR
- 7404: Hex inverter (NOT Gate)

- Connecting Wires

6.5 Pin Diagram:

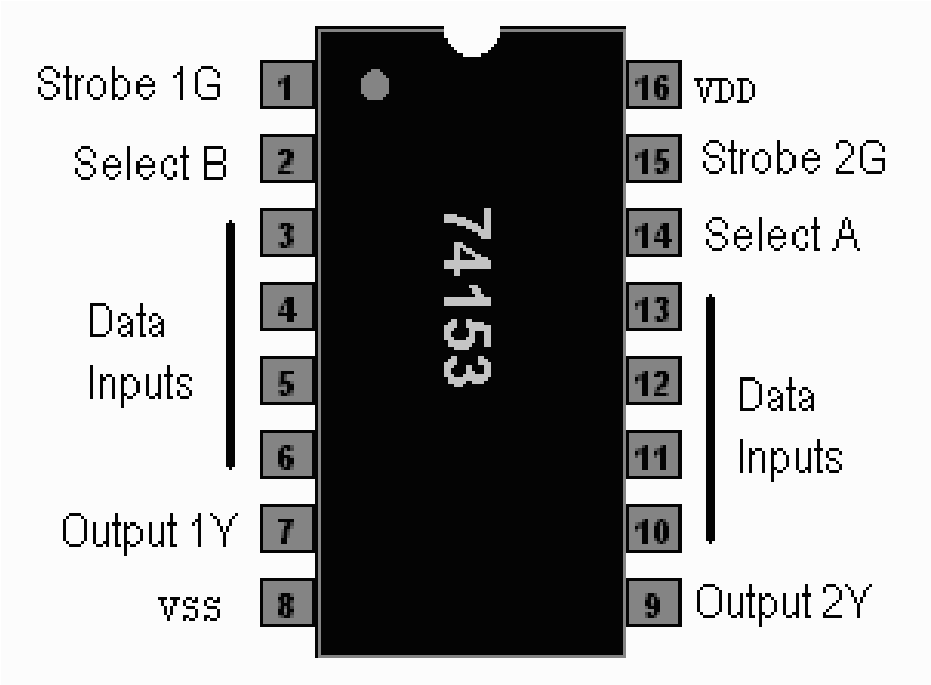


Figure 6.1: Pin Diagram of 4 x 1 Multiplexer

6.6 Theory:

Multiplexer: A data selector, more commonly called a Multiplexer, shortened to "MUX" or "MPX", is combinational logic switching devices that operate like a very fast acting multiple position rotary switches. They connect or control, multiple input lines called "channels" consisting of either 2, 4, 8 or 16 individual inputs, one at a time to an output. Then the job of a multiplexer is to allow multiple signals to share a single common output. For example, a single 8-channel multiplexer would connect one of its eight inputs to the single data output.

The Boolean expression for this 4-to-1 Multiplexer above with inputs I0 to I3 and data select lines S0 ,S1 is given as: $Y = S0S1I0 + S0S1I1 + S0S1I2 + S0S1I3$

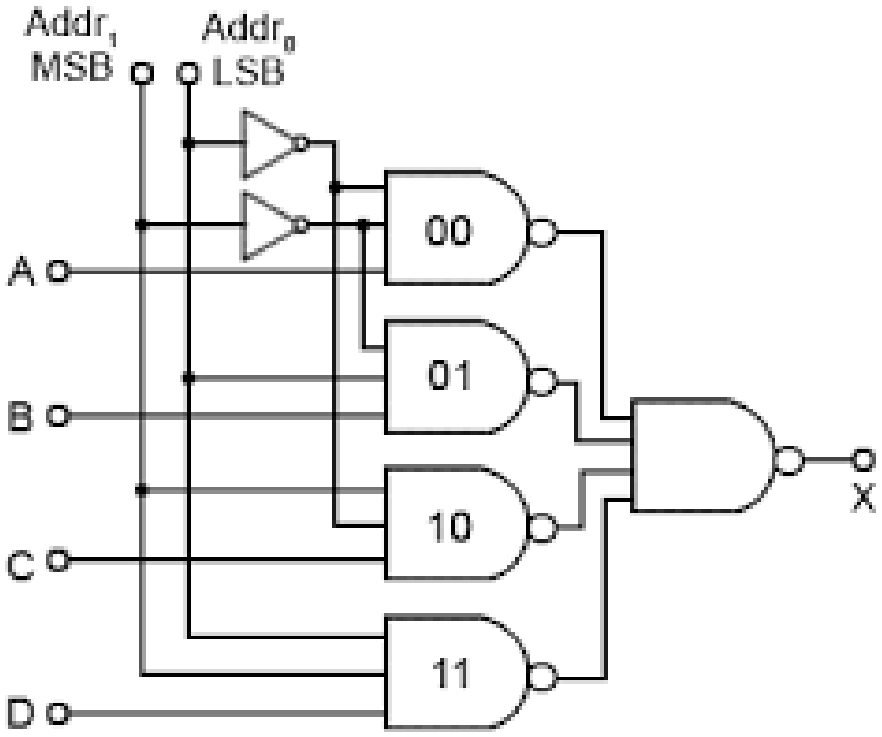


Figure 6.2: Logic Circuit of 4X1 MUX

6.7 Procedure:

1. Collect the components necessary to accomplish this experiment.

2. Plug the IC chip into the breadboard.

3. Connect the supply voltage and ground lines to the chips. PIN7 = Ground and PIN14 = +5V.

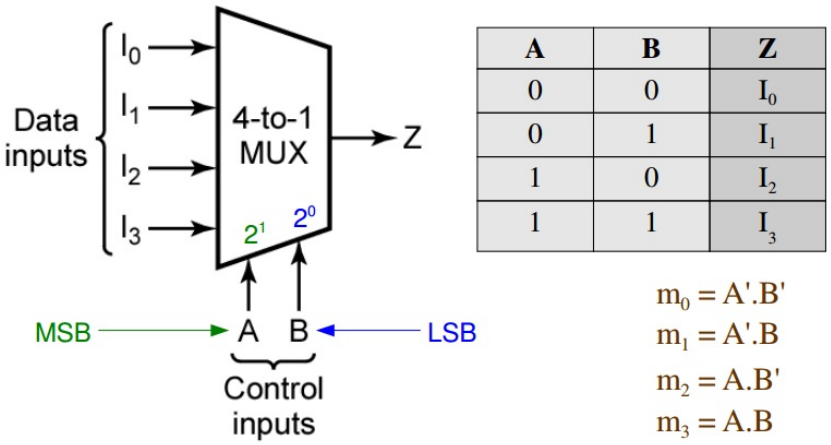
4. Make connections as shown in the respective circuit diagram.

5. Connect the inputs of the gate to the input switches of the LED.

6. Connect the output of the gate to the output LEDs.

7. Once all connections have been done, turn on the power switch of the bread-board

8. Operate the switches and fill in the truth table (Write "1" if LED is ON and "0" if L1 is OFF Apply the various combination of inputs according to the truth table and observe the condition of Output LEDs.



A	B	Z
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3

Figure 6.3: Truth Table and Block diagram of 4x1 MUX

6.8 Observation Table:

Input Lines: I3,I2, I1 ,I0 Select Lines: S1, S0 Output Variable: Z LED ON: RED Light: Logic 1 LED OFF: Green Light: Logic 0

Table 6.1: Add caption

Select Lines		Output
S1	S0	Z

6.9 Results and Analysis:

Verified the truth table as follows. The input data was routed to output by varying the addresses on select lines

6.10 Conclusion:

The truth table of 4:1 MUX using IC 74153 has been

verified.