Lab 7: De-Multiplexer

7.1 Aim

To the Truth Table of 1:4 De-multiplexer using IC 74139

7.2 Objective:

- To get familiar with the concept of de-multiplexing

7.3 Apparatus Required:

- Prototyping board (breadboard)
- DC Power Supply 5V
- Light Emitting Diode (LED)
- Digital IC:74139:Dual 1:4 DEMUX
- Connecting Wires

7.4 Pin Diagram:

7.5 Theory:

De-multiplexer: The data distributor, known more commonly as a Demultiplexer or "Demux", is the exact opposite of the Multiplexer. The demultiplexer takes one single input data line and then switches it to any one of a number of individual output lines one at a time. The demultiplexer converts a serial data signal at the input to a parallel data at its output lines.

The Boolean expression for this 1-to-4 DeMultiplexer above with inputs I0 to I3 and data select lines S0 ,S1 is given as: $Y = S0S1D0 + S0S1D1 + S0S1D2 + S0S1D3$

The function of the Demultiplexer is to switch one common data input line to any one of the 4 output data lines. Some standard demultiplexer ICÂt's also have an

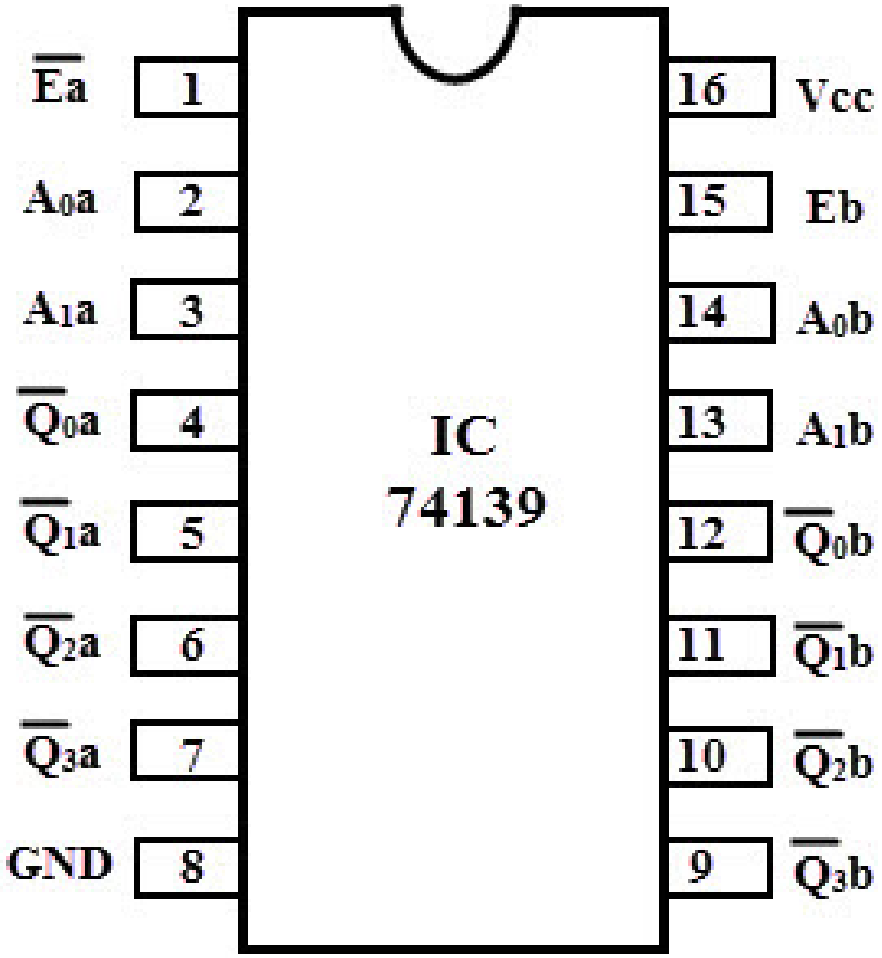
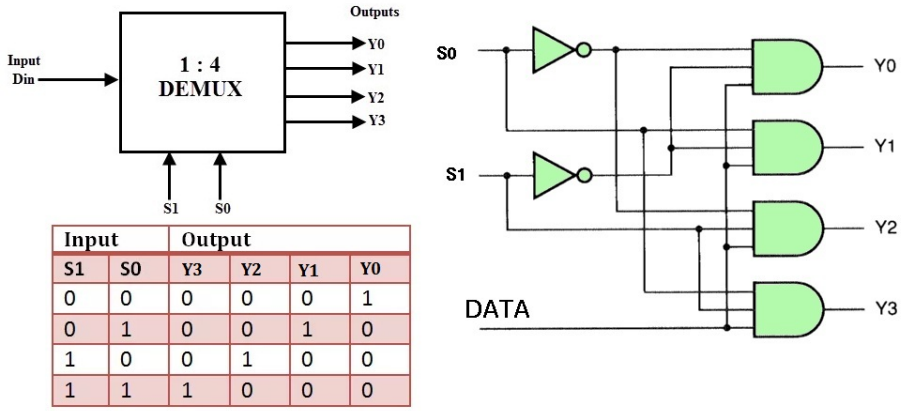


Figure 7.1: Pin Diagram of of dual 1 X 4 Demultiplexer

"enable output" input pin which disables or prevents the input from being passed to the selected output. Also some have latches built into their outputs to maintain the output logic level after the address inputs have been changed. However, in standard decoder type circuits the address input will determine which single data output will have the same value as the data input with all other data outputs having the value of logic "0".

7.6 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.



Input		Output			
S1	S0	Y3	Y2	Y1	Y0
0	0	0	0	0	1
0	1	0	0	1	0
1	0	0	1	0	0
1	1	1	0	0	0

Figure 7.2: Block diagram, logic circuit and truth table for 1:4 Demultiplxer

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.

7.7 Observation Table:

Input Variable: D, S0, S1 Output Variable: Y0, Y1, Y2, Y3 LED ON: RED Light: Logic 1 LED OFF: Green Light: Logic 0

Table 7.1: Add caption

Select Lines		Data Input	Output			
S1	S0	Data	Y	Y2	Y1	Y0

7.8 Results and Discussion:

Multiplexer and demultiplexer help in reducing the cost of transmission of digital signals. Logic design is simple and boolean expression need not be simplified. Mux

and Demux acts as rotary switches. Multiplexers are used as one method of reducing the number of logic gates required in a circuit or when a single data line is required to carry two or more different digital signals i.e it converts parallel data into serial data and also used for data selection. The demultiplexer converts a serial data signal at the input to a parallel data at its output lines and used for data distribution. Both are available as ICs.

7.9 Conclusion:

1:4 DEMUX using IC74139 has been verified.