Practical Assignment: 5

Aim: To Verify the Truth Tables of Multiplexer and Demultiplexer.

Theory:

Multiplexer:

A multiplexer (MUX) is a digital electronic device that is used to select one of several input data lines and route it to a single output line. It operates based on the principle of data switching, allowing multiple inputs to be directed to a single output. Multiplexers are fundamental building blocks in digital electronic circuits and play a crucial role in various applications.

- Function:

The primary function of a multiplexer is to choose one of its data inputs and pass it to the output line. The selection of the input to be transmitted to the output is determined by the binary values present at the select inputs of the MUX.

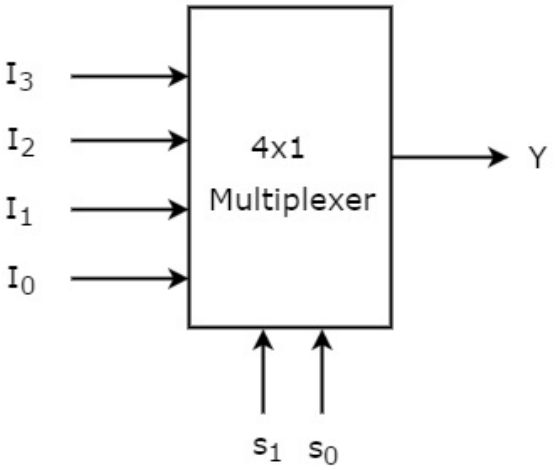
- Select Lines:

A multiplexer typically has 2^n data inputs, where 'n' is the number of select lines. The number of select lines determines how many data inputs the MUX can handle. For example, a 2-to-1 MUX has 2 data inputs and 1 select line, while a 4-to-1 MUX has 4 data inputs and 2 select lines.

Types of MUX:

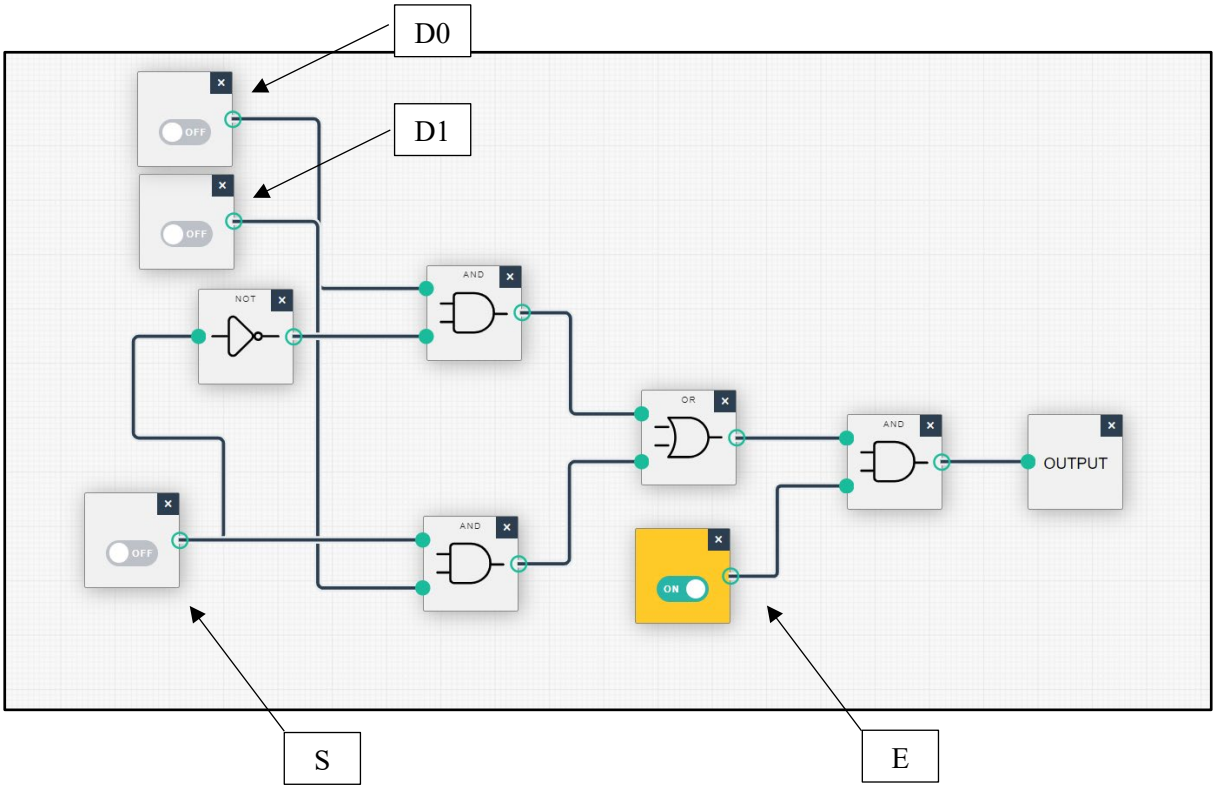
1. 2:1 – This type of MUX has two data inputs and one select line.
2. 4:1 – It has four data inputs and two select lines.
3. 8:1 – It has eight data inputs and three select lines.
4. 16:1 – This MUX has sixteen data inputs and four select lines.

Example:



- In the Above Diagram, I (0 - 3) are Inputs.
- S (0 & 1) are select Inputs.
- Y is output.

2:1 Multiplexer:



Truth Table:

Enable (E)	Select (S)	D1	D0	Output (Y)
0	x	x	x	0
1	0	x	0	0
1	0	x	1	1
1	1	0	x	0
1	1	1	x	1

Demultiplexer:

A Demultiplexer (DEMUX) is the opposite of a multiplexer. It takes a single input line and distributes it to one of several output lines based on the values applied to its select inputs. Demultiplexers are used to split a single data stream into multiple branches.

- Function:

A demultiplexer selects one of its output lines and routes the input signal to that selected output line based on the values applied to its select lines.

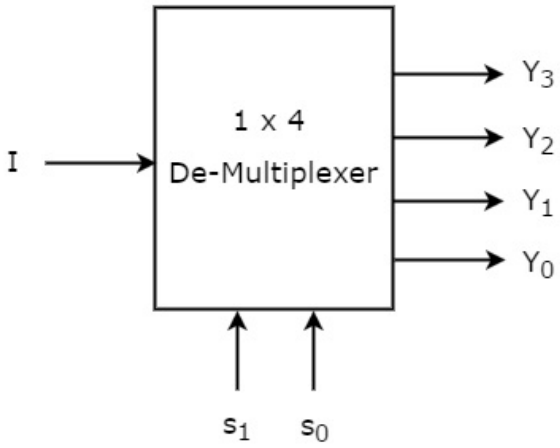
- Select Lines:

A demultiplexer typically has 'n' select lines that determine which output line will receive the input signal. If a demultiplexer has 'n' select lines, it will have 2^n output lines.

Types of DEMUX:

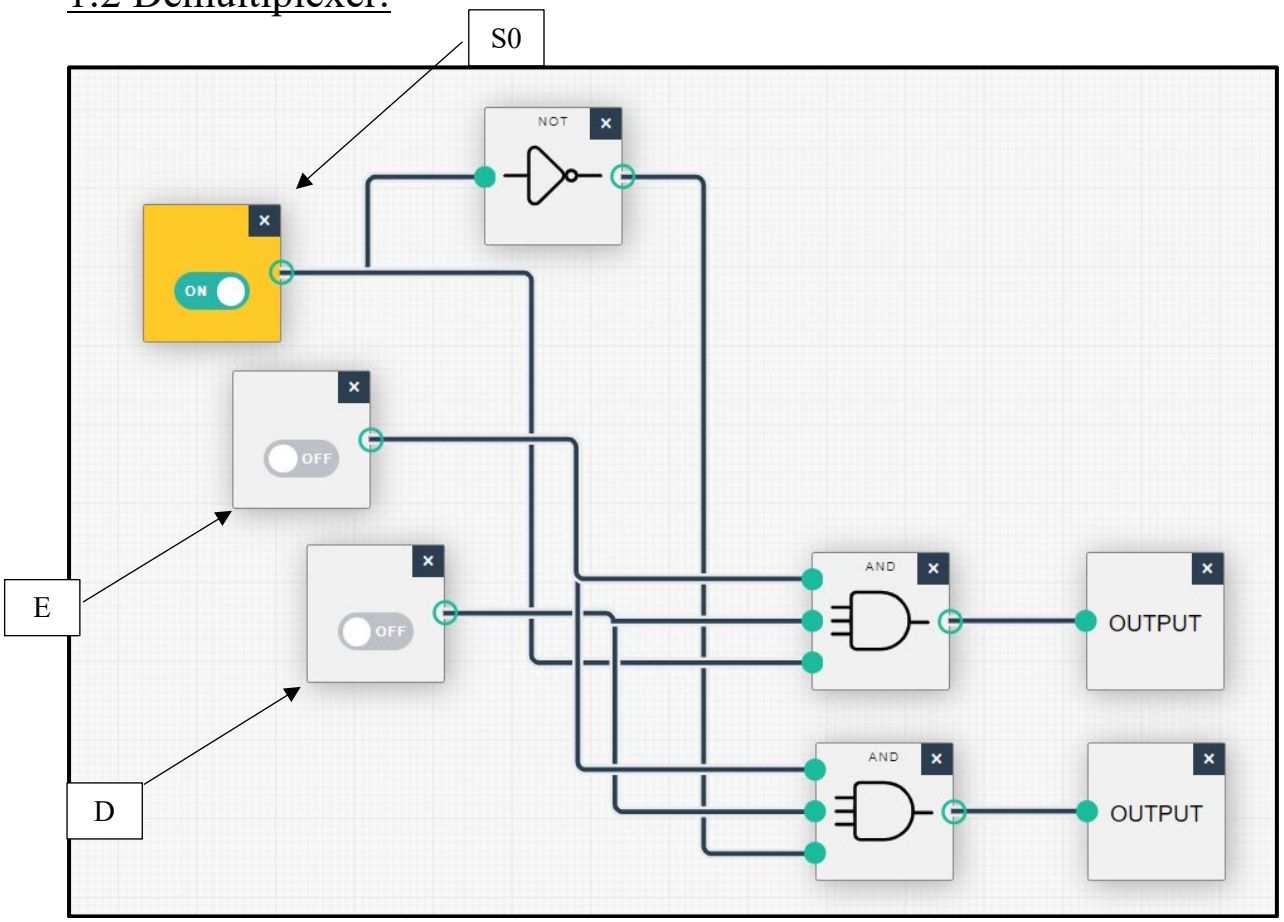
1. 1:2 – It has one input line and two output lines.
2. 1:4 – This type has one input line and four output lines.
3. 1:8 – It has one input line and eight output lines.
4. 1:16 – This type has one input line and sixteen output lines.

Example:



- In the above diagram, I is Input.
- S (1 & 0) are select Inputs.
- Y (0 - 3) are Outputs.

1:2 Demultiplexer:



Truth Table:

Enable	Input	Select	Output	
E	D	S	Y0	Y1
0	X	X	0	0
1	0	0	0	0
1	1	0	0	1
1	0	1	0	0
1	1	1	1	0

Conclusion:

Hence, we learned about Multiplexers and Demultiplexers along with their types and Functions.

We also studied in details about 2:1 Multiplexer and 1:2 Demultiplexer and verified its truth table.

K	S	P	A	T