2101227_VISHALKUMARPRAJAPATI

EXPERIMENT NUMBER 6

TITLE: Implementation of 4x1 multiplexer , 8x1 multiplexer and 1x4 demultiplexer using logic gates.

❖ OBJECTIVE:

To analyse the truth table and working of 1x4 De-Multiplexer by using 3-input NAND and 1-input NOT logic gate ICs and 4x1 Multiplexer by using 3-input AND, 3-input OR, and 1-input NOT logic gate ICs and Implementation of 8x1 MUX using MSI ICs.

❖APPARTUS REQUIRED:

- Switches
- Power supply
- Resistances
- LEDs
- IC 7411 NAND Gates, 7404 Hex inverters , IC 74LS153etc

❖THEORY:

Multiplexer -

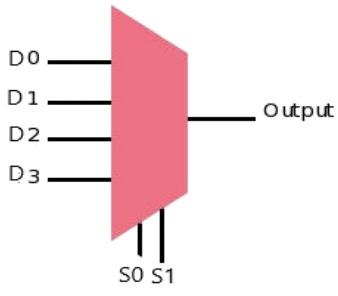
Multiplexer is a device that has multiple inputs and a single line output. The select lines determine which input is connected to the output, and also to increase the amount of data that can be sent over a network within certain time. It is also called a data selector.

Multiplexers are classified into four types:

a)2-1multiplexer(1selectline)
b)4-1multiplexer(2selectlines)
c)8-1multiplexer(3selectlines)
d) 16-1 multiplexer(4selectlines)

4x1 Multiplexer -

4x1 Multiplexer has four data inputs D0, D1, D2 & D3, two selection linesS0 & S1 and one output Y.

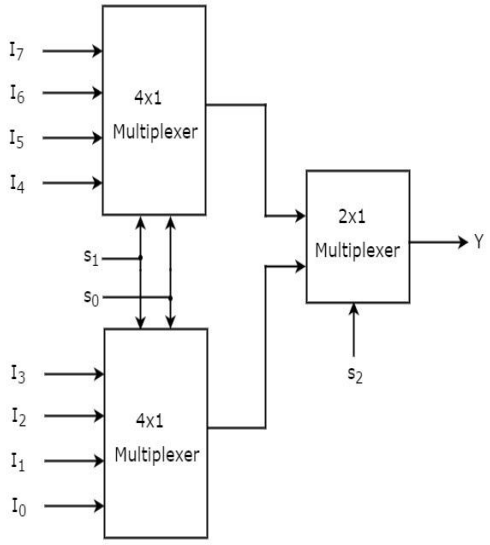


Selection Lines		Output
S0	S1	Y
0	0	D_0
0	1	D_1
1	0	D_2
1	1	D_3

Fig : Truth table of 4x1 Multiplexer

8x1 Multiplexer –

In this section, let us implement 8x1 Multiplexer using 4x1 Multiplexers and 2x1 Multiplexer. We know that 4x1 Multiplexer has 4 data inputs, 2 selection lines and one output. Whereas, 8x1 Multiplexer has 8 data inputs, 3 selection lines and one output. So, we require two 4x1 Multiplexers in first stage in order to get the 8 data inputs. Since, each 4x1 Multiplexer produces one output, we require a 2x1 Multiplexer in second stage by considering the outputs of first stage as inputs and to produce the final output. Let the 8x1 Multiplexer has eight data inputs I_7 to I_0, three selection lines s_2, s_1 & s0 and one output Y.



Selection Inputs			Output
S_2	S_1	S_0	Y
0	0	0	I_0
0	0	1	I_1
0	1	0	I_2
0	1	1	I_3
1	0	0	I_4
1	0	1	I_5
1	1	0	I_6
1	1	1	I_7

De-multiplexer –

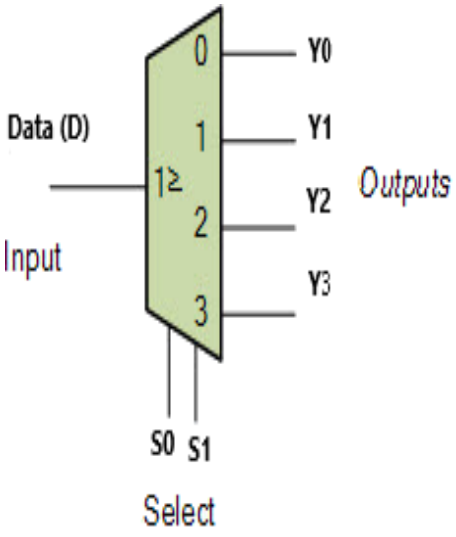
De-multiplexer is also a device with one input and multiple output lines. It is used to send a signal to one of the many devices. The main difference between a multiplexer and a de-multiplexer is that a multiplexer takes two or more signals and encodes them on a wire, whereas a de-multiplexer does reverse to what the multiplexer does.

De-multiplexer are classified into four types:

a)1-2demultiplexer(1selectline)
b)1-4demultiplexer(2selectlines)
c)1-8demultiplexer(3selectlines)
d)1-16 demultiplexer(4selectlines)

1x4De-multiplexer -

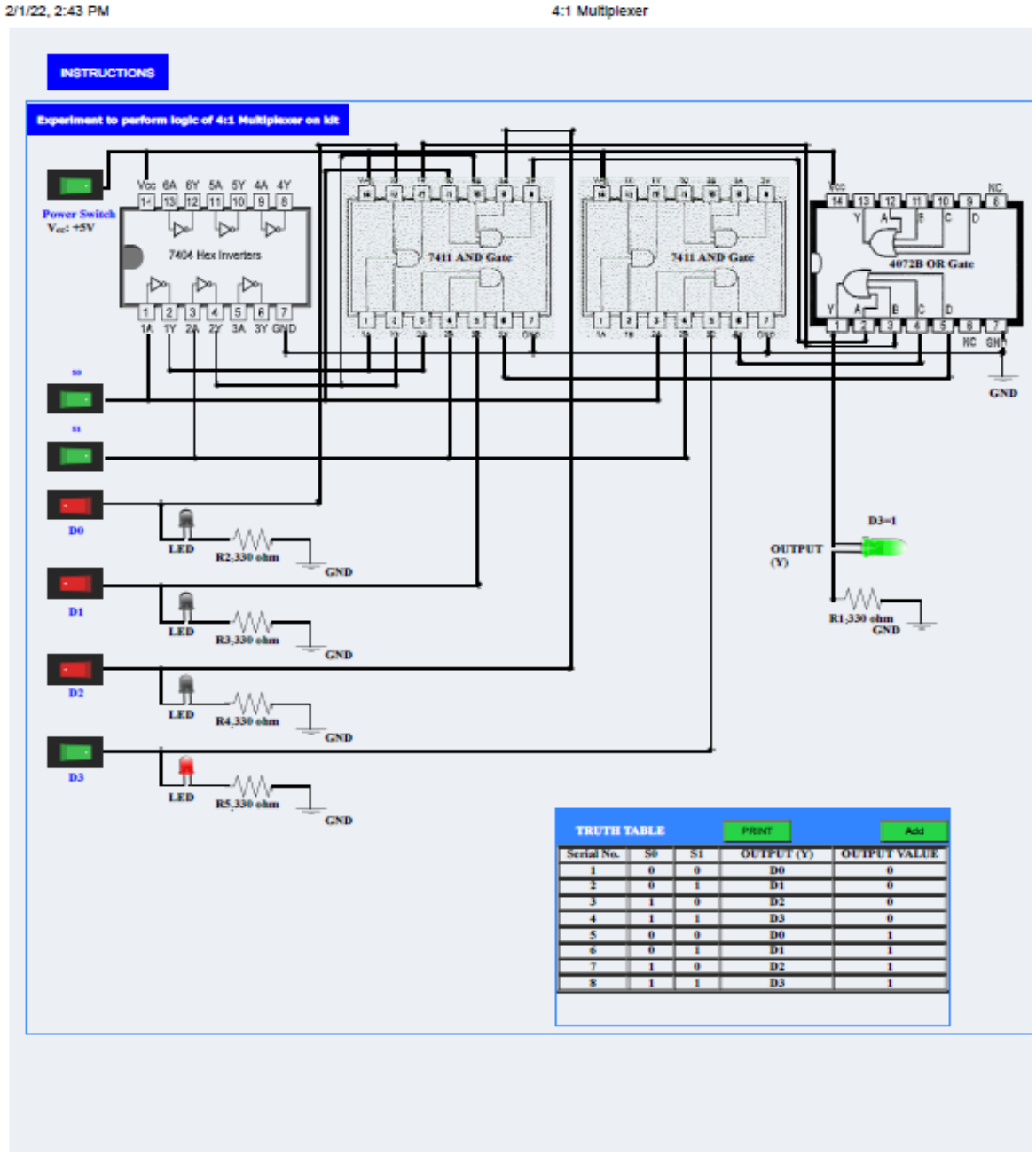
1x4 De-Multiplexer has one input Data(D), two selection lines, S0 & S1 and four outputs Y0, Y1, Y2 & Y3.



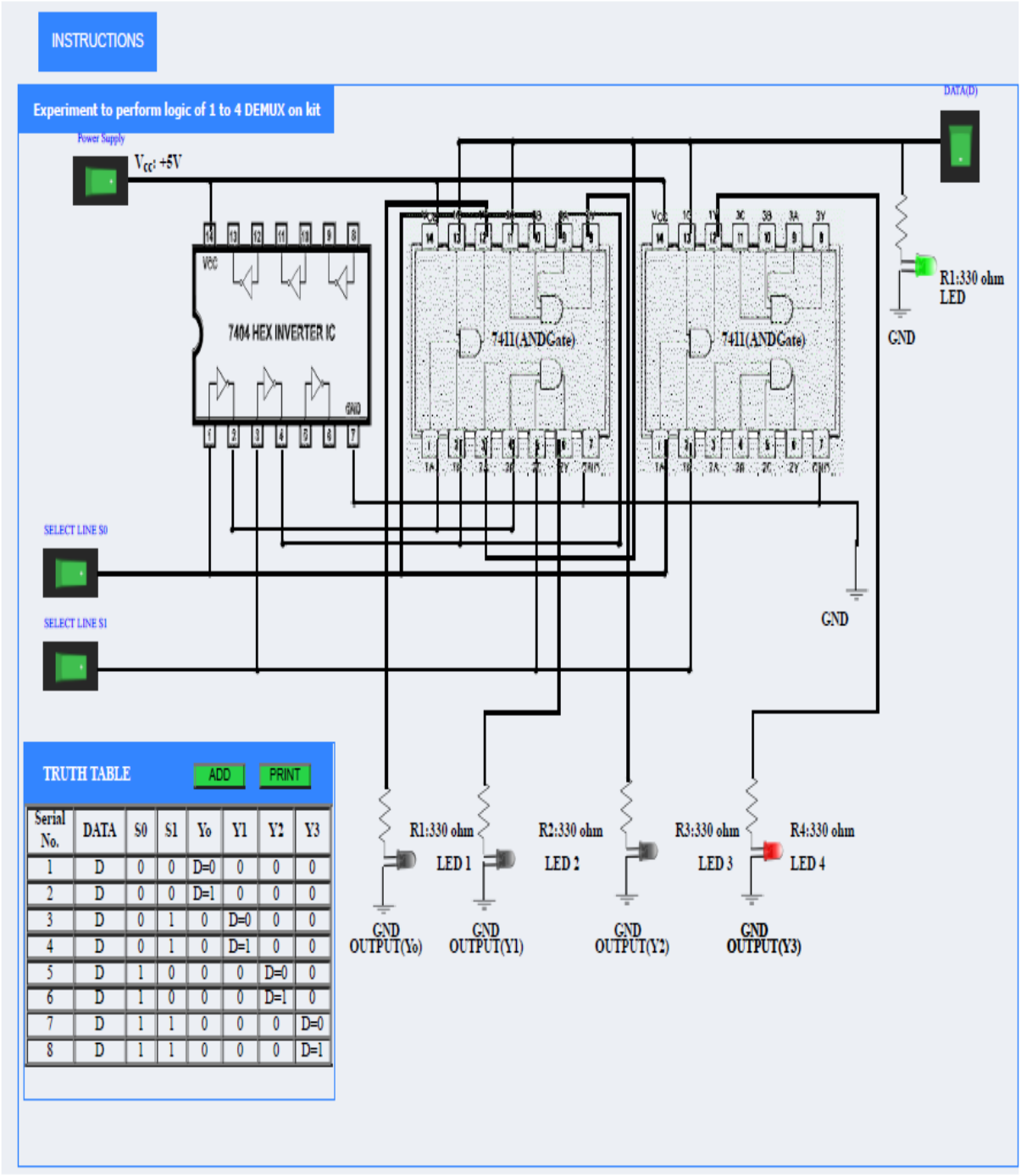
Selection Inputs		Outputs			
S0	S1	Y_3	Y_2	Y_1	Y_0
0	0	0	0	0	D
0	1	0	0	D	0
1	0	0	D	0	0
1	1	D	0	0	0

❖CIRCUIT DIAGRAM AND CALCULATIONS:

- ***4x1 Multiplexer:***

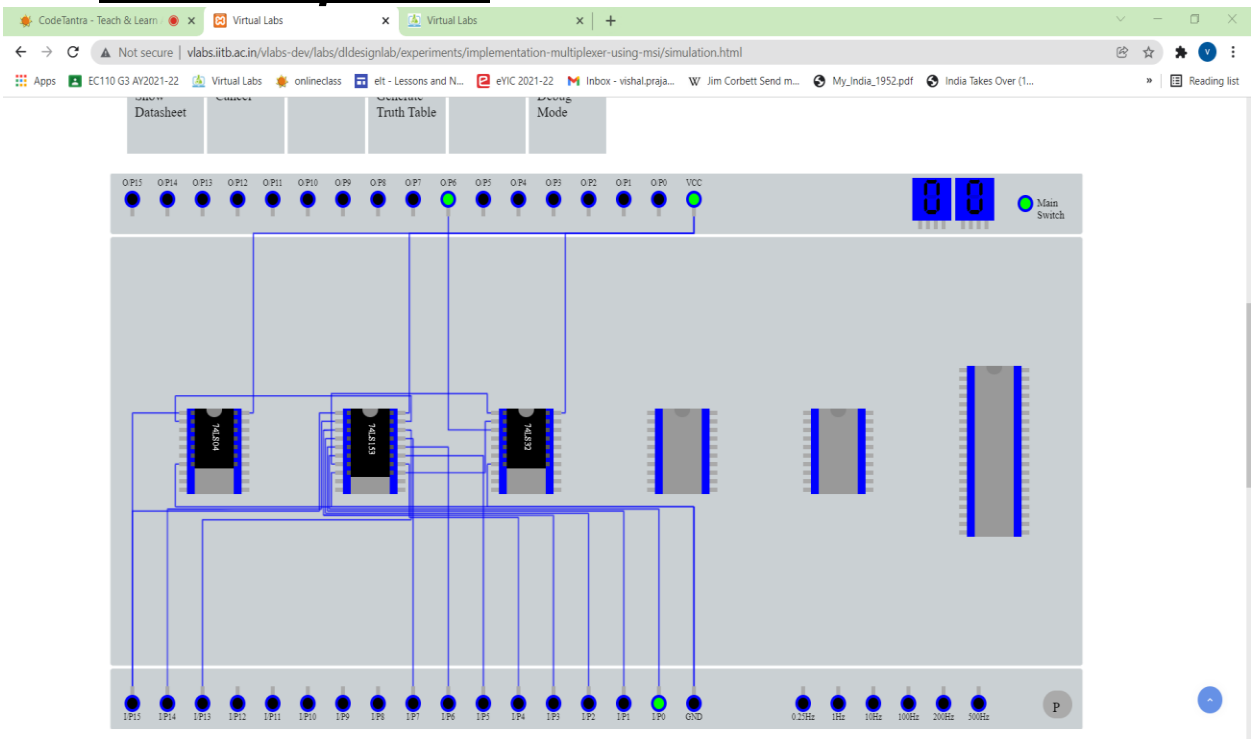


- ***1x4 DeMultiplexer:***



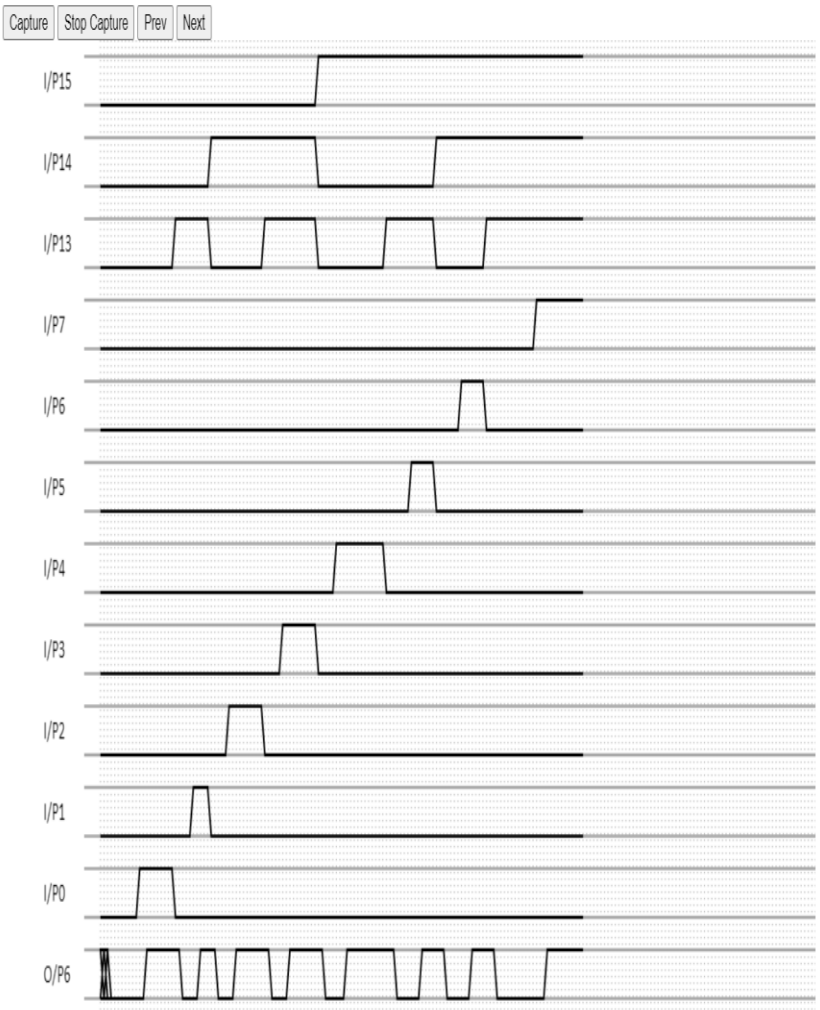
Serial No.	DATA	S0	S1	Yo	Y1	Y2	Y3
1	D	0	0	D=0	0	0	0
2	D	0	0	D=1	0	0	0
3	D	0	1	0	D=0	0	0
4	D	0	1	0	D=1	0	0
5	D	1	0	0	0	D=0	0
6	D	1	0	0	0	D=1	0
7	D	1	1	0	0	0	D=0
8	D	1	1	0	0	0	D=1

- ***8x1 Multiplexer:***



I/P15	I/P14	I/P13	I/P7	I/P6	I/P5	I/P4	I/P3	I/P2	I/P1	I/P0	O/P6
0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0	0	1	1	1
0	0	0	0	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	1	0	1	1
0	0	0	0	0	0	0	0	1	1	0	0
0	0	0	0	0	0	0	0	1	1	1	1
0	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	1	0	0	1	1
0	0	0	0	0	0	0	1	0	1	0	0
0	0	0	0	0	0	0	1	0	1	1	1
0	0	0	0	0	0	0	1	1	0	0	0
0	0	0	0	0	0	0	1	1	0	1	1
0	0	0	0	0	0	0	1	1	1	0	0
0	0	0	0	0	0	0	1	1	1	1	1
0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0	1	1
0	0	0	0	0	0	1	0	0	1	0	0
0	0	0	0	0	0	1	0	0	1	1	1
0	0	0	0	0	0	1	0	1	0	0	0


I/P15
I/P14
I/P13
I/P12
I/P11
I/P10
I/P9
I/P8
I/P7
I/P6
I/P5
I/P4
I/P3
I/P2
I/P1
I/P0
GND
0.25Hz
1Hz
10Hz
100Hz
200Hz
500Hz
P


Capture
Stop Capture
Prev
Next
I/P15
I/P14
I/P13
I/P7
I/P6
I/P5
I/P4
I/P3
I/P2
I/P1
I/P0
O/P6

❖RESULTS:

Verified the output of 4:1 Multiplexer , 8:1 Multiplexer, and 1:4 De-Multiplexer.

❖PRECAUTIONS:

- All the connections should be made properly as per the circuit diagram.
- Connections should be tight and easy to inspect.
- Power supply should be 5v.
- Keep the switch turned off while making connections.