Implementation of 4x1 multiplexer using logic gates.

AIM: 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.

Introduction:

The function of a multiplexer is to select the input of any 'n' input lines and feed that to one output line. The function of a de-multiplexer is to inverse the function of the multiplexer and the shortcut forms of the multiplexer. The de-multiplexers are mux and demux. Some multiplexers perform both multiplexing and de-multiplexing operations.

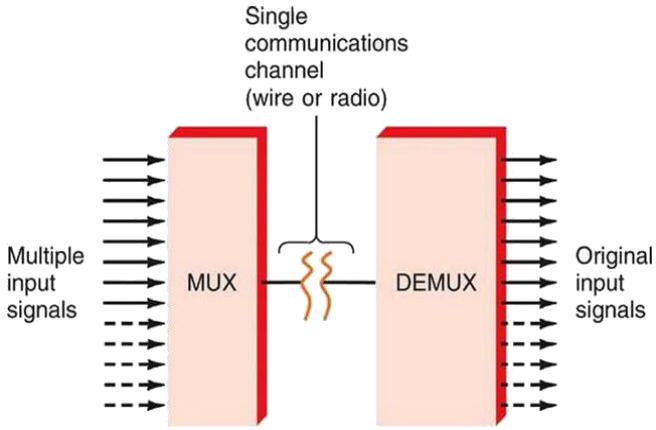


Figure-1:Block diagram of Multiplexer and De-multiplexer

1) 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 (4 select lines)

1.1) 4x1 Multiplexer

4x1 Multiplexer has four data inputs D0, D1, D2 & D3, two selection lines S0 & S1 and one output Y. The block diagram of 4x1 Multiplexer is shown in the following figure.One of these 4 inputs will be connected to the output based on the combination of inputs present at these two selection lines. Truth table of 4x1 Multiplexer is shown below.

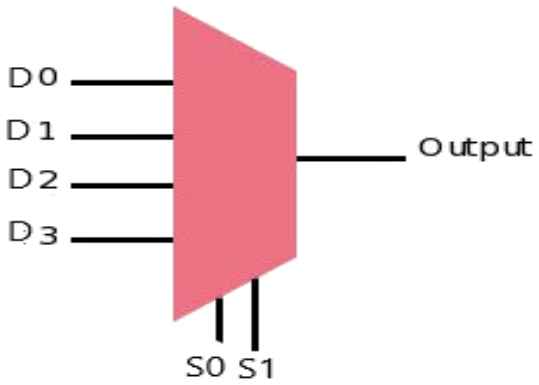


Figure-2:Block diagram of 4x1 Multiplexer

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

Figure-3:Truth table of 4x1 Multiplexer

PRETEST:

In a multiplexer, the selection of a particular input line is controlled by _____

- a: Data controller
- b: Selected lines
- c: Logic gates
- d: Both data controller and selected lines

If the number of n selected input lines is equal to 2^m then it requires _____ select lines.

- a: 2
- b: m
- c: n
- d: 2^n

Which of the following circuit can be used as parallel to serial converter?

- a: Multiplexer
- b: Demultiplexer
- c: Decoder
- d: Digital counter

How many select lines would be required for an 8-line-to-1-line multiplexer?

- a: 2
- b: 4
- c: 8
- d: 3

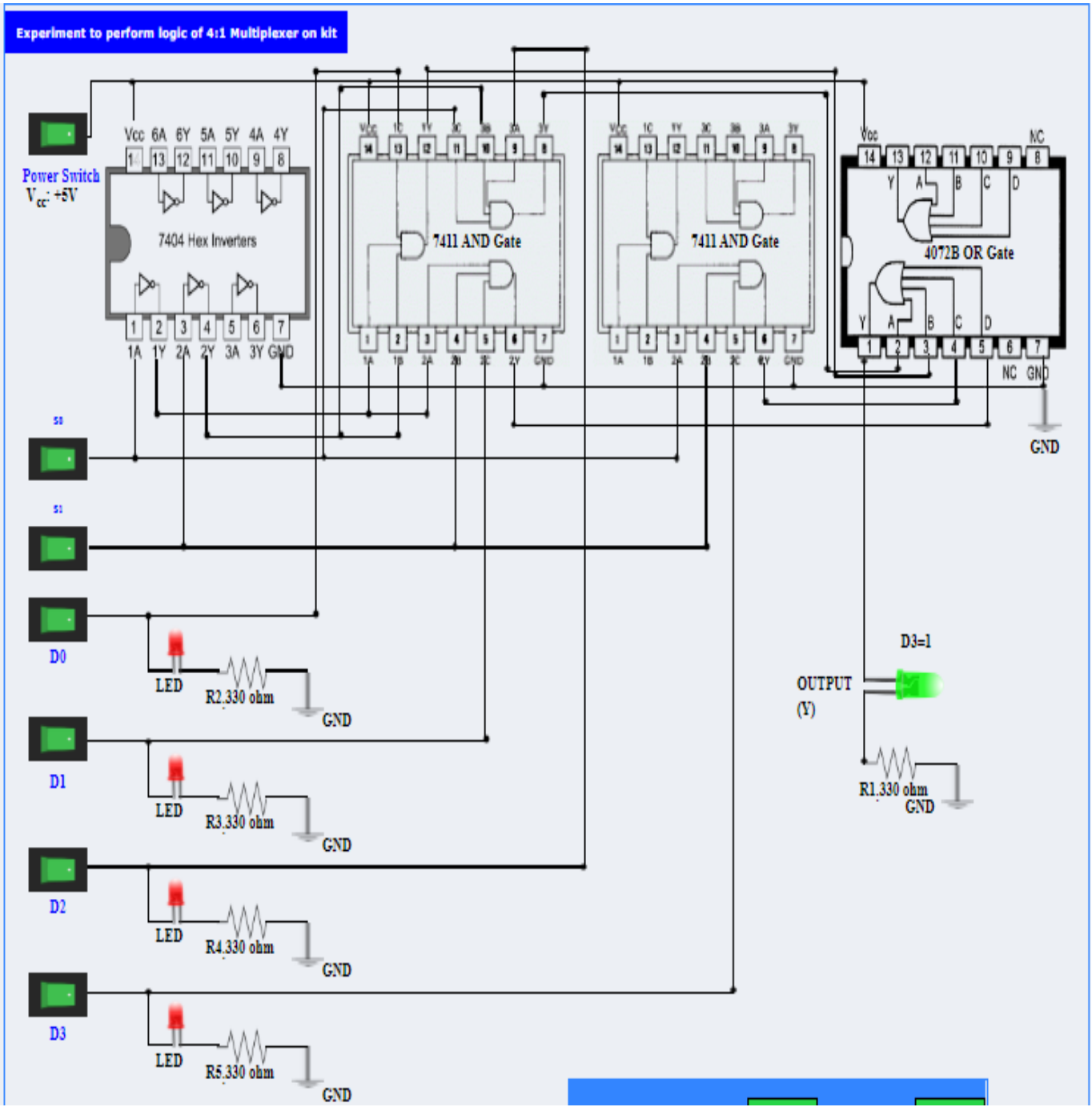
Submit Quiz

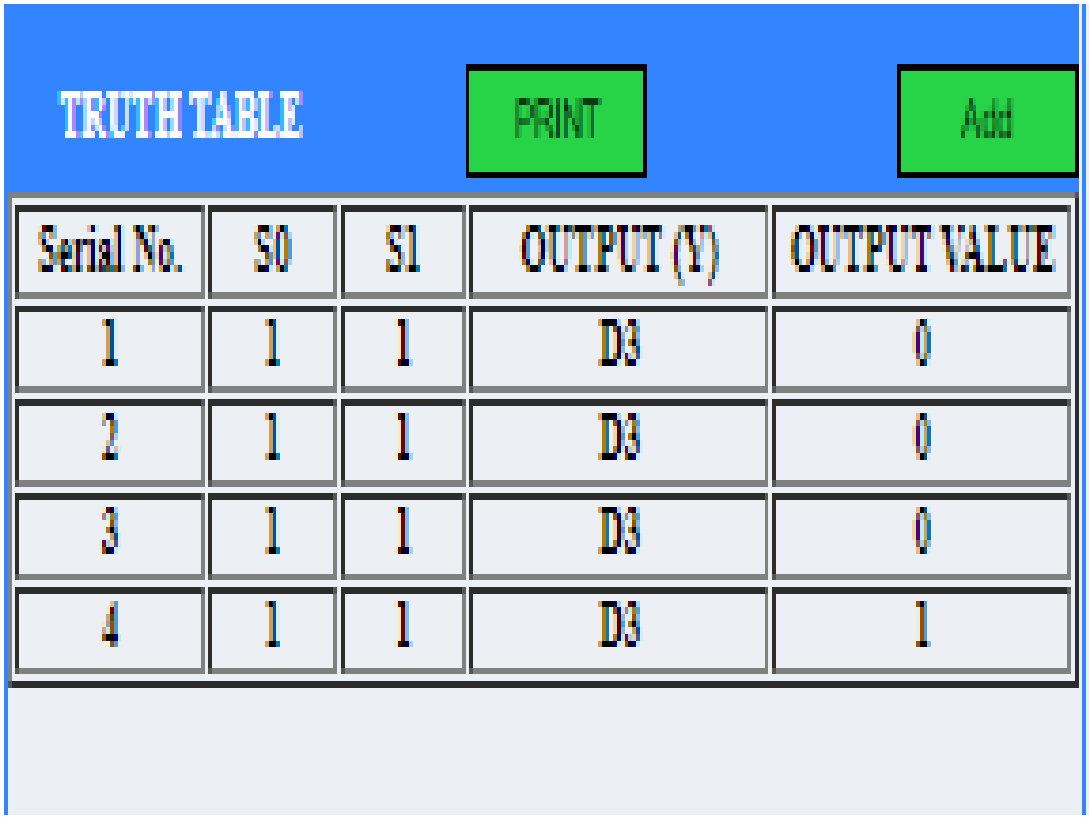
PROCEDURE:

1) 4x1 Multiplexer

Step-1) Connect the supply(+5V)  to the circuit.
Step-2) First press "ADD" button to add basic state of your output in the given table.
Step-3) Press the switches "S0" and "S1"to select the desired input line.
Step-4) Press "D0"/"D1"/"D2"/"D3" any one button to add your inputs.
Step-5) Press "ADD" button to add your inputs and outputs in the given table.
Step-6) Repeat step 3, 4 and step 5 for next state of inputs and their corresponding outputs.
Step-7) Press the "PRINT" button after completing your simulation to get your results.

SIMULATION:


Experiment to perform logic of 4:1 Multiplexer on kit
Power Switch
Vcc: +5V
Vcc 6A 6Y 5A 5Y 4A 4Y
7404 Hex Inverters
1A 1Y 2A 2Y 3A 3Y GND
7411 AND Gate
7411 AND Gate
Vcc NC
4072B OR Gate
NC GND
GND
s0
s1
D0
D1
D2
D3
LED
R2.330 ohm
R3.330 ohm
R4.330 ohm
R5.330 ohm
GND
D3=1
OUTPUT
(Y)
R1.330 ohm



Serial No.	S0	S1	OUTPUT (Y)	OUTPUT VALUE
1	1	1	D3	0
2	1	1	D3	0
3	1	1	D3	0
4	1	1	D3	1

CONCLUSION: