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Circuit Simulation Project

https://esim.fossee.in/circuit-simulation-project

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Project Guide: Dr. Maheswari. R

Title of the Project: -

Design of 4 to 1 Multiplexer in eSIM.

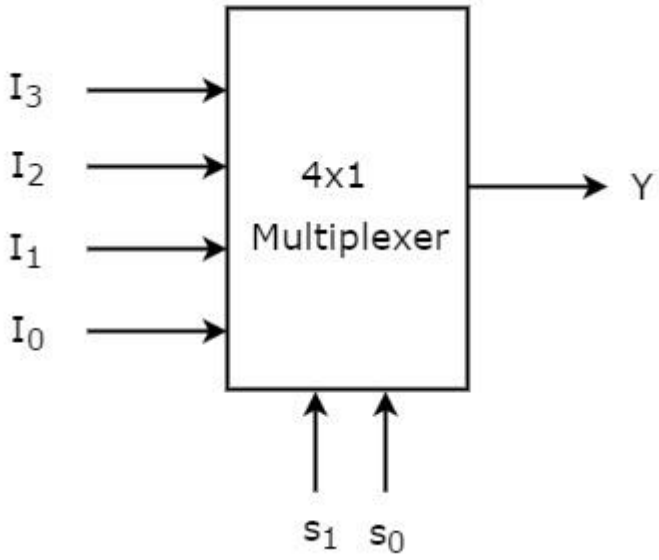
Theory/Description: -

Multiplexer is a combinational circuit that has maximum of 2^n data inputs, 'n' selection lines and single output line. One of these data inputs will be connected to the output based on the values of selection lines.

Since there are 'n' selection lines, there will be 2^n possible combinations of zeros and ones. So, each combination will select only one data input. Multiplexer is also called as **Mux**.

4x1 Multiplexer

4x1 Multiplexer has four data inputs I_3, I_2, I_1 & I_0, two selection lines s_1 & s_0 and one output Y. The **block diagram** of 4x1 Multiplexer is shown in the following figure.



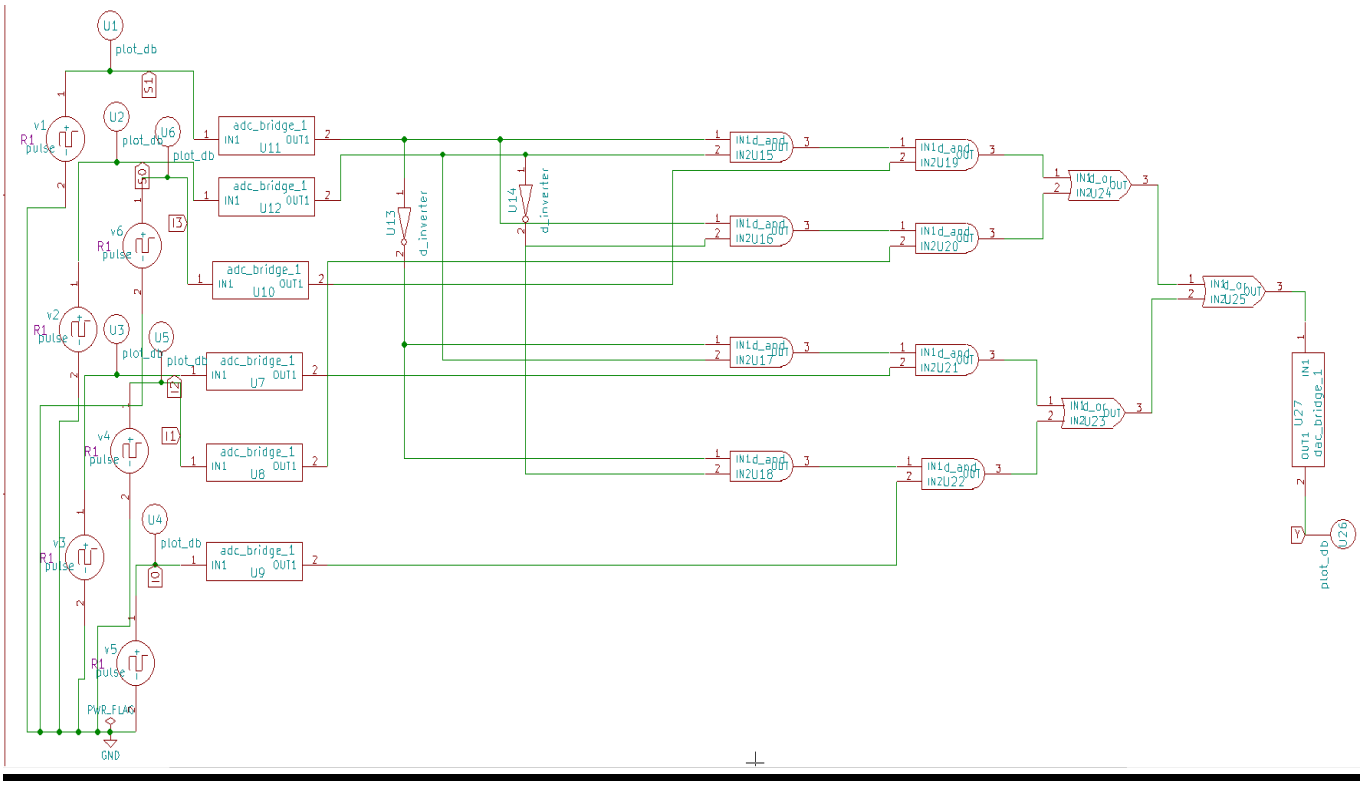
One of these 4 inputs will be connected to the output based on the combination of inputs present at these two selection lines. **Truth table** of 4x1 Multiplexer is shown below.

Selection Lines		Output
S_1	S_0	Y
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3

From Truth table, we can directly write the **Boolean function** for output, Y as

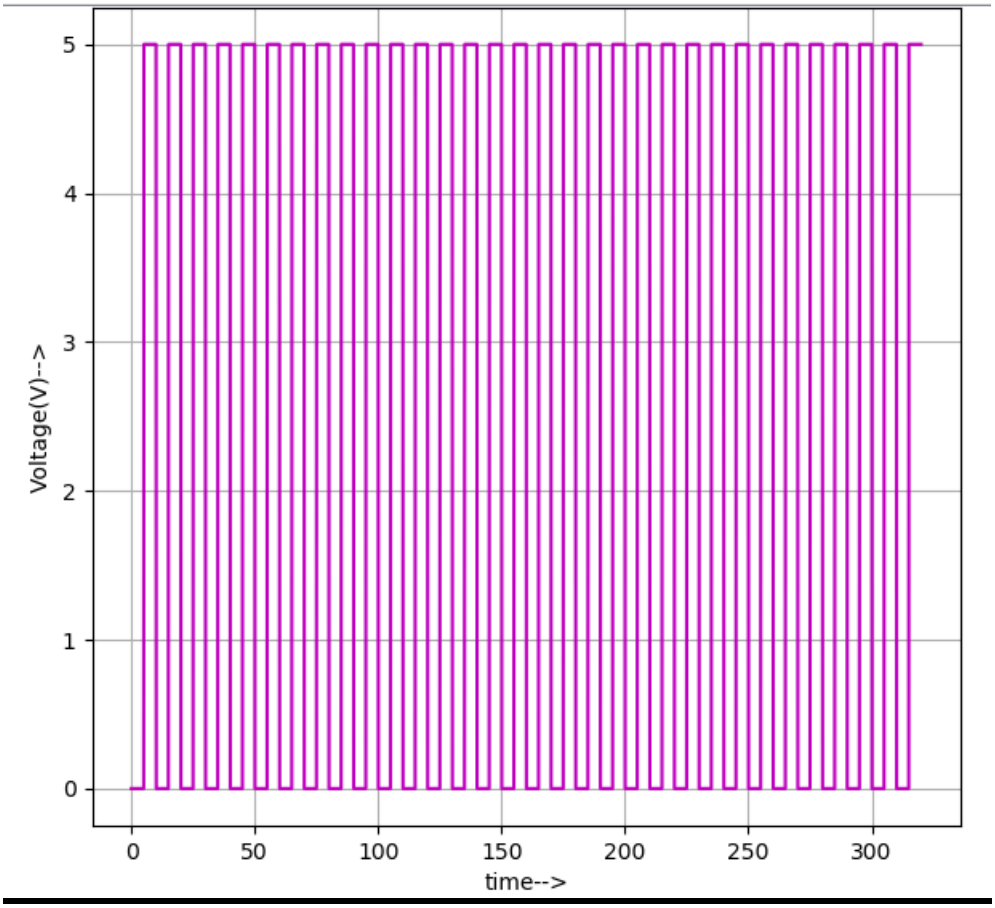
$$Y=S1'S0'I0+S1'S0I1+S1S0'I2+S1S0I3$$

CIRCUIT DIAGRAM: -

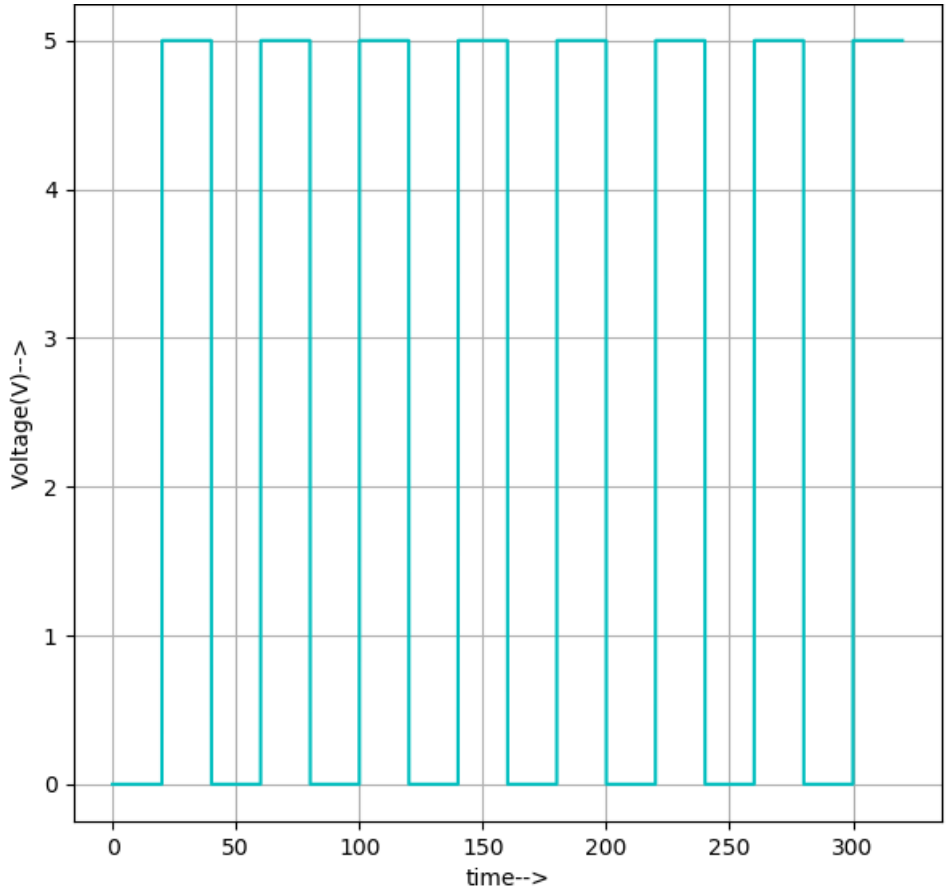


RESULT/OUTPUT: -

SELECTION LINES:-

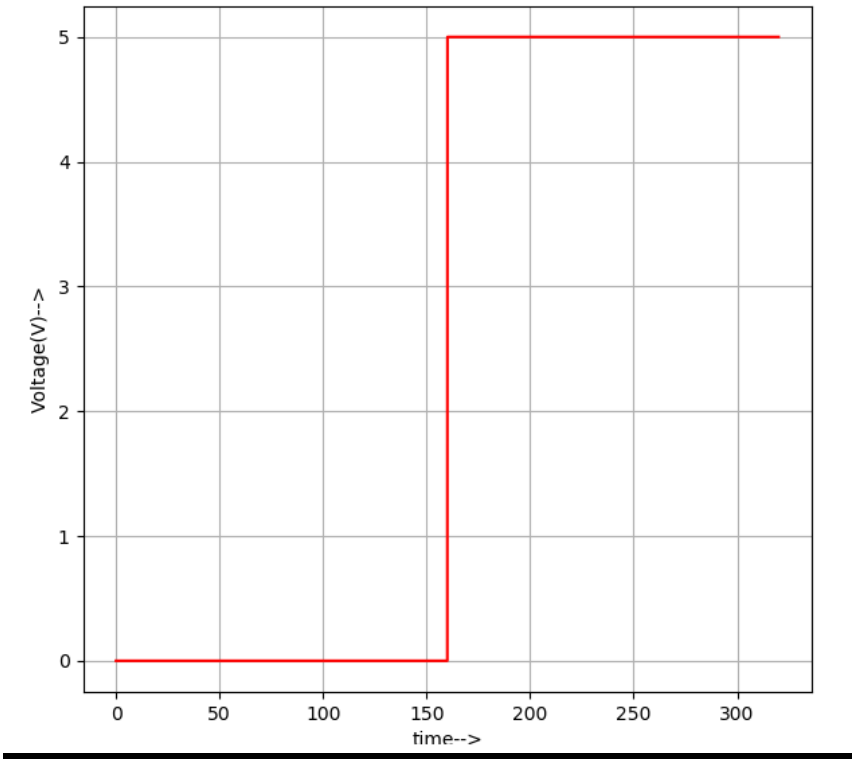


S1

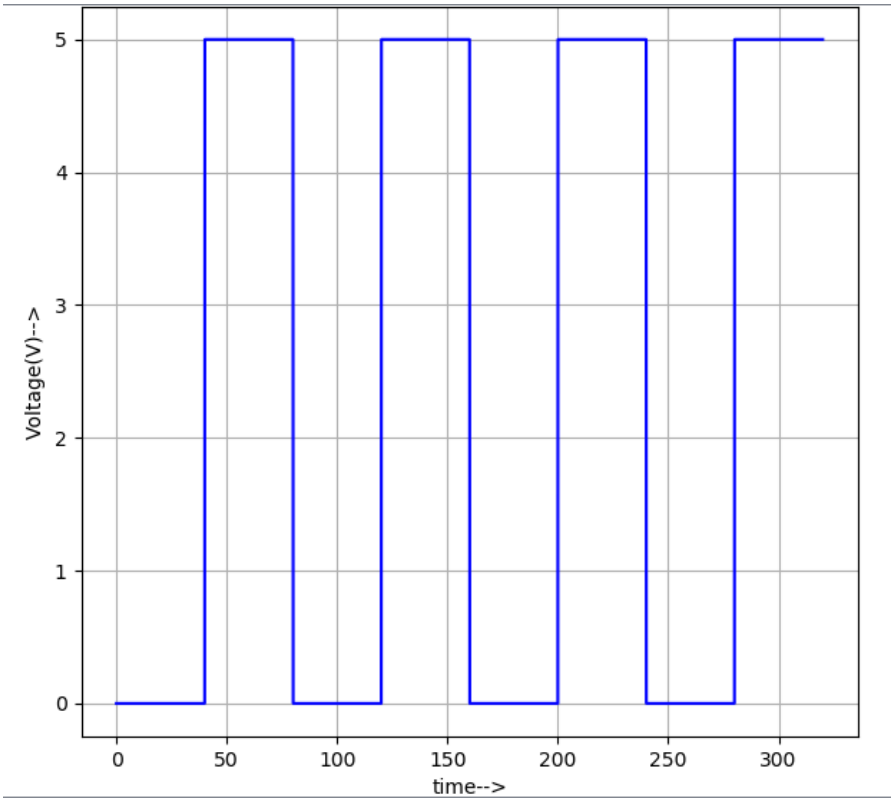


S0

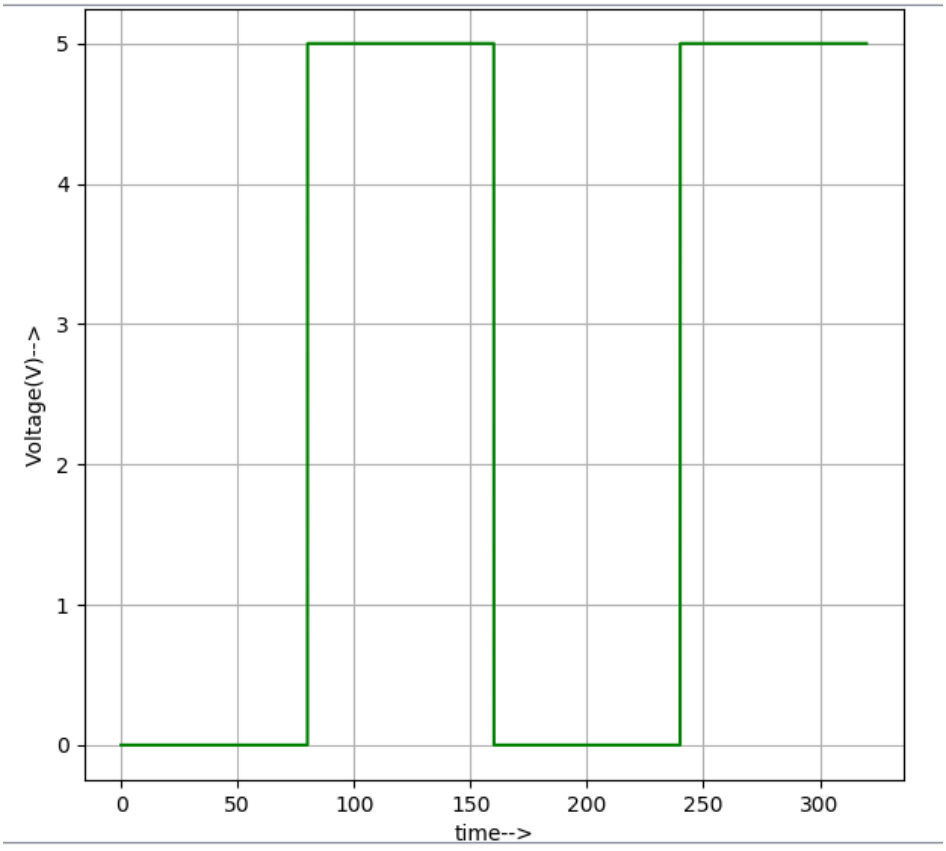
DATA INPUTS: -



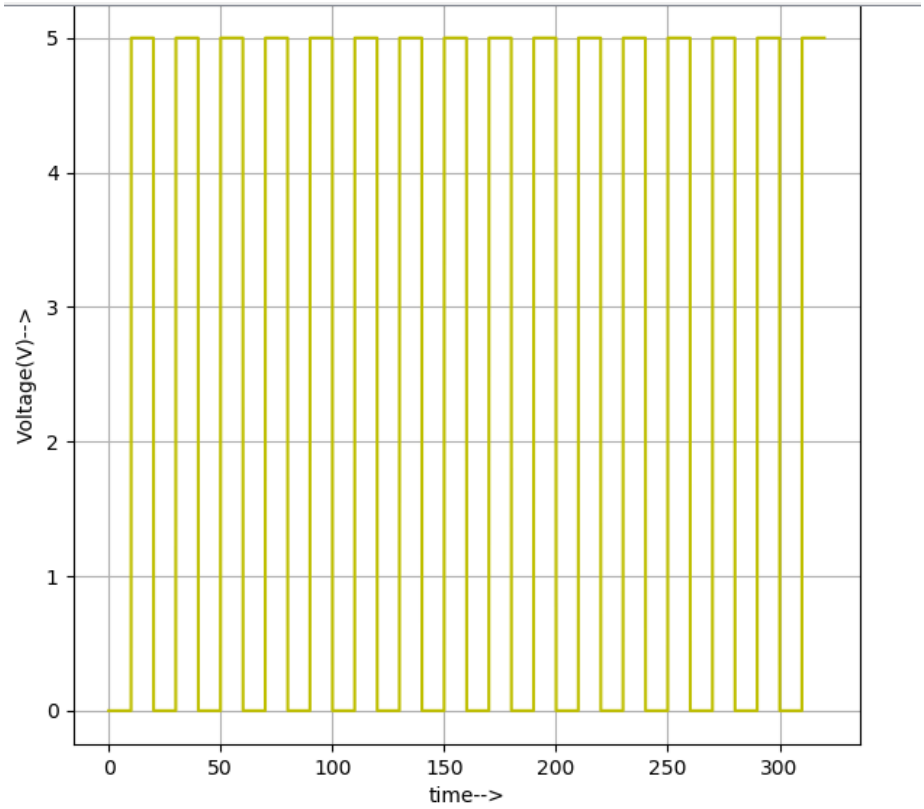
I0


Voltage(V)-->
time-->
0
1
2
3
4
5
0
50
100
150
200
250
300

I1

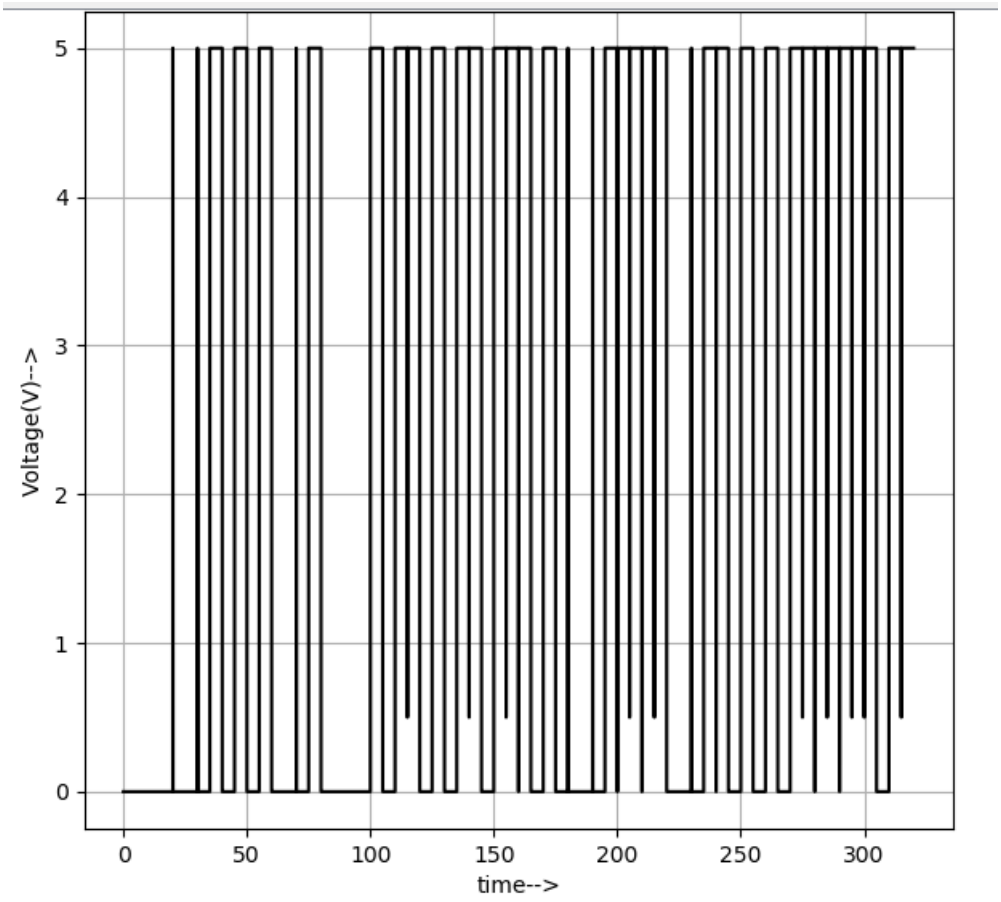

Voltage(V)-->
time-->
0
1
2
3
4
5
0
50
100
150
200
250
300

I2



I3

OUTPUT: -



Y

REFERENCES: -

https://www.tutorialspoint.com/digital_circuits/digital_circuits_multiplexers.htm

https://www.electronics-tutorials.ws/combination/comb_2.html