Digital Electronics

Experiment 7

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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, 3input OR, and 1-input NOT logic gate ICs.

Theory:

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.

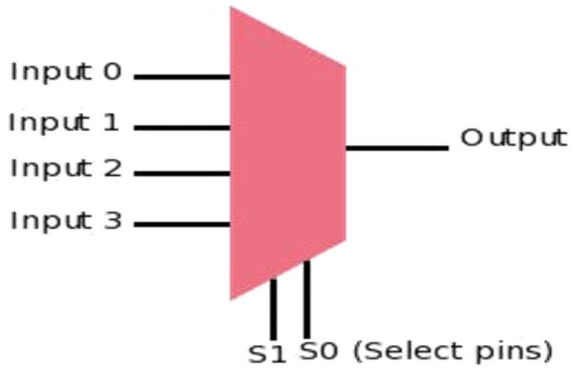
1) Multiplexer:

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.

4x1 Multiplexer

4x1 Multiplexer has four data inputs I3, I2, I1 & I0, two selection lines S1 & S0 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.

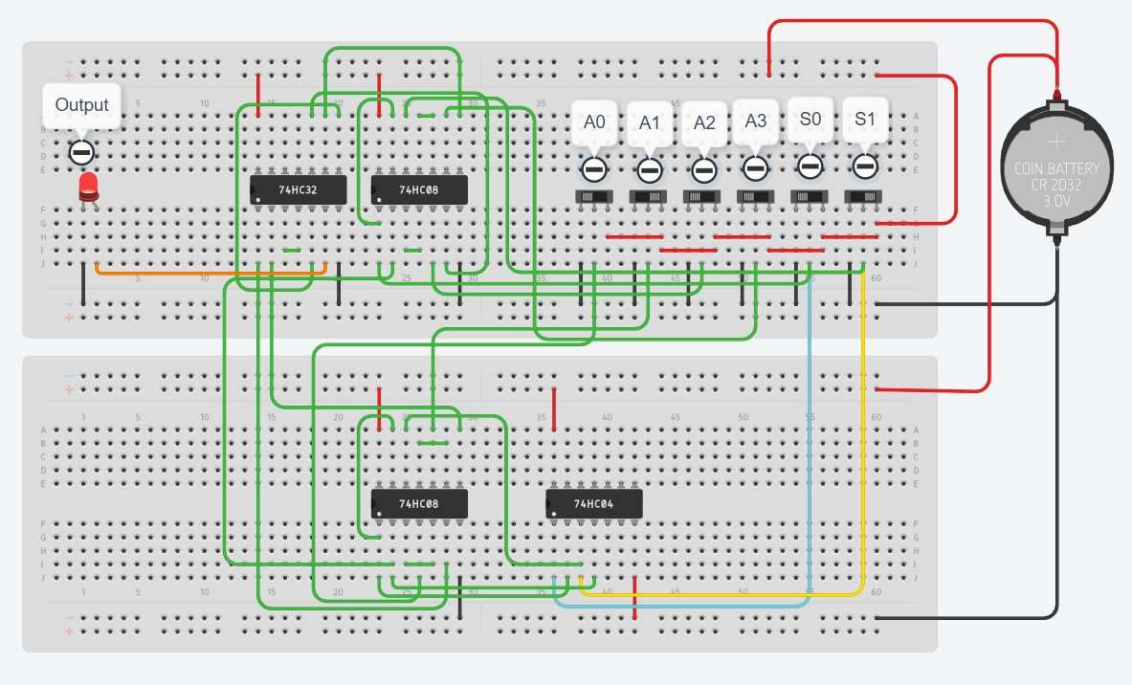
Block Diagram:



Truth Table:

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

Tinkercad:



Multiplexer using AND, NOT, OR gates with inputs S0 = 0, S1 = 1 that activates the A1 input

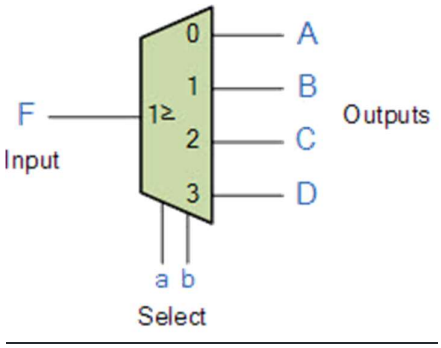
2) De-multiplexer:

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.

1x4 De-multiplexer**:**

1x4 De-Multiplexer has one input I, two selection lines, S1 & S0 and four outputs Y3, Y2, Y1 & Y0. The block diagram of 1x4 De-Multiplexer is shown in the following figure.

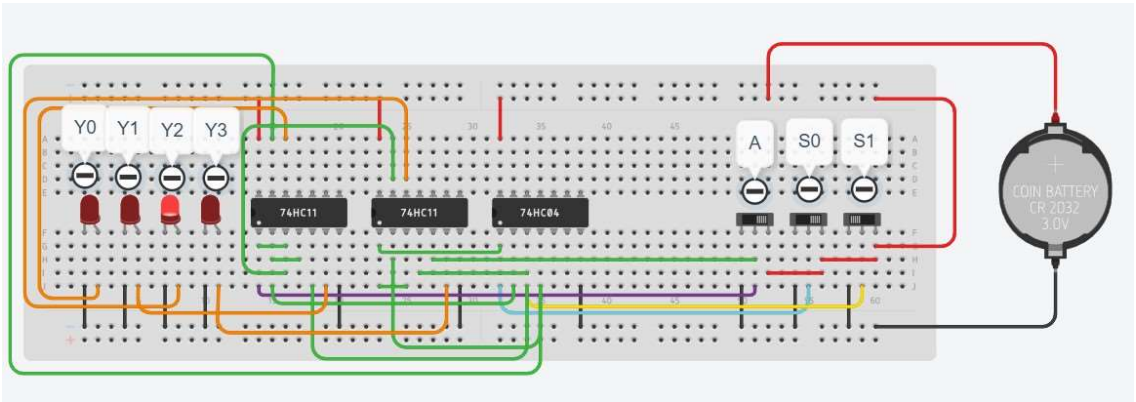
Block Diagram:



Truth Table:

Selection Inputs		Outputs			
S_1	S_0	Y_3	Y_2	Y_1	Y_0
0	0	0	0	0	1
0	1	0	0	1	0
1	0	0	1	0	0
1	1	1	0	0	0

Tinkercad:



De-multiplexer using AND, NOT gates with inputs S0 = 1, S1 = 0