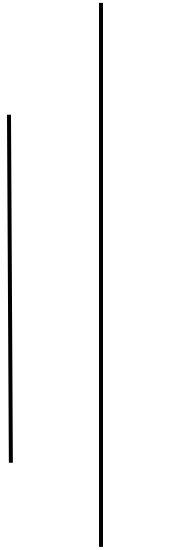




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Lab no: 7 of Digital logics

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LAB 6: Demultiplexer

Objective:

- To know about demultiplexer and how to implement it.

Discussion:

The function of the Demultiplexer is to switch one common data input line to any one of the 4 output data lines A to D. As with the multiplexer the individual solid-state switches are selected by the binary input address code on the output select pins “a” and “b” as shown.

Demultiplexer:

A demultiplexer (or demux) is a circuit that receives information on a single line and transmits this information on one of 2^n possible output lines. The selection of a specific output line is controlled by the bit value of n selection lines. A decoder with an enable input can function as a demultiplexer. Here enable input and input variable for decoder is taken as data input line and selection line for the demultiplexer.

1-to-4 De-multiplexer:

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	1	0	0

The Boolean function for this 1-to-4 demultiplexer (demux) above outputs A to D and data select lines a, b is given as:

$$Y_3 = s_1 s_0$$

$$Y_2 = s_1 s_0'$$

$$Y_1 = s_1' s_0$$

$$Y_0 = s_1' s_0'$$

The function of the demultiplexer (demux) is to switch one common data input line to any one of the 4-output data line A to D in our example above. As with the multiplexer the individual solid-state switches are selected by the binary input address code on the output select pins “a” and “b” as shown.

As with the previous MUX circuit, adding more address line inputs, it is possible to switch more outputs giving a 1-to- 2^n data line outputs. Some standard DEMUX has an additional enable output which prevents the input from being passed to the selected output. The implementation of the Boolean expression above using individual logic gates would require the use of six individual gates consisting of AND and NOT gates as given below:

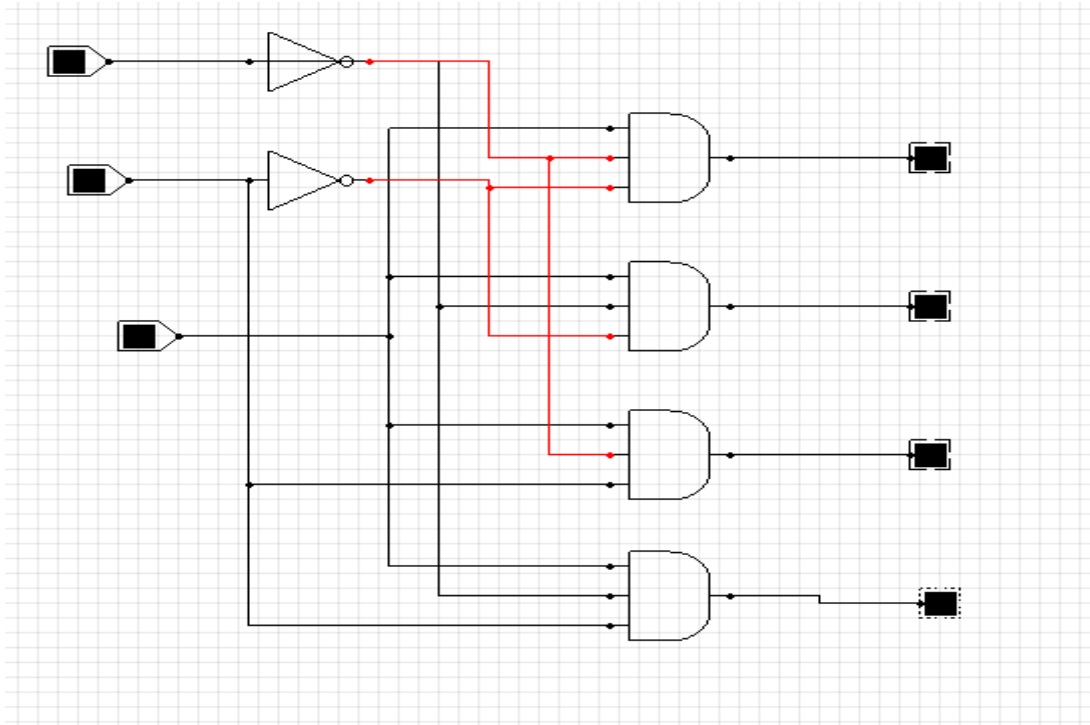
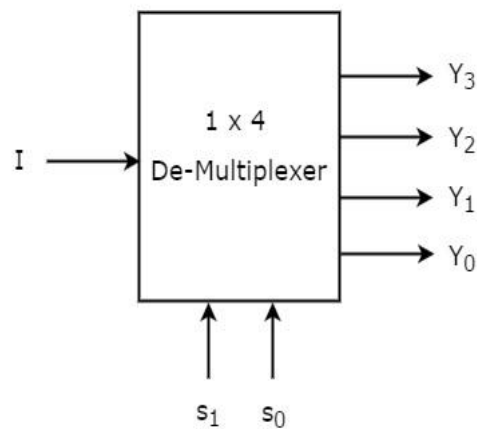


Fig: logic diagram of 1-to-4 demultiplexer



As with MUX, we can also use the DEMUX to digitally control the gain of an operational amplifier as shown.