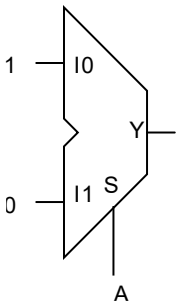
EEE/CPE 64 PAL Worksheet

MUX WORKSHEET

1) Can MUX be used as a universal gate?

Example 1) Find which gate the 2:1 mux represents,

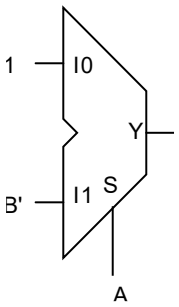


$Y = S'IO + S\,I1$

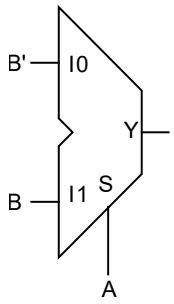
$Y = A'.1 + A\,.\,0$

$Y = A'$ (NOT GATE)

2) Find which gate the 2:1 mux represents,



3) Find which gate the 2:1 mux represents,



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Boolean function implementation by using MUX:

For implementing any Boolean function of n- variables with 2^n : 1 MUX, We can follow the below procedure,

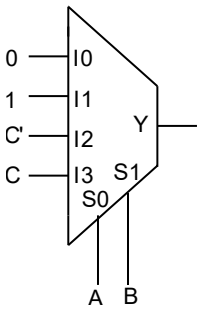
1) Express the function in its sum of products (SOP) form.
2) In the ordered sequence of n - variables, connect (n – 1) variables to the select line and the single highest order position variable to the input line with complemented or uncomplemented form including 0 and 1.
3) List the inputs of MUX (all the minterms) in two rows. The first row lists all those minterms where single variable is complemented and then second row with uncomplemented form.
4) Circle all the minterms of the function and inspect each column separately.
5) If two minterms in a column are not circled, apply '0' to the corresponding MUX input.
6) If two minterms are circled, apply '1' to the corresponding MUX input.
7) If one minterm is circled (either upper row or lower row), then its front value is the corresponding MUX input.

Example 2) Implement $f(A,B,C) = \sum m(0,1,4,6,7)$ by using 4:1 MUX

A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

A and B => select lines, c =>input.

	I0	I1	I2	I3
C'	[0]	2	[4]	[6]
C	[1]	3	5	[7]
	1	0	C'	1



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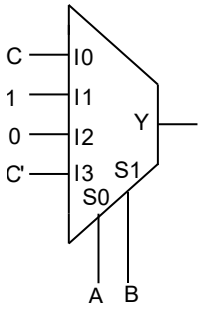
4) Implement $f(A,B,C) = \sum m(2,3,4,7)$ by using 4:1 MUX.
5) Implement $f(A,B,C) = \sum m(1,5,6,7)$ by using 4:1 MUX.

6) Find the output of the function $f(A,B,C)$ = ??? given by MUX.



7) Implement the following Boolean function with a 4: 1 multiplexer and external gates.

   $F\ (A,B,C,D)\ = \sum(0,8,10,11,12,13,14,15)$

   Connect inputs A and B to the selection lines. The input requirements for the four data lines will be a function of variables C and D. These values are obtained by expressing F as a function of C and D for each of the four cases when AB = 00, 01, 10, and 11. These functions may have to be implemented with external gates.

8) The logic function $F = AC + ABD + ACD$ is to be realized using an 8 to 1 multiplexer. Use A, C and D as control inputs.
9) A Demultiplexer has how many inputs?
10) A Demultiplexer with n select lines has ___ outputs?