

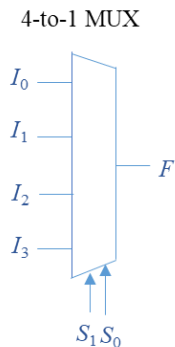
Name _____ Student ID _____ Colleges & Schools _____ Department _____

Homework Unit 9

1. Use 4-to-1 multiplexer and a minimum number of external gates to realize the function

$$F(w, x, y, z) = \sum m(3, 4, 5, 7, 10, 14) + \sum d(1, 6, 15).$$

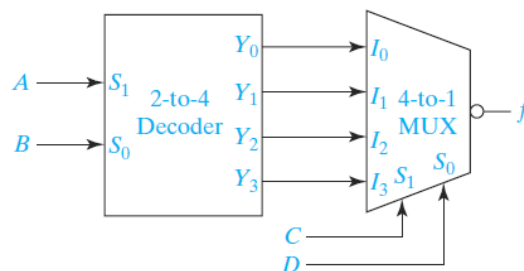
The inputs are only available uncomplemented.



2. Realize a BCD to excess-3 code converter using a 4-to-10 decoder with active low outputs and a minimum number of gates.

BCD input				Excess-3			
A	B	C	D	f_0	f_1	f_2	f_3
0	0	0	0	0	0	1	1
0	0	0	1	0	1	0	0
0	0	1	0	0	1	0	1
0	0	1	1	0	1	1	0
0	1	0	0	0	1	1	1
0	1	0	1	1	0	0	0
0	1	1	0	1	0	0	1
0	1	1	1	1	0	1	0
1	0	0	0	1	0	1	1
1	0	0	1	1	1	0	0

3. The circuit below has a 2-to-4 decoder with active high outputs connected to a 4-to-1 MUX with an active low output.



Derive a minimum SOP or a minimum POS expression for the output $f(A, B, C, D)$.

4. Braille is a system which allows a blind person to read alphanumerics by feeling a pattern of raised dots. Design a circuit that converts BCD to Braille. The table shows the correspondence between BCD and Braille.

- Use a multiple-output NAND-gate circuit.
- Use a PLA. Give the PLA table.
- Specify the connection pattern for the PLA.

<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>W</i> <i>X</i>	
				<i>Z</i>	<i>Y</i>
0	0	0	0	.	:
0	0	0	1	.	
0	0	1	0	:	
0	0	1	1	.	.
0	1	0	0	.	:
0	1	0	1	.	.
0	1	1	0	:	.
0	1	1	1	:	:
1	0	0	0	.	.
1	0	0	1	.	.

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<i>ABCD</i>	<i>WXYZ</i>
0000	0111
0001	1000
0010	1001
0011	1100
0100	1110
0101	1010
0110	1101
0111	1111
1000	1011
1001	0101