Computer Circuit Fundamentals (Lab 9)

Decoders

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Computer Circuit Fundamentals
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OBJECTIVES

➢ To understand how decoders function.
➢ To create decoders using basic gates.
➢ To understand the function of the 74LS139.

DESIGN

Experiment

➢ There were three experiments conducted in this lab. The first one was to test the functions of a 1-bit comparator. The second one was to test the functions of a 2-bit comparator. The third one was the same as the second, but instead using the proper 74139 chip for our testing. The min term circuit was created using basic gates. The max term circuit was created using only NAND gates. Following the max term NAND circuit, we compared results between that circuit and the results from using the 74139 chip.

SCHEMATICS

Min Term Generator Logic Circuit
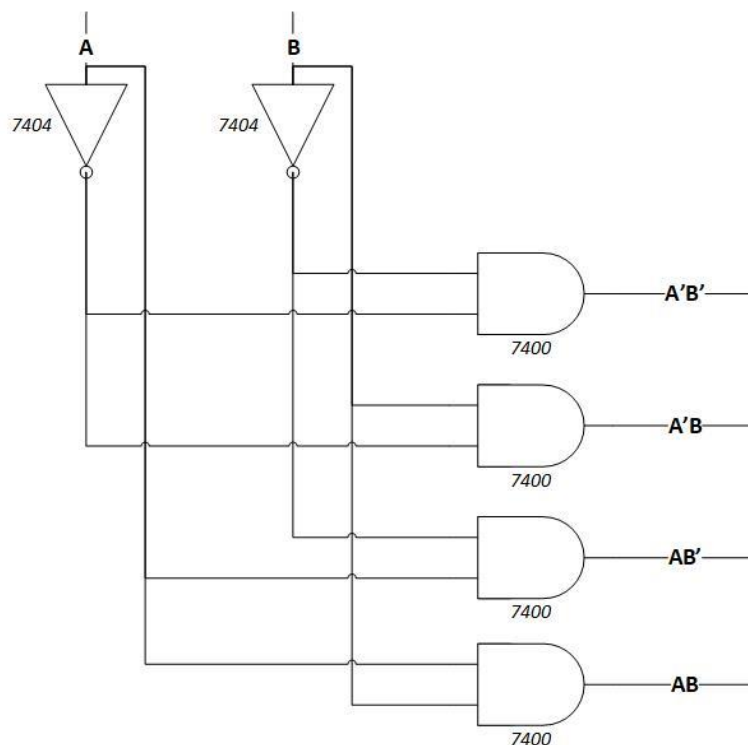
Input		Output			
A	B	Y0	Y1	Y2	Y3
0	0	1	0	0	0
0	1	0	1	0	0
1	0	0	0	1	0
1	1	0	0	0	1

$Y0 = (AB)'$

$Y1 = (A'B)$

$Y2 = AB'$

$Y3 = AB$

Max Term Generator Logic Circuit
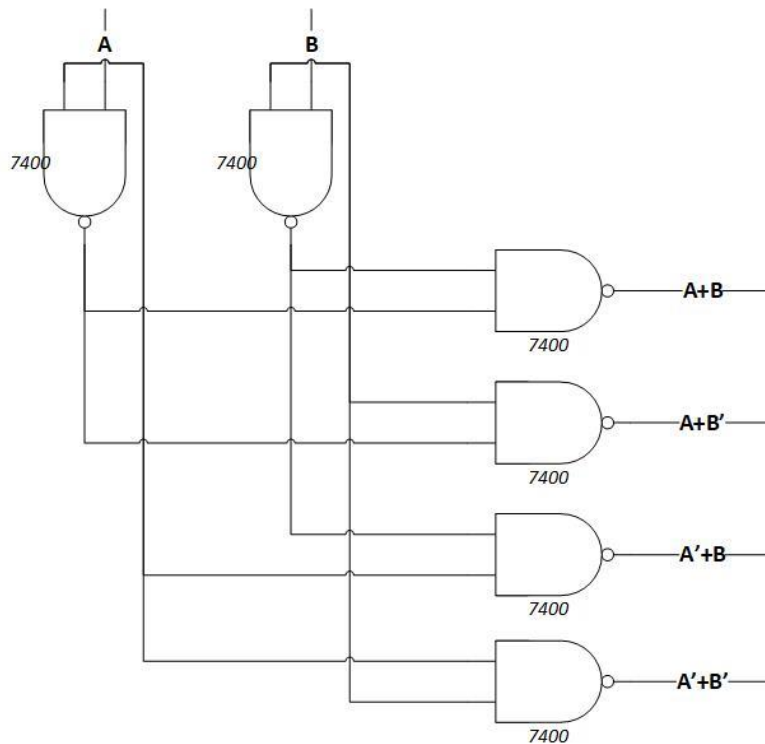
Input		Output			
A	B	Y0	Y1	Y2	Y3
0	0	0	1	1	1
0	1	1	0	1	1
1	0	1	1	0	1
1	1	1	1	1	0

Y0 = A+B

Y1 = A+B'

Y2 = A'+B

Y3 = A'+B'

QUESTIONS

Questions from the Experiment

2:4) The Boolean expressions have been created and are under "Schematics" under the 2-bit comparator truth table. The circuit has been implemented using NAND gates and the logic diagram could be found under "Schematics". The implemented circuit for the max generator was shown to the instructor.

2) The max term generator logic was tested using the 74139 chip.