EEL 3701C - Digital Logic & Computer Systems

Lab 0 Report

Due one week after regular lab completion.
Delay penalty: 10% per week, maximum 40%

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Prelab Report

Prelab Design and Implementation

The design of this lab very methodical, I opened the document outlining the lab, and I got the electric components from the box and laid them out on the table. On the other hand, the implementation was messy. The tablespace got cluttered very quickly, which is something I need to work on next time. However, I followed a linear arrangement on the breadboard which helped keep my train of thought in line. My biggest obstacle during the prelab was understanding the inverter. I assumed that it needed a constant supply of electricity to maintain an inverted signal, but that was not true. Figuring this out took me quite a bit of time because I did not consider applying the neutral charge to the input of the inverter. I felt happy about being able to use my Arduino kit components again, it had been so long since I used them last.

Prelab Homework

Reading Summary

Safety is common sense in the lab. Students must pay close attention to directions, warnings, and labels when working with components. Without proper safety measures, a student can injure themselves and those around them. Protective clothing must be worn when dealing with any high danger materials/components, and food/drinks must be out of harm's way, especially when things are plugged in.

To assemble the electrical components, rules must be followed do the dot. Any mistake in assembly can result in a faulty component, which can damage the rest of the components when connected. To ensure that assembly is done correctly, students must learn how to solder with mastery. To learn, Youtube is available to show students how to and how not to do it.

Part 1

Problem 1

A (High/Low)	Y (Volts)	Y (High/Low)
High	0.0	Low
Low	2.8	High

Problem 2

Input		Output				
A	B	7400	7402	7408	7432	7486
0	0	1	1	0	0	0
0	1	1	0	0	1	1
1	0	1	0	0	1	1
1	1	0	0	1	1	0
Identify Gate Type		2-input NAND Gate	2-input NOR Gate	2-input AND Gate	2-input OR Gate	2-input Ex-OR

Problem 3

Input			Output	
A	B	C	7410	7411
0	0	0	1	0
1	0	0	1	0
0	1	0	1	0
0	0	1	1	0
1	1	0	1	0
1	0	1	1	0
0	1	1	1	0
1	1	1	0	1
Identify Gate Type			3-input NAND Gate	3-input AND Gate

Part 2

Problem 4

Input			Output
A	B	C	X
0	0	0	0
1	0	0	1

0	1	0	0
0	0	1	1
1	1	0	1
1	0	1	1
0	1	1	0
1	1	1	1

Postlab Report

Problem Statement:

This labs goals were to get me to understand how a breadboard and logic gates work. Further, it assisted with finding datasheets for components. The inputs of the systems were simply electricity, high and low signals. The outputs were the emission or lack thereof of photons from an LED, to indicate that signal was coming through or not. The function of the system was simple, indicate flow or no flow of electricity.

Design:

I used nearly every gate provided to me (with the exception of a few that were missing) to learn how they were used. Wires and LED's were also used to transport and indicate signals. This was a relatively simple lab, so there were not a lot of design decisions to make.

Implementation:

As stated in the prelab, implementing the lab was a bit messy. Once the breadboard was set up with the first gate, the rest of them were easy because of similar internal wiring. The outputs were a bit confusing at first, because they were opposite of what I expected, but once I figured out how the DIP switch worked, I understood why the output was so and the rest of the lab was smooth sailing.

Testing:

This lab was tested with a simple LED light and a multimeter. Everything worked as expected once I understood how it worked. Early in the lab, I was very confused to see how the LED was behaving as I got near it and touched it. However, after understanding that resistors were required before every main component, I had very little trouble reaching the end of this lab.

Conclusions:

I explored the fundamental possibilities of electrical control. This lab began as a big challenge, which quickly became easy as I completed check boxes that I should have completed beforehand. In the future, I plan to keep my workspace organized and watch all the videos in advance to get the most of the lab in the shortest amount of time.

Appendix
Images below are the different combinations of the signal into the AND gate