**CDA3201L Lab #2**

**Introduction to Lab Equipment**

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**Introduction**

In this lab, we had to assemble a circuit made of 3 inputs and 6 NAND gates. We were taught how to properly use a breadboard, IC, wiring, LEDs, and resistors. Our goal was to recreate the schematic given in our worksheet and understand its practicality and functionality.

**Methods and Materials**

* About 20 wires, varying in length
* 2 QUAD 2-INPUT NAND GATE ICs
* 1 Red LED
* 1 470 ohm resistor
* Power supply

1. First we connect 4 wires to the positive and negative lines and when we have to test the circuit, we connect them to the power supply.
2. Place 2 of the NAND gate ICs on the breadboard. One side of the pins should be placed on one side of the bridge and the second set on the other side of the bridge. Do this for the second IC. We connect pin 7 and 14 of the ICs to the positive and negative holes so they are powered when we test the circuit
3. We start by determining the inputs of A, B, and C. We set aside 3 distinguishable wires and 3 holes on the breadboard for these inputs. The first NAND gate’s input ask for A NAND B, so we connect wires from the corresponding input holes to pins 1 and 2 of the first IC. The second NAND gate’s inputs ask for B NAND C, so we connect wires from the corresponding input holes to pins 13 and 12. The third NAND gate’s inputs ask for A NAND C, so we connect wires from the corresponding input holes to pins 10 and 9. The schematic then has us take the output from A NAND B and B NAND C, so we connect the outputs of those gates, which are pin 3 and pin 11 to pin 4 and 5. We then have to NAND the output, so we take two wires and connect pin 6 to the second IC’s pin 1 and 2. We then take output of A NAND C which is pin 8 and connect it to pin 13 of the second IC and connect pin 3 of the second IC to pin 12.
4. To visualize our output, we connect the long side of the LED to pin 11 of the second IC and connect the shorter side of the LED to a hole that is not near an IC. We connect the 470 ohm resistor to the same column as the LED and the negative pinhole.
5. To test the circuit, we take our 3 input wires and attach them to the positive pinholes for 1 and negative pinholes for 0. We then connect the power supply to the circuit and observe the LED.

**Result**

We noticed that the pins would light up when any 2 or 3 of the 3 inputs were connected to positive. The boolean expression for this circuit was AB + BC + AC. The results we received were expected, as we constructed a truth table and minimized the boolean expression for this circuit. I think that because our results matched with our previous expectations, it reinforced our confidence in our answers and their correctness.

**Conclusion**

In this experiment we recreated the circuit schematic given to us on a breadboard. We learned how to properly use an IC and how to properly set up the breadboard. We were taught how to correctly create connections with wiring and how to go about setting up the schematic. A problem we encountered during the experiment was with the power supply. I had to constantly reexamine the circuit but it turns out the power supply had a second toggle to control the power.