**Name of the Experiment:**

**Design and Construct a Two Bit Comparator Circuit with Two Input A and B; and Two output x and y; when A>B, x=1 and y=0; when A<B, x=0 and y=1; when A=B, x=0 and y=0.**

**Theory:** A comparator is a circuit which takes two sets of logical inputs, each set of which represents a binary number, and produces logical output(s) indicating the result of comparison between the two numbers, that is, which number is bigger or smaller or if both number is equal. A two bit comparator is a comparator circuit which takes two binary numbers as logical inputs, each consisting of two bits and returns the result of the comparison between the two numbers in logical output(s).

In this experiment we will construct a comparator circuit that has four logical inputs in total (A\_1,A\_0,B\_1,B\_0) and two logical outputs (x,y). We will construct the circuit as shown in figure (3a).

**Instruments:**

1. Trainer Board,
2. Connecting wires,
3. IC’s: IC-7404 (NOT gates), IC-7432 (OR gates), IC-7408 (AND gates) (two).

**Procedure:**

1. First, we placed the IC’s on the bread board of the trainer board. The IC’s were placed on the gap(s) of the bread board so that all the pins were disconnected to each other.
2. Then we connected +5V source to each IC’s pin-14, ground voltage to each IC’s pin-7.
3. Next, we connected the four switches (inputs) and two small red bulbs (outputs) with the IC’s such that the connection was equivalent to the circuit in figure (3a).
4. Then we used the four switches to determine the values of the outputs for different values of the inputs. We wrote down these values in the truth table.

**Result:**

For A>B, we observed x=1, y=0. For A<B, we observed x=0, y=1. For A=B we observed x=0, y=0.

//Truth Table, equation, K-map, simplified equation.

**Discussion:** Through the whole experiment we constructed a comparator circuit and understood it’s functions. However, we faced some problems while doing the experiment. To realize the comparator we needed four specific IC’s in total. But we received a wrong IC and it took us some time to find out which IC was the wrong one. We analyzed the output’s from all the gates to find if the gate is working properly. This way we successfully found the wrong IC and continued with a new correct one.