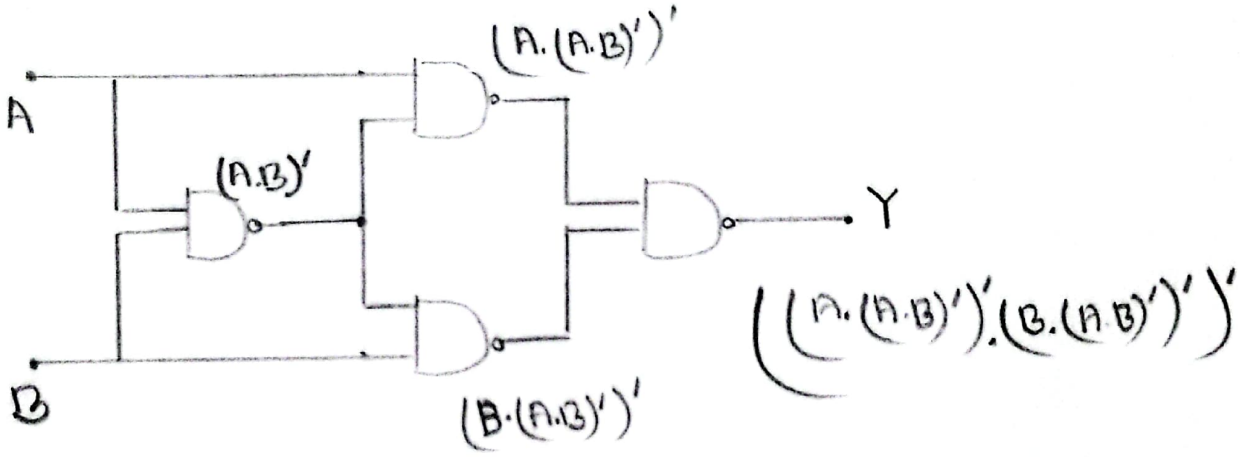
Experiment name : Applications of Boolean Algebra

Required components and equipment:

- Breadboard
- ~~Come~~
- Connecting wires
- IC 7400 (NAND Gate)

Experimental Setup:




Results and Discussions:

Here the Boolean equation for the output is $((A(AB)')'(B(AB)')')'$. Using some boolean algebra properties we can easily simplify the equation and find the output.

Now, $((A.(AB)').(B.(AB))')'$

$= ((A.(AB)')')' + ((B.(AB)')')'$ [Demorgan Theorem]

$= A(AB)' + B(AB)'$ $[\because (A')' = A]$

$= A(A'+B') + B(A'+B')$ [Demorgan Theorem]

$= AA' + AB' + BA' + BB'$

$= 0 + AB' + BA' + 0$ $[\because A.A' = 0]$

$= AB' + BA'$

| A | B | A' | B' | A'B | AB' | A'B+AB' |
|---|---|---|---|---|---|---|
| 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| 0 | 1 | 1 | 0 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 |

Truth Table

| A⊕B |
|---|
| 0 |
| 1 |
| 1 |
| 0 |

Truth table of XOR Gate

The Boolean equation for this output is $Y = (A.(AB'))'.(B.(AB))'$. After simplifying the boolean equation we get $(AB'+BA')$. The curcuit's function is identical to a single gate which is XOR Gate.