# Lab Report 1

## Materials:

Logic Box, Gates – AND, NAND, OR, NOR, Inverter, Exclusive OR, Exclusive NOR, wire.

## Method:

1. Build each of the circuits shown below.
2. Connect the inputs to the switches on the logic boxes labeled below.
3. Connect the output to the LED.
4. Record the truth table results for each part.



**Circuit 1: AND Gate**



**Circuit 2: NAND Gate**



**Circuit 3: OR Gate**



**Circuit 4: NOR Gate**



**Circuit 5: Inverter**



**Circuit 6: Exclusive OR**



**Circuit 7: Exclusive NOR**

## Results:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Circuit 1: AND Gate** | | |  | **Circuit 2: NAND Gate** | | |
| **S0** | **S1** | **L6** | **S0** | **S1** | **L6** |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 | 0 |
| **Table 1** | | | **Table 2** | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Circuit 3: OR Gate** | | |  | **Circuit 4: NOR Gate** | | |
| **S0** | **S1** | **L6** | **S0** | **S1** | **L6** |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 | 0 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 |
| **Table 3** | | | **Table 4** | | |

|  |  |
| --- | --- |
| **Circuit 5: Inverter** | |
| **S0** | **L6** |
| 0 | 1 |
| 1 | 0 |
| **Table 5** | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Circuit 6: XOR** | | |  | **Circuit 7: XNOR** | | |
| **S0** | **S1** | **L6** | **S0** | **S1** | **L6** |
| 0 | 0 | 0 | 0 | 0 | 1 |
| 0 | 1 | 1 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 | 0 | 0 |
| 1 | 1 | 0 | 1 | 1 | 1 |
| **Table 6** | | | **Table 7** | | |

## Conclusion:

* **AND Gate:** All True is High otherwise Low.
* **NAND Gate:** All True is Low otherwise High. *Opposite of AND Gate.*
* **OR Gate:** All False is Low. Any 1 is High.
* **NOR Gate:** All False is High. Any 1 is Low. *Opposite of OR Gate.*
* **Inverter Gate:** Only 1 input. Inverts High to Low or vice versa.
* **XOR Gate:** All True is Low and All False is Low. 1 True and not the other.
* **XNOR Gate:** All True is High and All False is High. *Opposite of XOR Gate.*

**Henceforth, we can establish that the practical lab results (table 1 to 7) for all the gates (circuit 1 to 7) correspond with the theory.**