
Lab – 01: Building and Testing an AND Gate using 7408 IC and DIP Switches

Objective

Understand the operation of the AND gate and build a circuit using the 74xx IC, DIP switches, resistors, LEDs, and a power supply.

Materials

- Power Supply (or Battery as an alternative)
- 7408 IC (Quad 2-input AND gate from the 74xx TTL family)
- Resistor (e.g., 330Ω for LED current limiting)
- LED (Light Emitting Diode)
- DIP Switch (2-switches for input)
- Breadboard and connecting wires.

Background

- DIP Switch: A compact set of manual switches used to set configurations. Each switch in a DIP switch is a single pole, single throw (SPST) toggle or rocker switch.
- LED Polarity: LEDs are diodes, which means they allow current to flow in one direction. The longer leg is the positive (anode) side, and the shorter leg is the negative (cathode) side. Additionally, the flat edge on the LED's base indicates the cathode.

Procedure

- Setting up the Power Supply:
 - Connect the power supply to the breadboard ensuring correct polarity.
 - Alternatively, use a battery as a power source.
- Configuring the DIP Switch:
 - Connect the DIP switch to the breadboard.
 - Connect one side of each switch to the positive rail (Vcc) and the other side to the input pins of the 7408 IC.
- Setting up the AND Gate:
 - Place the 7408 IC on the breadboard.
 - Connect the output of the DIP switch to the input pins of the AND gate on the 7408 IC.
- Connecting the Resistor and LED:
 - Connect a 330Ω resistor to the positive leg (anode) of the LED.
 - Connect the other end of the resistor to the output pin of the 7408 IC.
 - Connect the negative leg (cathode) of the LED to the ground (GND).
- Testing the AND Gate:
 - Toggle the DIP switches to represent different input combinations and observe the LED's behavior.

Truth Table for AND Gate:

Input A Input B Output (A AND B)

0 0 0

0 1 0

1 0 0

1 1 1

Schematic Diagram:

[Here, you would typically insert a drawn schematic diagram showing the connections between the power supply, DIP switch, 7408 IC, resistor, and LED.]

Observations

The LED lights up only when both switches on the DIP switch are toggled on, demonstrating the AND logic operation.

Conclusion

Students should have successfully built and tested an AND gate using the 74xx IC and DIP switches, demonstrating the principle of logical AND operation.