

**The University of Azad Jammu and Kashmir, Muzaffarabad**

Department of Software Engineering

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| Lab No | 03 |

**AND GATE**

**Procedure to Connect 7408 (AND Gate IC) in EWB**

1. Open EWB Software

* Start **Electronic Workbench** on your computer.

2. Place the 7408 IC

* Click on **Place** → **Component**.
* Go to the **TTL** or **Digital** library.
* Search and select **7408** (it’s the Quad 2-input AND gate).
* Place the 7408 IC onto the workspace.

3. Connect the Power Supply

* **Pin 14**: Connect it to **+5V** (power supply).
* **Pin 7**: Connect it to **Ground (GND)**.

This powers up the IC so it works properly.

4. Set up Inputs

* From **Inputs** menu, pick **Logic Switches**.
* Place **two switches** (one for each input).
* Connect:
  + One switch to **Pin 1** (Input A1).
  + One switch to **Pin 2** (Input B1).

5. Set up Output

* From **Indicators** menu, place an **LED**.
* Put a **330Ω resistor** in series with the LED (protects the LED).
* Connect:
  + **Pin 3** (Output Y1) → Resistor → LED → Ground.

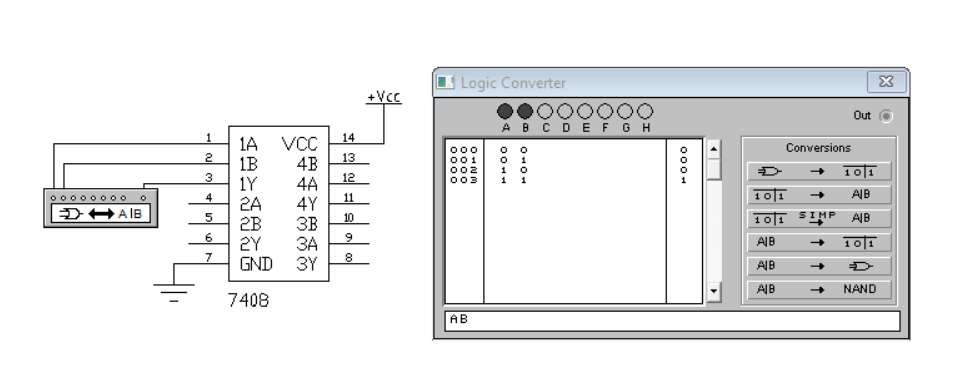
6. Start Simulation

* Click **Run** (or Start Simulation button).

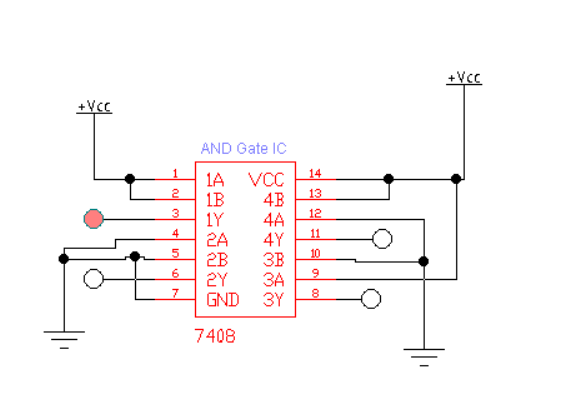
7. Test the Circuit

* Use the switches to turn inputs ON or OFF.
* Observe the LED:
  + LED **ON** = Output is HIGH (1).
  + LED **OFF** = Output is LOW (0).
* Try all combinations (00, 01, 10, 11) and record the results.

Truth Table:

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Output:

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**NOR GATE**

**Procedure to Connect 7402 (NOR Gate IC) in EWB**

1. Open EWB Software

* Start **Electronic Workbench** on your computer.

2. Place the 7402 IC

* Click **Place → Component**.
* Go to **TTL** or **Digital** library.
* Search for **7402** (Quad 2-input NOR gates).
* Place the **7402 IC** onto your workspace.

3. Connect Power to the IC

* **Pin 14**: Connect to **+5V** (positive power supply).
* **Pin 7**: Connect to **Ground (GND)**.

⚡ Powering the IC is necessary to make it work properly.

4. Set Up Inputs

* From the **Inputs** section, place **two logic switches**.
* Connect:
  + First switch to **Pin 1** (Input A1).
  + Second switch to **Pin 2** (Input B1).

5. Set Up Output

* From the **Indicators** section, place an **LED**.
* Add a **330Ω resistor** between the output and LED.
* Connect:
  + **Pin 3** (Output Y1) → **Resistor** → **LED** → **Ground**.

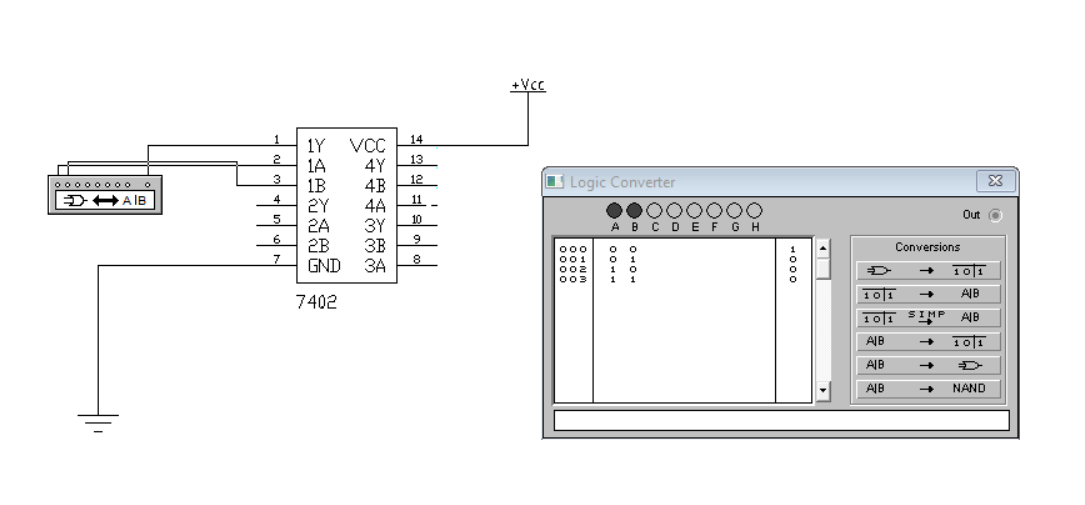
6. Start the Simulation

* Click **Run** to start the simulation.

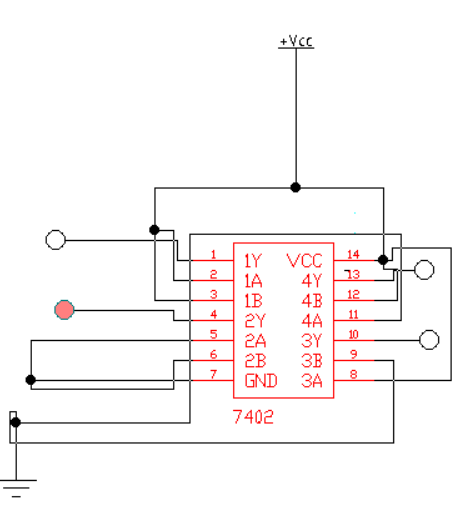
7. Test and Observe

* Change the switches to different combinations (00, 01, 10, 11).
* Watch the LED:
  + LED **ON** = Output is HIGH (1).
  + LED **OFF** = Output is LOW (0).
* Write down the results to create the **truth table**.

Truth table:

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Output:

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**NOT GATE**

**Procedure to Connect 7404 (NOT Gate/Inverter IC) in EWB**

1. Open EWB Software

* Start **Electronic Workbench** on your computer

2. Place the 7404 IC

* Click on **Place → Component**.
* Find the **TTL** or **Digital** library.
* Search for **7404** (Hex Inverter/NOT gates).
* Place the **7404 IC** onto your workspace.

3. Connect Power to the IC

* **Pin 14**: Connect to **+5V** (positive power).
* **Pin 7**: Connect to **Ground (GND)**.

⚡ This step powers the IC so it works properly.

4. Set Up Input

* From the **Inputs** menu, place **one logic switch**.
* Connect the switch to **Pin 1** (Input A1).

5. Set Up Output

* From the **Indicators** menu, place an **LED**.
* Add a **330Ω resistor** between the output and LED.
* Connect:
  + **Pin 2** (Output Y1) → **Resistor** → **LED** → **Ground**.

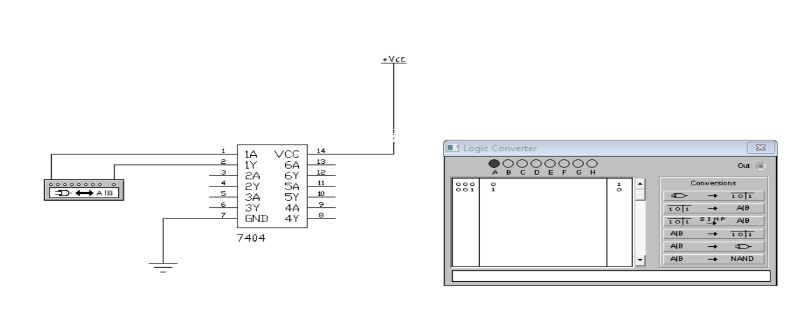
6. Start the Simulation

* Click **Run** to start simulation.

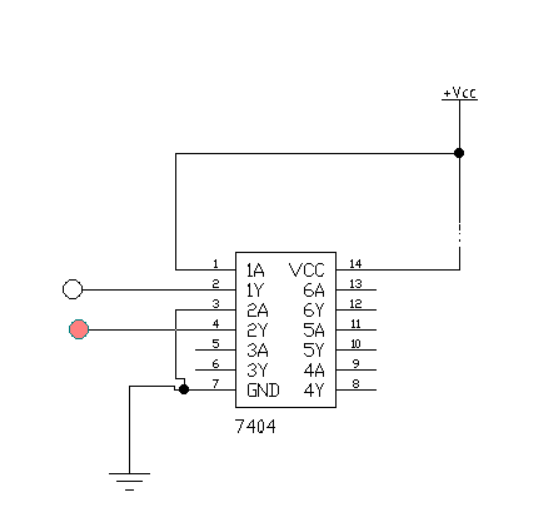
7. Test and Observe

* Turn the switch ON and OFF (0 or 1).
* Observe the LED:
  + If input is **0** → LED turns **ON** (Output 1).
  + If input is **1** → LED turns **OFF** (Output 0).

Truth table:

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Output:

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