

The University of Azad Jammu and Kashmir, Muzaffarabad.



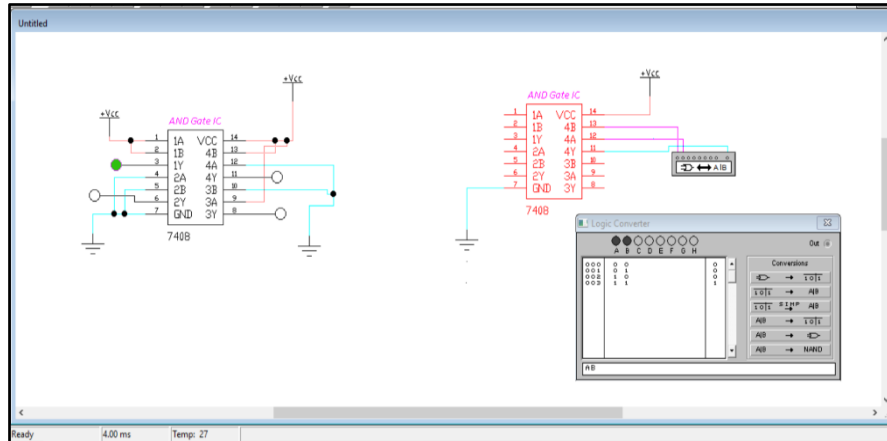
**Computer Architecture &
Logic Design**

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|-------------------------|--------------------|
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Department of Software Engineering

Verification of Basic Logic Gates & their Truth tables

And Gate using IC:



Procedure to Connect 7408 (AND Gate IC) in EWB

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.

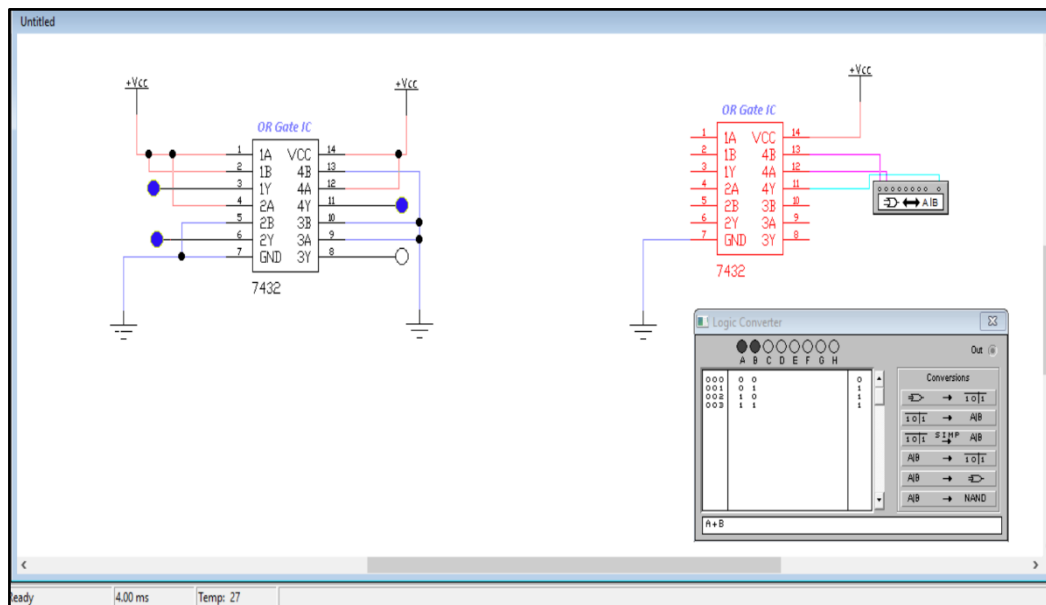
6. Start Simulation

- 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.

OR Gate using IC:



Procedure to Connect 7432 (OR Gate IC) in EWB

1. Open EWB Software

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

2. Place the 7432 IC

- Click **Place** → **Component**.
- Find the **TTL** or **Digital** family.
- Search for **7432** (Quad 2-input OR gates).
- Place the **7432 IC** on your workspace.

3. Connect Power to the IC

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

✂ This step powers the IC so it can work correctly during simulation.

4. Set Up Inputs

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

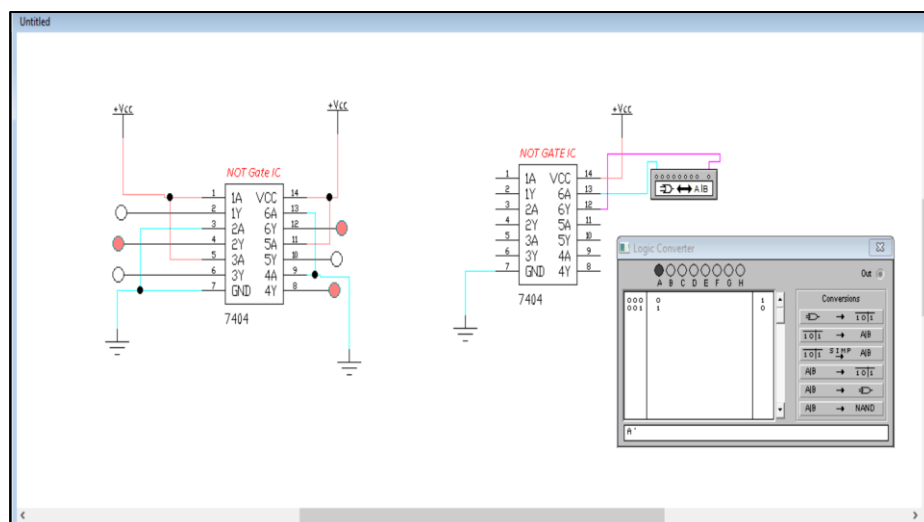
6. Start the Simulation

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

7. Test and Observe

- Toggle the switches through different combinations (00, 01, 10, 11).
- Watch the LED:
 - LED **ON** = Output is HIGH (1).
 - LED **OFF** = Output is LOW (0).
- Record the output to make your **truth table**.

NOT Gate using IC:



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**.

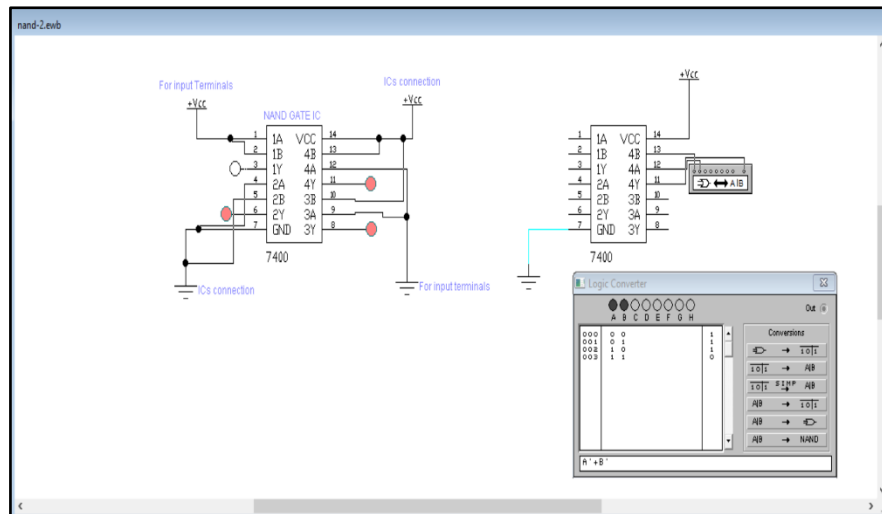
6. Start the Simulation

- 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).
- Record the behaviour to create the **truth table**.

NAND Gate using IC:



Procedure to Connect 7400 (NAND Gate IC) in EWB

1. Open EWB Software

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

2. Place the 7400 IC

- Go to **Place** → **Component**.
- Find the **TTL** or **Digital** library.
- Search for **7400** (Quad 2-input NAND gate).
- Drag and place the IC on your workspace.

3. Connect Power to the IC

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

⚡ This powers up the IC so it works properly in the simulation.

4. Setup Input Connections

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

5. Setup Output Connection

- From the **Indicators** menu, place an **LED**.

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**.

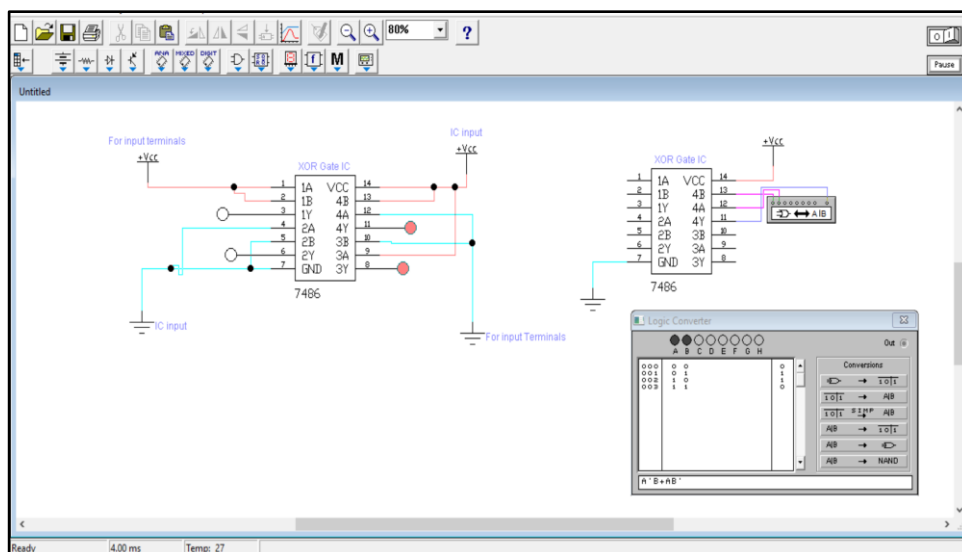
6. Start the Simulation

- 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**.

XOR using IC:



Procedure to Connect 7486 (XOR Gate IC) in EWB

Open EWB Software

Launch **Electronic Workbench** on your computer.

2. Place the 7486 IC

- Go to **Place** → **Component**.
- Find the **TTL** or **Digital** section.
- Search for **7486** (Quad 2-input XOR gates).
- Drag and place the **7486 IC** onto your workspace.

3. Connect Power to the IC

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

✂ This is needed to power the IC so it works during simulation.

4. Set Up Inputs

- From the **Inputs** menu, place **two logic switches**.
- Connect:
 - One switch to **Pin 1** (Input A1).
 - One switch to **Pin 2** (Input B1).

5. Set Up Output

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

6. Start the Simulation

- Click the **Run** button to begin simulation.

7. Test and Observe

- Use the switches to test all input combinations (00, 01, 10, 11).
- Observe the LED:
 - LED **ON** = Output is HIGH (1).
 - LED **OFF** = Output is LOW (0).
- Record results to build the **truth table**.