**MAWLANA BHASHANI SCIENCE AND TECHNOLOGY UNIVERSITY**

SANTOSH, TANGAIL-1902



DEPARTMENT OF INFORMATION AND COMMUNICATION TECHNOLOGY

**Course Title: Digital Logic Design Lab**

**Course Code: ICT-2104**

**Lab Report on:** Implementation of XOR gate using basic gates

**Lab Report No: 03**

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| Submitted By | Submitted To |
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**Date of Performance:**

**Date of Submission:**

**Experiment No:** 03

**Experiment Name:** Implementation of XOR gate using basic gates

**Objectives:** To implement an XOR (Exclusive OR) gate using basic logic gates (AND, OR, and NOT) and verify its functionality by constructing the circuit and observing the truth table.

**Materials Required:**

* Breadboard
* Logic gates ICs (AND, OR, NOT)
* LEDs (for output visualization)
* Resistors (220Ω)
* Connecting wires
* Power supply (5V)
* Multimeter (optional, for testing)

**Procedures:**

**1. Component Preparation:**

* Gather all necessary components: AND gates (e.g., 74HC08), OR gates (e.g., 74HC32), NOT gates (e.g., 74HC04), LEDs, resistors, and a breadboard.

**2. Circuit Design:**

The XOR gate can be implemented using the following configuration:

* Use two AND gates, one OR gate, and two NOT gates.
* Connect the inputs A and B to the first NOT gate and the second NOT gate respectively.
* Connect A to the input of the first AND gate and the output of the second NOT gate.
* Connect B to the input of the second AND gate and the output of the first NOT gate.
* Connect the outputs of the two AND gates to the input of the OR gate.

**3. Wiring the Circuit:**

* Place all components on the breadboard according to the design.
* Use connecting wires to link the gates as described in the circuit design.
* Connect the LEDs to the output of the OR gate to visualize the result.

**4. Power Supply:**

* Connect the power supply to the circuit, ensuring correct voltage levels.

**5. Testing:**

* Apply different combinations of inputs (A and B) and observe the output.
* Record the results in the truth table.

**Circuit Diagram:**

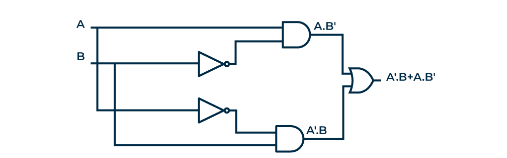
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Fig: XOR gate using AND, OR & NOT gates

**Truth Table:**

|  |  |  |
| --- | --- | --- |
| **A** | **B** | **Y=A ⊕ B** |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 0 | 0 | 0 |
| 1 | 1 | 0 |

**Discussion:**

The XOR gate is unique in that it outputs true (1) only when the number of true inputs is odd. This behavior is effectively demonstrated by the constructed circuit. By combining AND, OR, and NOT gates, the XOR logic can be replicated. The results from the truth table align with the expected output of an XOR gate, confirming the successful implementation of the circuit.