# EXPERIMENT NO.: - 2

**AIM*:***To study NAND and NOR gates as Universal Gates.

**THEORY:**

Any Gate is a logic circuit with one output and one or more inputs. The output signal of any gate occurs only for certain combination of input signals. Different types of gates are used in the digital circuit. AND neither gate, OR gate, NOR gate, NAND gate, NOT gate are the basic logic gates. Some gates are the combination of above basic gates. Such gates can be prepared by using discrete components like diodes, transistors, and resisters but nowadays, different ICs are used to have different gates. A power supply of +5 V is used to give input. This supply is also used to drive ICs. When power supply to the input is 'ON' we can say that logic level is at '1' and when power supply to the input is 'OFF' the logic level is said to be at '0' level.

**NAND GATE**:

It is a sequence of series combination of AND gate and NOT gate, known as NAND gate. The output of NAND gate is at ‘0’ level only when all the inputs are ‘1’ level. In rest of all the conditions of inputs the output will be at level ‘1’. IC 7400 can be used to get NAND gate. This IC has two input NAND gates, which are four in numbers. The truth table of NAND gate is given in the table.



|  |  |  |
| --- | --- | --- |
| **A** | B | OUTPUT |
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

**Practical Figure:**

**NOR GATE:**

It is a sequence of series combination of OR gate and NOT gate. The output of NOR gate is at level ‘1’ when all the inputs are at ‘0’ level. In rest of all the conditions of inputs the output is at ‘0’ level. IC 7402 can be used to get NOR gate. It neither has two input NOR gates, which are four in numbers. The truth table of NOR gate is given in table.

|  |  |  |
| --- | --- | --- |
| A | B | OUTPUT |
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |

**Practical Figure:**

**EQUIPMENTS REQUIRED:**

Trainer kit or Bread Board, Power Supply and LED’s.

**COMPONENTS REQUIRED:**

-ICs 7400, 7402

-Hook up wires

**PROCEDURE:**

1. Pull all switches at ‘0’ position.

1. Switch ON the power supply.
2. Test the truth table of different gates by changing the position of inputs (i.e. ‘1’ level means switch is ON & ‘0’ level means switch is OFF) and check the level of output (if LED glows it is at level ‘1’ and if LED doesn’t glow output is at level ‘0’).

**OBSERVATIONS:**

**CONCLUSION:**