# Experiment No. 1

Title: Implementation of basic logic gates using Universal gates.

Batch: B3 Roll No.: 16010422185 Experiment

No.: 1

Aim: To implement basic logic gates using Universal gates

**Resources needed:** Simulation Platform(Circuit Verse)

### Theory:

Logic gates are the basic building blocks of any digital system. It is an electronic circuit having one or more than one input and only one output. The relationship between the input and the output is based on a certain logic. Based on this, logic gates are named as AND gate, OR gate, NOT gate etc

Classification: The two types of gate are:

1: Basic or Fundamental Gates:

- OR gate
- AND gate
- NOT gate
- 2: Derived Gates:
  - NAND gate
  - NOR gate
  - X-OR gate
  - X-NOR gate

#### **Basic Gates:**

- OR gate: The OR gate has two or more inputs but only 1 output. If any or all the inputs are high, the output is high. If all the inputs are low, the output is low.
- AND gate: The AND gate has two or more inputs but only one output. If any or all inputs are low then output is also low. When all the inputs are high then only the output is high.
- NOT gate: The Not gate is a gate with only one input and one output. The output is always in opposite state of an input. A NOT gate is also called as Inverter because it performs inversion.

#### **Procedure:**

- a) Verify the truth tables of Basic and derived gates on the simulation platform.
- b) Design Basic logic gates using Universal gates ((NAND and NOR) using simulation platform.
- c) Verify the truth table for Basic gates by realizing them by using universal gates. (NAND and NOR) on a simulator.
- d) Paste the schematic of realization of basic logic gates using universal gates (to a pdf file.
- e) Create a document with a table giving the IC number used for each of the logic gate studied in the experiment, Outcomes, Conclusion.
- f) Please note every document uploaded as Lab Write Up should be labelled as Exp\_<No>\_<RollNo.pdf

#### **Observations and Results:**

a) Verify the individual circuit using the truth table method. (showing intermediate outputs).

K. J. SOMAIYA COLLEGE OF ENGG

b) Design basic logic gates using Universal Gates.

**Outcomes: 1)AND GATE-**

A	В	Y
0	0	0
0	1	0
1	0	0
1	1	1

### 2)OR GATE-

A	В	Υ
0	0	0
0	1	1
1	0	1
1	1	1

3)NOT GATE-

А	Υ
0	1
1	0

4)NOT GATE USING NAND

А	Υ
0	1
1	0

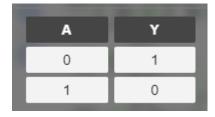
5)AND GATE USING NAND

A	В	Υ
0	0	0
0	1	0
1	0	0
1	1	1

6)OR GATE USING NANDOMAIYA COLLEGE OF ENGG

A	В	Υ
0	0	0
0	1	1
1	0	1
1	1	1

7)NOT GATE USING NOR



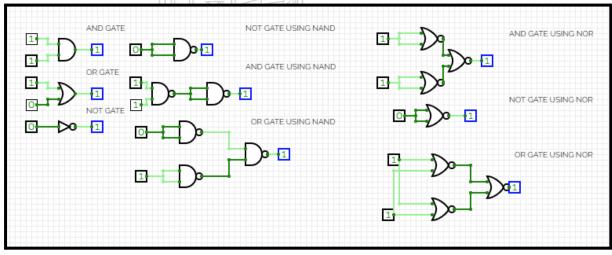
## 8) AND GATE USING NOR

A	В	Y
0	0	0
0	1	0
1	0	0
1	1	1

# 9)OR GATE USING NOR

A	В	Y
0	0	0
0	1	1
1	0	1
1	1	1

# 10) ALL BASIC AND DERIVED CIRCUITS



# 11)IC TABLE OF ALL LOGIC GATES-

Gate	IC No.
AND	7408
OR	7432
NOT	7404
NOR	7402
<b>NAND</b>	<b>7400</b>
<b>EX-OR</b>	7486
EX-NOR	747266

### **Conclusion:**

In this experiment we showcased the truth table and logic circuits of all logic gates and also implemented basic logic gates using universal logic gates .

Grade: AA / AB / BB / BC / CC / CD /DD

## Signature of faculty in-charge with date

### **References:**

### **Books/ Journals/ Websites:**

1. R. P. Jain, "Modern Digital Electronics", Tata McGraw Hill.

2. http://www.allaboutcircuits.com/worksheets/basic-logic-gates/

