Experiment No. 1

Title: Implementation of basic logic gates using Universal gates.

Batch: B1 **Roll No.: 16010420133** **Experiment No.: 1**

Aim: To implement basic logic gates using Universal gates

Resources needed: Simulation Platform(Circuitverse)

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 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 simulator.
d) Paste the schematic of realization of basic logic gates using universal gates (to a pdf file.
e) Upload the pdf on Microsoft Team.
f) Create a document with a table giving IC number used for each of the logic gate studied in the experiment, Outcomes , Conclusion.
g) Please note every document uploaded on Microsoft Team should be labelled as Exp_<No>_<RollNo>_<schematic/writeup>.pdf

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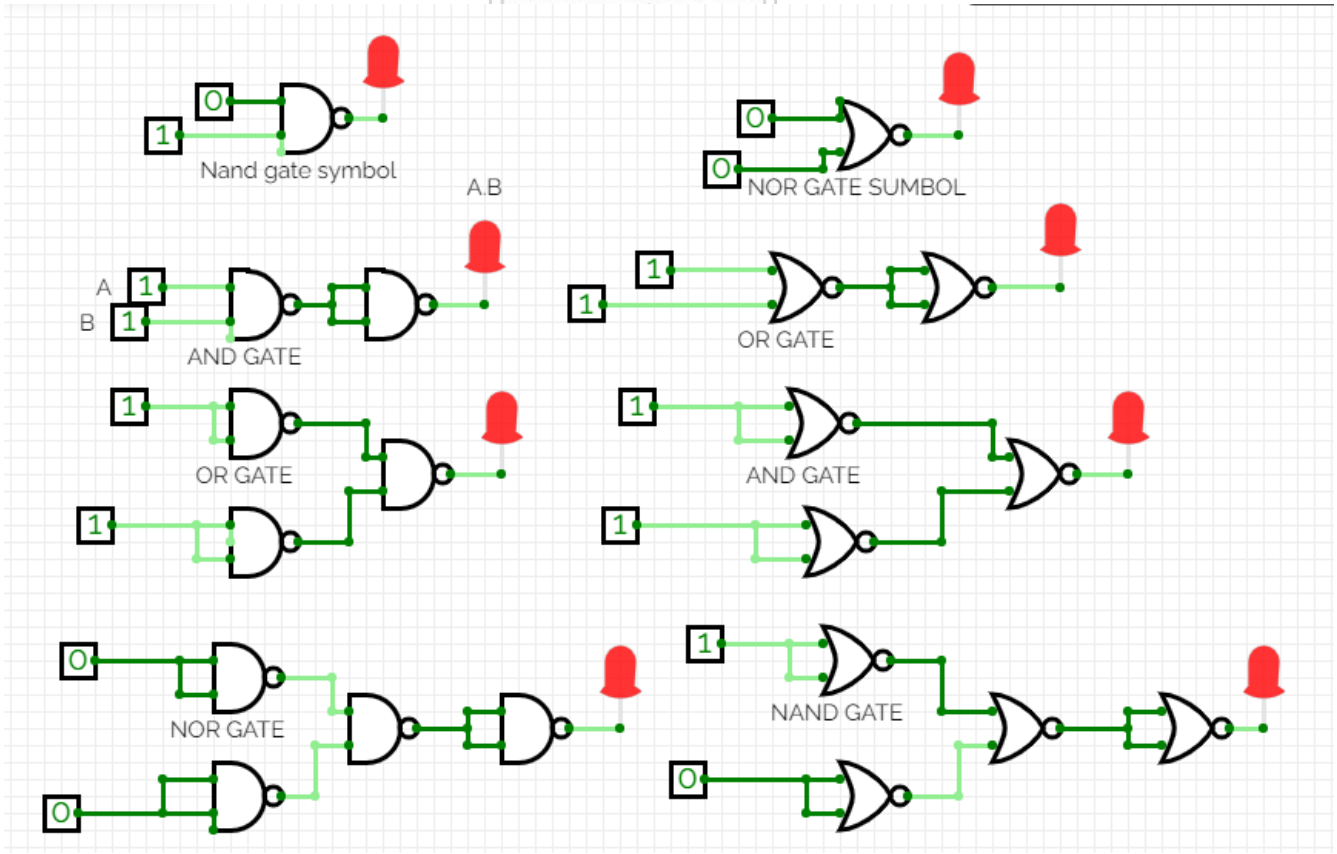
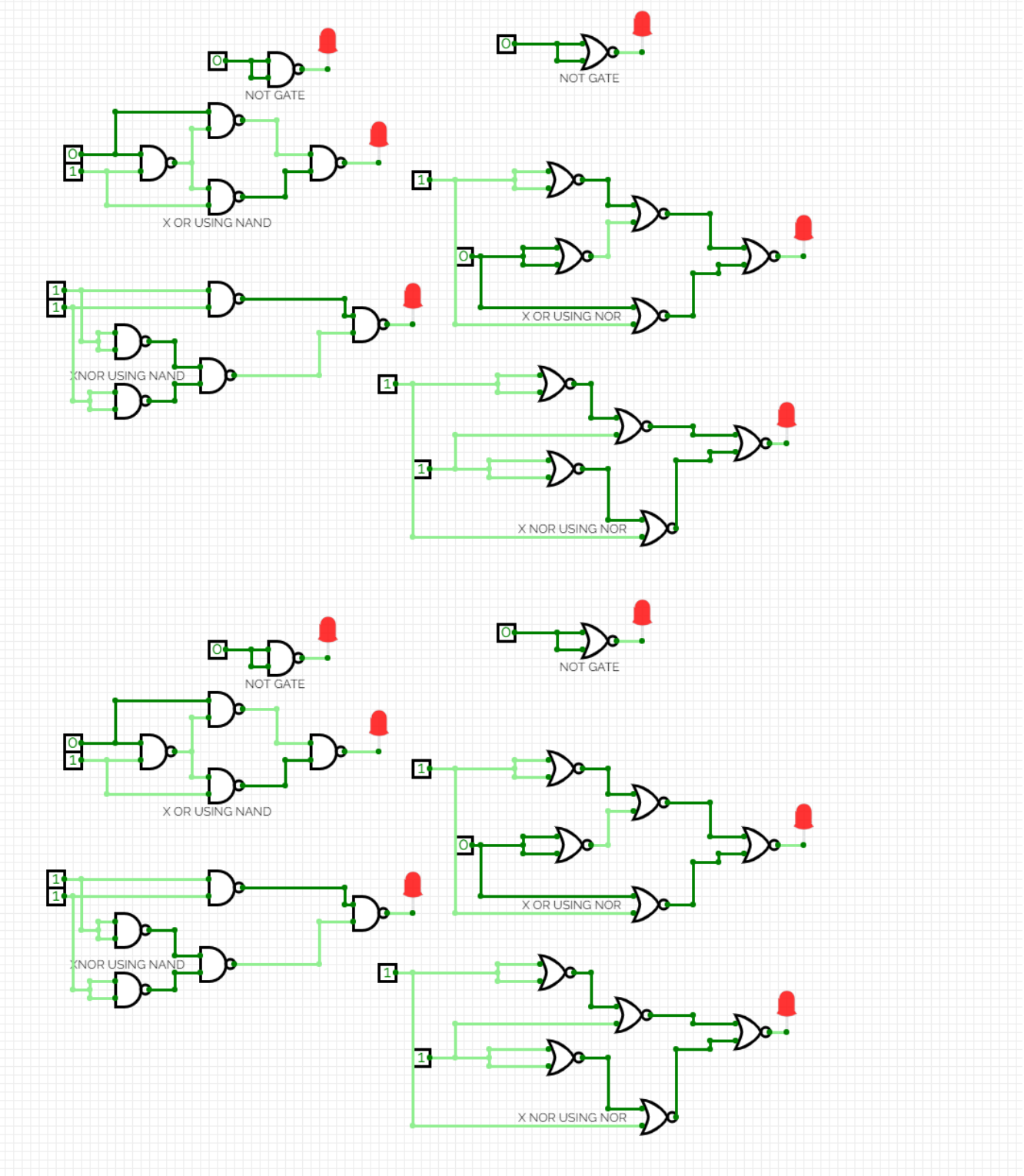
Observations and Results:

a) Verify the individual circuit using truth table method. (showing intermediate outputs).
b) Design basic logic gates using Universal Gates.

Simulation (Circuit Diagram):-




NOT GATE
NOT GATE
X OR USING NAND
X OR USING NOR
XNOR USING NAND
X NOR USING NOR
NOT GATE
NOT GATE
X OR USING NAND
X OR USING NOR
XNOR USING NAND
X NOR USING NOR

IC Numbers of Gates:

7408	AND
7432	OR
7404	NOT
7402	NOR

OR GATE USING NAND

A	B	A'B'	(A'B')'=(A+B)
0	0	1	0
0	1	0	1
1	0	0	1
1	1	0	1

OR GATE USING NOR

A	B	(A+B)'	(A+B)"=(A+B)
0	0	1	0
0	1	0	1
1	0	0	1
1	1	0	1

AND GATE USING NAND

A	B	(A.B)'	(A.B)"=(A.B)
0	0	1	0
0	1	1	0
1	0	1	0
1	1	0	1

AND GATE USING NOR

A	B	A'+B'	(A'+B')'=A.B
0	0	1	0
0	1	1	0
1	0	1	0
1	1	0	1

NOT GATE USING NAND

A	A	A'
0	0	1
0	0	1
1	1	0
1	1	0

NOT GATE USING NOR

A	A	A'
0	0	1
0	0	1
1	1	0
1	1	0

Outcomes:

Understand the basic building blocks, techniques used in digital logic design.

Conclusion:

Thus we have successfully learnt to implement basic gates using the universal 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/

THANK YOU