Thakur Polytechnic Department of Computer Engineering

SYCO – B31

GROUP – 29

SUBJECT:- DESIGN BASIC GATES USING UNIVERSAL NAND GATE

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MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION

This is to certify that the following group of students roll no. **141-145** semester of Diploma in **COMPUTER ENGINEERING** of institute, **THAKUR POLYTECHNIC (Code: 0522)** has completed the **Micro Project** satisfactorily in subject – DTE (22320) for the academic year 20**20** – 20**21** as prescribed in the curriculum.

Place:_____   EnrollmentNo.:

Date: _____
                            Seat No.:_____

Subject teacher   **Head of Department**   **Principal**

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Acknowledgement

Performing our assignment, we had to take the help and guideline of some respected persons, who deserve our greatest gratitude. The completion of this assignment gives us much Pleasure. We would like to show our gratitude to Mr. Manish Salvi, Course Instructor, Thakur Polytechnic for giving us a good guideline for assignment throughout numerous consultations. We would also like to expand our deepest gratitude to all those who have directly and indirectly guided us in writing this assignment.

In addition, a thank you to Professor Mr. Manish Salvi, who introduced us to the Methodology of work, and whose passion for the "underlying structures" had lasting effect?

Many people, especially our classmates and team members itself, have made valuable comment suggestions on this proposal which gave us an inspiration to improve our assignment. We thank all the people for their help directly and indirectly to complete our assignment.

PROPOSAL

Resources Required:

SR. NO.	NAME OF RESOURCES	SPECIFICATIONS	QUANTITY	REMARKS
1.	Google Chrome	Search Engine	1	Available
2.	Microsoft Word	Office 2019	1	Available
3.	Computer System	Intel i3 6006U, 8GB RAM	1	Available
4.	Software 1	https://logic.ly/demo/samples	1	Available
5.	ICs, breadboard, wires, LEDs, connectors power supply, multimeter	For performing demonstration in Digital Electronics Laboratory		Available

Roll Numbers of the Team Members	Names of the Team members
141	HARSSHAMM JEETENDRA
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(Subject Teacher)

Mr. Manish Salvi

Report

# Design Basic Gates using Universal NAND Gates

NAND Gate:

The **NAND** gate represents the complement of the AND operation. Its name is an abbreviation of **NOT AND**.

The graphic symbol for the NAND gate consists of an AND symbol with a bubble on the output, denoting that a complement operation is performed on the output of the AND gate.

The truth table and the graphic symbol of NAND gate is shown in the figure.

X	Y	NAND
0	0	1
0	1	1
1	0	1
1	1	0

$$Z = \overline{X \cdot Y}$$
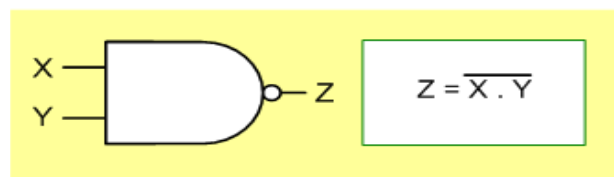
The truth table clearly shows that the NAND operation is the complement of the AND.

NAND Gate is a Universal Gate:

To prove that any Boolean function can be implemented using only NAND gates, we will show that the AND, OR, and NOT operations can be performed using only these gates.
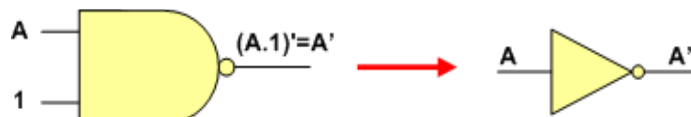
Implementing an Inverter Using only NAND Gate
The figure shows two ways in which a NAND gate can be used as **an inverter (NOT gate)**.

1. All NAND input pins connect to the input signal **A** gives an output **A'**.
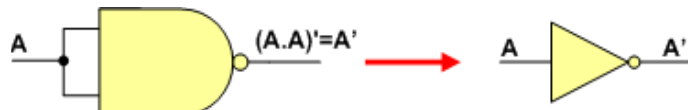
2. One NAND input pin is connected to the input signal **A** while all other input pins are connected to logic **1**. The output will be **A'**.
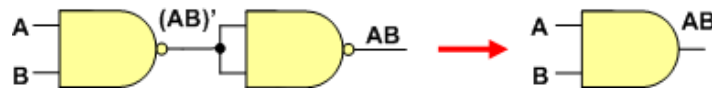

Truth Table :-

Inputs(A)		Output(A')
0	0	1
1	1	0

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Implementing AND Using only NAND Gates

An AND gate can be replaced by NAND gates as shown
replaced by a NAND gate with its output complemented by

- **Use 2 NAND Gates**
- **Using NAND gate built NOT gate.**
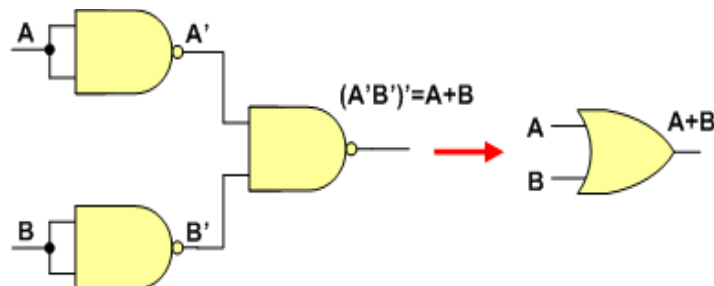- **Insert this NOT gate after NAND Gate.**
- **NOT + NAND = AND Gate**

Truth Table:-

A	B	(AB')	AB
0	0	1	0
0	1	1	0
1	0	1	0
1	1	0	1

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Implementing OR Using only NAND Gates

An OR gate can be replaced by NAND gates as shown in the figure (The OR gate is replaced by a NAND gate with all its inputs complemented by NAND gate inverters).

Truth Table:-

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

Conclusion:-

Thus, the NAND gate is a universal gate since it can implement the AND, OR and NOT functions.

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