DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, Kattankulathur – 603203.

Title of Experiment	: **5. Verification and interpretation of Logic Gates.**
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Register Number	: RA2111028010094
Date of Experiment	: 26-10-2021

Sl. No.	Marks Split up	Maximum marks (50)	Marks obtained
1	Pre Lab questions	5	
2	Preparation of observation	15	
3	Execution of experiment	15	
4	Calculation / Evaluation of Result	10	
5	Post Lab questions	5	
Total		**50**	

Staff Signature

PRE-LAB QUESTIONS

1. Name the different Logic Gates.

Different logic gates are as follows:

1) AND Gate.
2) OR Gate.
3) NOT Gate.
4) NAND Gate.
5) NOR Gate.
6) Exclusive OR (X-OR) Gate.
7) Exclusive NOR (X-NOR) Gate.

2. List out the IC names for the different logic Gates.

IC names for different logic gates are as follows:

NAND Gate - 7400
NOR Gate - 7402
NOT Gate - 7404
AND Gate - 7408
OR Gate - 7432
X-OR - 7486
X-NOR - 74266

3. What is the Boolean expression for a NOR gate?

Boolean expression for nor-gate is:

$Q = \overline{A + B}$

4. How does a NOR gate work?

When we connect the output of an OR gate to the input of a NOT gate, the combination will work as NOT-OR or NOR gate. Its output is 0 when any or all inputs are 1, otherwise output is 1.

5. Expression for Ex-OR and Ex-NOR?

Expression for Ex-OR gate: $Q = (A \oplus B) = \bar{A}.B + A.\bar{B}$

Expression for Ex-NOR gate: $Q = (\overline{A \oplus B}) = (A.B) + (\bar{A}.\bar{B})$

Experiment No. 5 **Date:** 26-10-2021	**Verification and interpretation of truth tables for AND, OR, NOT, NAND, NOR Exclusive OR (EX-OR), Exclusive NOR (EX-NOR) Gates.**

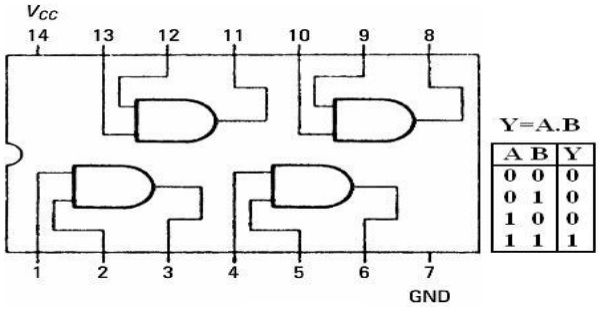
Aim: To verify the Boolean expression using logic gates.

Apparatus: Logic trainer kit, logic gates / ICs, wires.

Theory: Logic gates are electronic circuits which perform logical functions on one or more inputs to produce one output. There are seven logic gates. When all the input combinations of a logic gate are written in a series and their corresponding outputs written along them, then this input/ output combination is called **Truth Table**. The following logic gates and their working are explained.

i) AND Gate

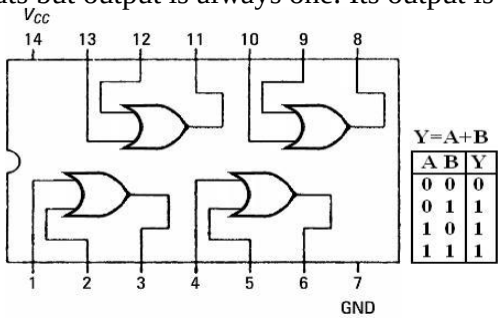
AND gate produces an output as 1, when all its inputs are 1; otherwise the output is 0. This gate can have minimum 2 inputs but output is always one. Its output is 0 when any input is 0.



IC 7408

ii) OR Gate

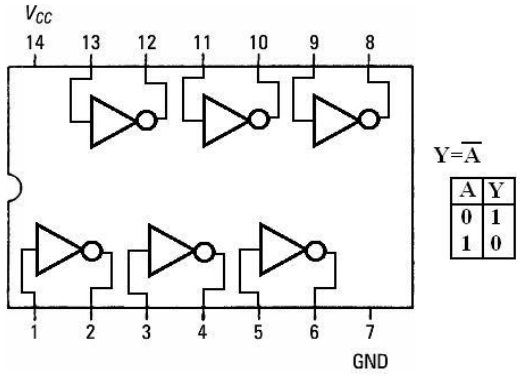
OR gate produces an output as 1, when any or all its inputs are 1; otherwise the output is 0. This gate can have minimum 2 inputs but output is always one. Its output is 0 when all input are 0.



IC 7432

iii) NOT Gate

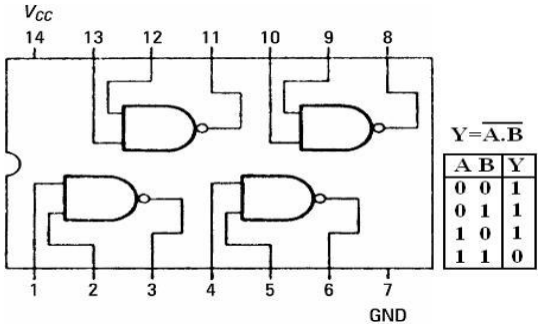
NOT gate produces the complement of its input. This gate is also called an INVERTER. It always has one input and one output. Its output is 0 when input is 1 and output is 1 when input is 0.



IC 7404

iv) NAND Gate

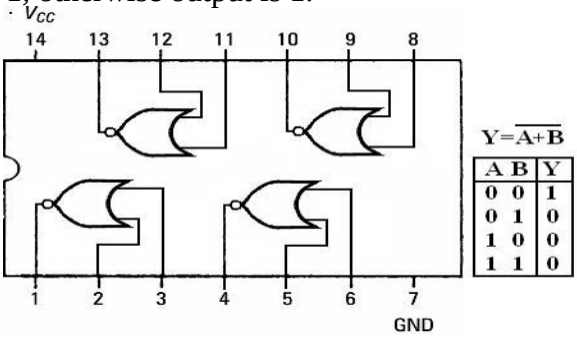
NAND gate is actually a series of AND gate with NOT gate. If we connect the output of an AND gate to the input of a NOT gate, this combination will work as NOT-AND or NAND gate. Its output is 1 when any or all inputs are 0, otherwise output is 1.



IC 7400

v) NOR Gate

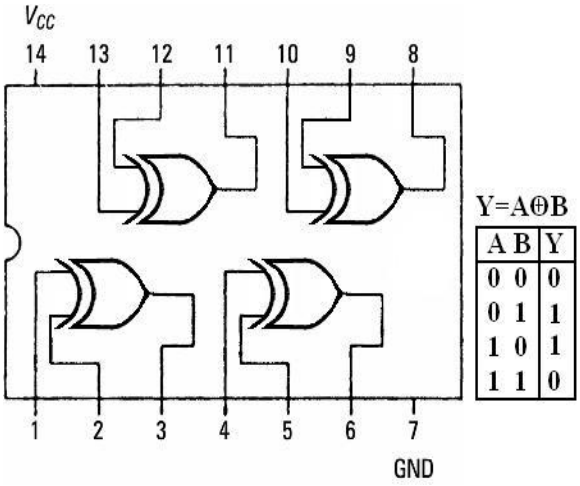
NOR gate is actually a series of OR gate with NOT gate. If we connect the output of an OR gate to the input of a NOT gate, this combination will work as NOT-OR or NOR gate. Its output is 0 when any or all inputs are 1, otherwise output is 1.



IC 7402

vi) Exclusive OR (X-OR) Gate

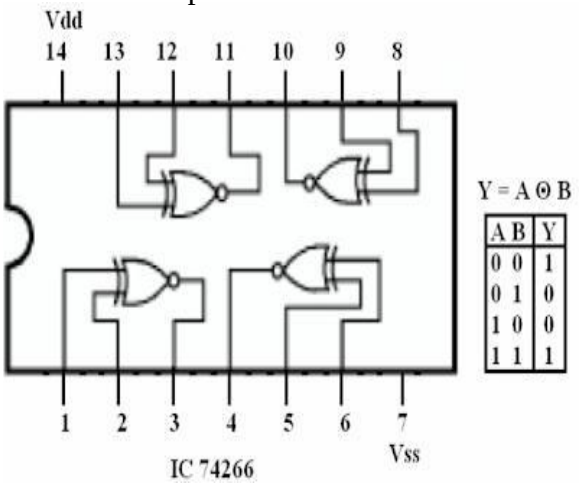
X-OR gate produces an output as 1, when number of 1's at its inputs is **odd**, otherwise output is 0. It has two inputs and one output.



IC 7486

vii) Exclusive NOR (X-NOR) Gate

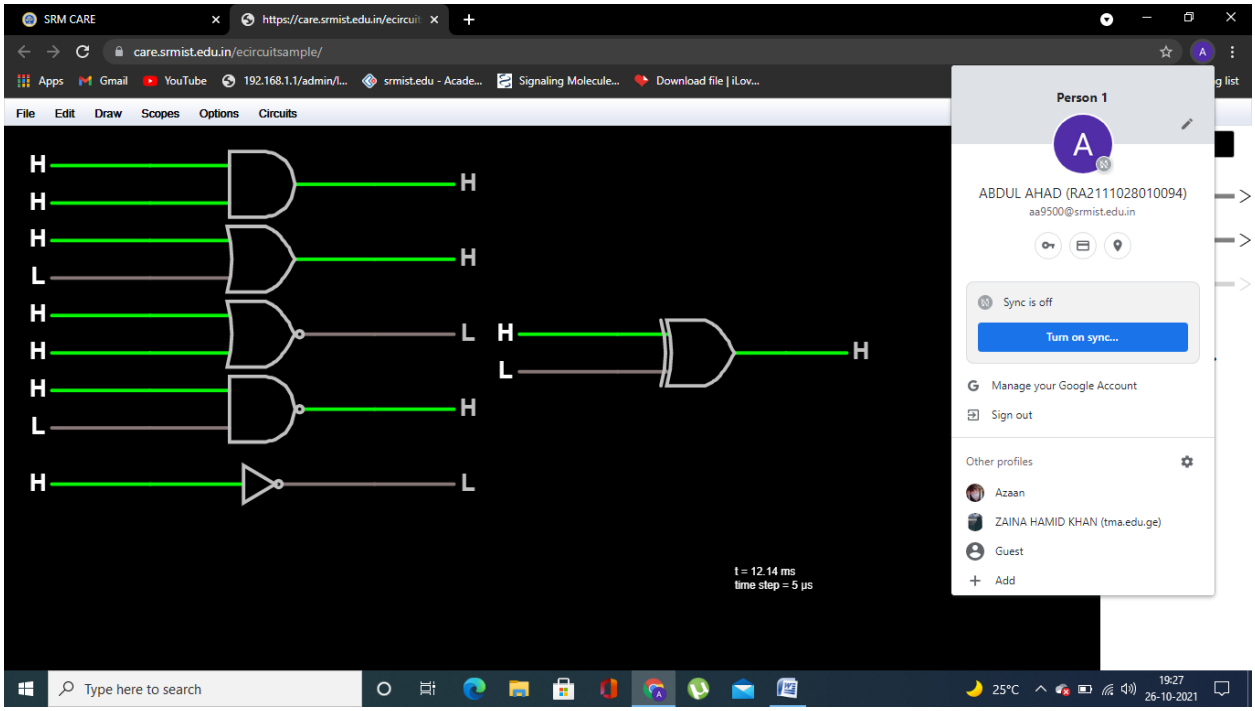
X-NOR gate produces an output as 1, when number of 1's at its inputs is **not odd**, otherwise output is 0. It has two inputs and one output.



IC 74266

Procedure:

1. Connect the trainer kit to ac power supply.
2. Connect the inputs of any one logic gate to the logic sources and its output to the logic indicator.
3. Apply various input combinations and observe output for each one.
4. Verify the truth table for each input/ output combination.
5. Repeat the process for all other logic gates.
6. Switch off the ac power supply.


SRM CARE
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care.srmist.edu.in/ecircuitsample/
Apps
Gmail
YouTube
192.168.1.1/admin/l...
srmist.edu - Acade...
Signaling Molecule...
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File
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H
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L
H
t = 12.14 ms
time step = 5 µs
Person 1
ABDUL AHAD (RA2111028010094)
aa9500@srmist.edu.in
Sync is off
Turn on sync...
Manage your Google Account
Sign out
Other profiles
Azaan
ZAINA HAMID KHAN (tma.edu.ge)
Guest
Add
Type here to search
25°C
19:27
26-10-2021

POST-LAB QUESTIONS

1. Name the universal Gates?

Universal gates are:

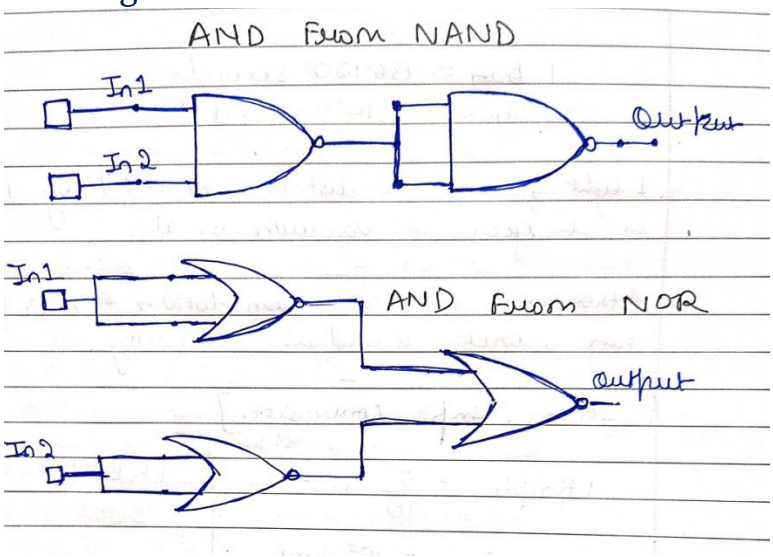
1) NAND Gate.

2) NOR Gate.

2. Deduce the logic of AND gate using NAND and NOR?

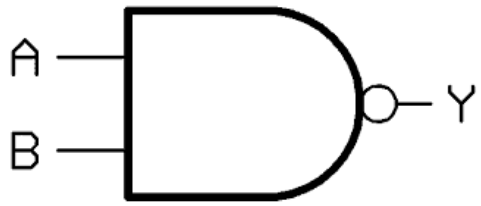
AND using NAND: Connect a NOT using NAND at the output of the NAND to invert it and get AND logic.

AND using NOR: Connect two NOT using NORs at the inputs of a NOR to get AND logic.



3. What is the symbol of NAND gate?

Symbol of NAND gate:



4. How many NAND gates are required to make an OR gate?

Three NAND gates

5. How many NOR gates are required to implement a NAND gate?

Four NOR gates