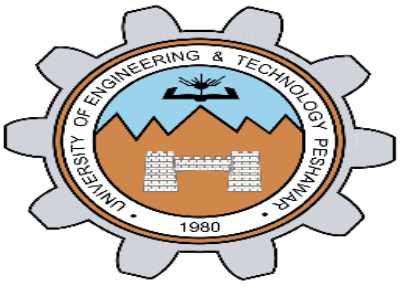
LAB REPORT NO 2



Spring 2020

CSE-202L Digital logic design lab

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Class Section: A

"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Submitted to:

Engr. Abdullah Hamid

(December 13, 2020)

Department of Computer Systems Engineering

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LABORATORY EXERCISE # 2

TITLE "STUDY OF BASIC GATES"

Objectives:

- To study basic gates.
- To determine the ground and VCC terminal of gates.
- To verify gates with truth table

APPARATUS:-

Power Supply, Breadboard, Connecting Wires.

COMPONENTS ICs :-

7400, 7402, 7404, 7408, 7432, 7486, DIP Switch and LEDs.

Theory introduction:-

Logic gates are the digital circuits with one output and one or more inputs. They are the basic building blocks of any logic circuit. Different logic gates are : AND, OR, NOT, NAND, NOR, EX-OR. Digital circuits have two discrete voltage levels to represent the binary digits (bits) 1 and 0. All digital circuits are switching circuits. Instead of mechanical switches, they use high-speed transistors to represent either an ON condition or an OFF condition. Various types of logic, representing different technologies, are available to logic designers. The choice of a particular family is determined by factors such as speed, cost, availability, noise immunity, and so forth. The key requirement within each family is compatibility; that is, there must be consistency within the logic levels and power supplies of various integrated circuits made by different manufacturers. The experiments in this lab use primarily transistor-transistor logic, or TTL. The detailed performance characteristics of TTL depend on the particular subfamily. However, all TTL is designed to operate from a 5 V power supply, and the logic levels are the same for all TTL integrated circuits.

Verification of OR gate with truth table:-

OR gate:-

Logic eqn. Y=A+B. The output of OR gate is true when one of the inputs A and B or both the inputs are true. Y=1 if A=1 0r B=8 0r both A=1 B=1.

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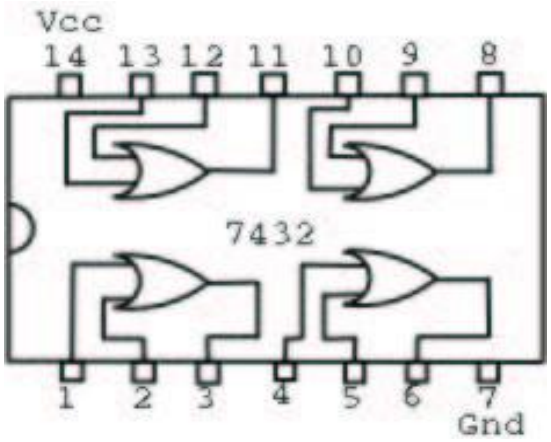
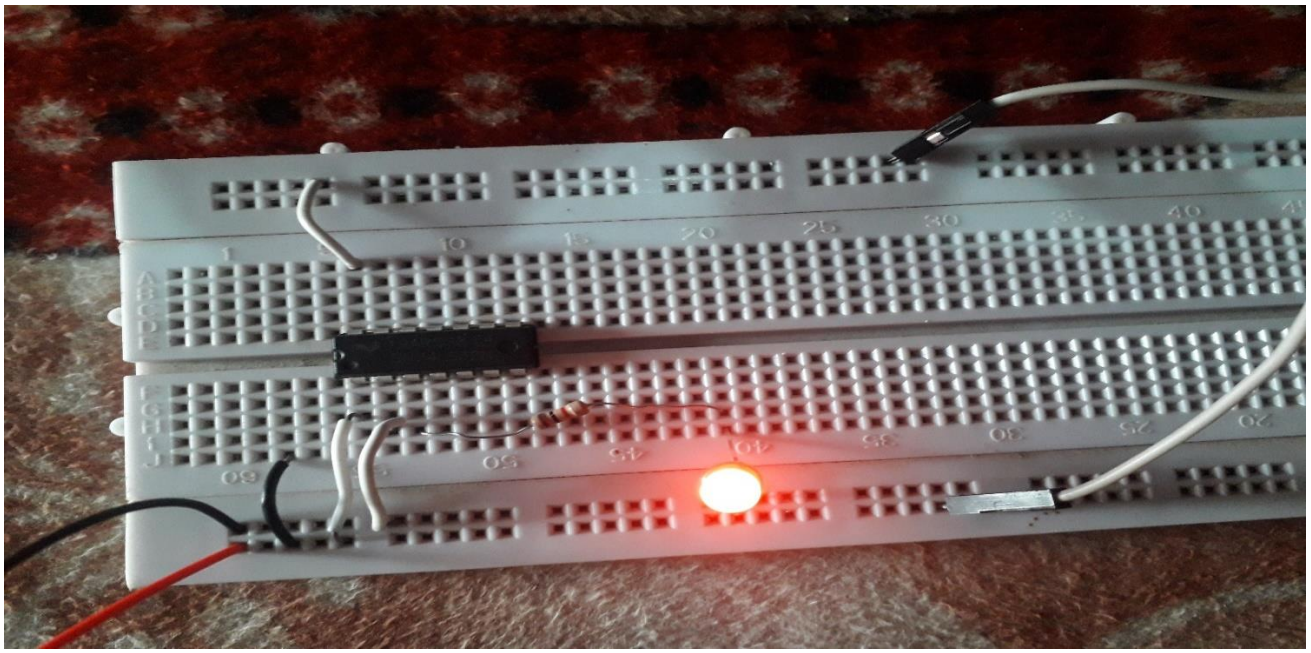


TRUTH/FUNCTION

Table

A	B	Y=A+B
0	0	0
0	1	1
1	0	1
1	1	1



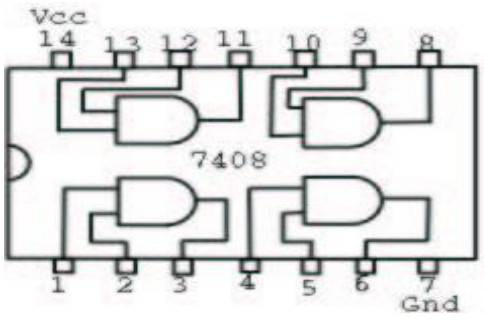
Note:- input =10

Procedure:-

- First we insert OR gate in the middle rows at breadboard.
- The 14st terminal (VCC) of gate is connected with positive terminal of the power supply and the 7th (ground) is connect with negative of power supply.
- We give two input to terminals 1st and 2nd, and take output from 3rd terminal by inserting LED.
- Input of 0 means ground and input of 1 means VCC.
- We have four possible combine input of two inputs, i-e (00,01,10,11) and output by LED with (OFF,ON,ON,ON) respectively.
- This is how we verify OR gate with truth table.
- Same steps are repeated for verification of AND,NOT,NOR,NAND,XOR etc.

AND gate:-

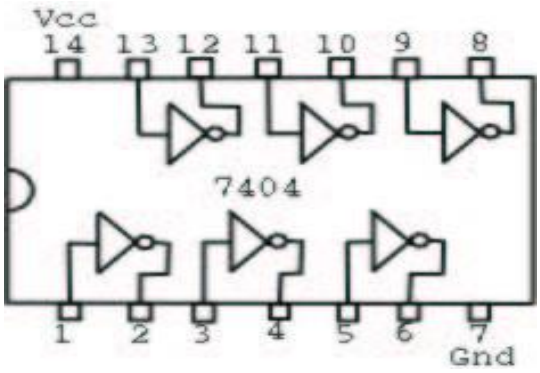
Function expression for AND gate is y=A.B ,the output of and gate is Y=0 if A 0r B is equal to 0,and Y=1when both A=1 and B=1



A	B	Y=A.B
0	0	0
0	1	0
1	0	0
1	1	1

NOT:-

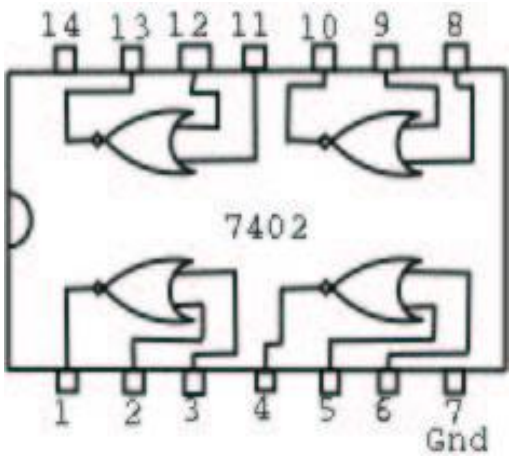
Logic eqn. Y = A′. The output of NOT gate is complement of the input.



A	B	Y=A′
0	1	0
1	1	0

NOR:-

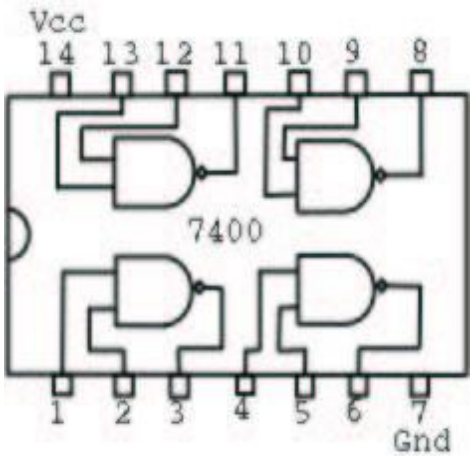
Logical eqn. $Y=\overline{A+B}$. The output of NOR gate is true (Y=1) when both the inputs are low.otherwise Y=0.



A	B	Y=(A+B)′
0	0	1
0	1	0
1	0	0
1	1	0

NAND:-

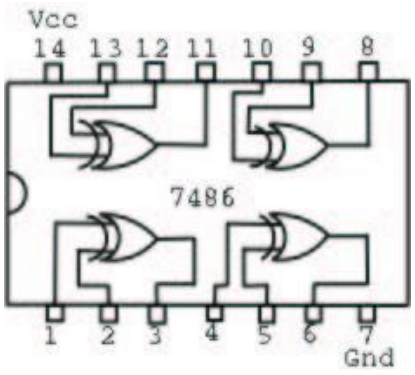
Logic equation. $Y=\overline{A.B}$. The output of NAND gate is true when one of the inputs or both the inputs are low.



A	B	Y=(A.B)′
0	0	1
0	1	1
1	0	1
1	1	0

EX-OR:-

Logic eqn. $Y=\overline{A}B+A\overline{B}$. The output of EX-OR gate is true when both the inputs are dissimilar.



A	B	Y=A⊕B
0	0	0
0	1	1
1	0	1
1	1	0

Conclusion:-

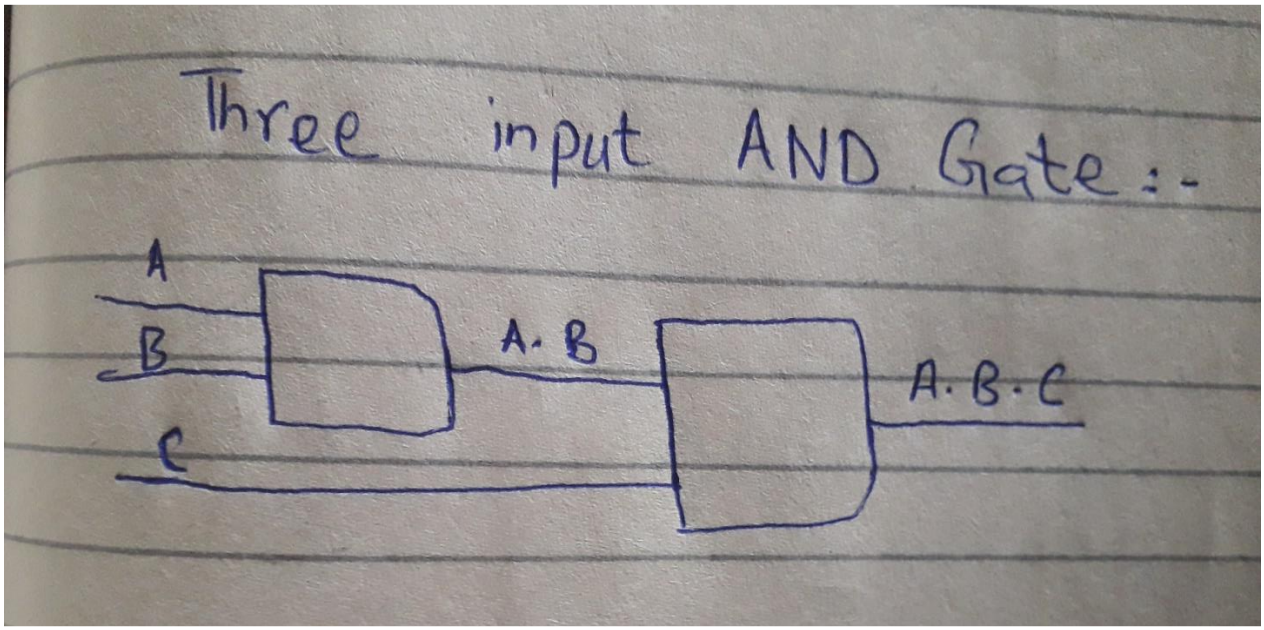
After performing the experiment for OR gate and then repeating all experimental steps for other gates (AND,NAND,NOR,EX-OR,NOT) we prove all the truth table for each gate separately.

REVIEW QUESTIONS:-

1) **A burglar alarm for a car has a normally LOW (grounded) switch on each of four doors. If any door is opened, the output of that switch goes HIGH. The alarm is set off with an activeLOW output . What type of gate will provide this logic?**
   Answer:-

   OR gate will provide this logic of a burglar alarm for a car. Because switch of the alarm has to become high when any door is opened, if any door is open the switch will output high.
2) **If more than two input AND & OR gates are available, how will you connect its inputs so that they work as two input gates? Perform it for three and four input AND & OR gates.**
   Answer:-

   For three AND gate:-
   We can connect three input using two AND gates which work as two inputs. A.B is the first input and C is the second input. As shown in the diagram.



For four input OR gate:-

By using three OR gates we can connect four inputs gate to two input gate, first input is A+B+C and the second input is D. As shown in the written diagram.