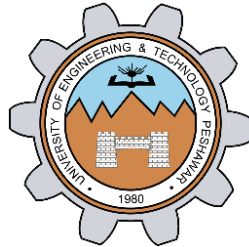


UNIVERSAL GATES

LAB # 04



Fall 2020

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Registration No: **19PWCSE1845, 19PECSR1850**

Semester: **3rd**

Class Section: **C**

Date: **06:12:2020**

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

Student Signature: _____

Submitted to:

Engr. Rehmat Ullah

DEPARTMENT OF COMPUTER SYSTEMS ENGINEERING

UNIVERSAL GATES

OBJECTIVES:

After completing this experiment, you will be able to:

- To study the realization of basic gates using universal gates (NAND & NOR)
- How to draw the circuit diagram and show the truth table.
- Experimentally verify the implement of universal GATES using two input variables.
- To verify the truth table of the implement of universal GATES.

EQUIPMENT:

- Dc power supply
- Breadboard

COMPONENTS:

- 7402 quad 2-input NOR gate
- 7400 quad 2-input NAND gate
- 7404 hex inverter
- LED
- DIP switch
- Two 280 Ω resistors
- Wires

THEORY:

AND, OR, NOT are called basic gates as their logical operation cannot be simplified further.

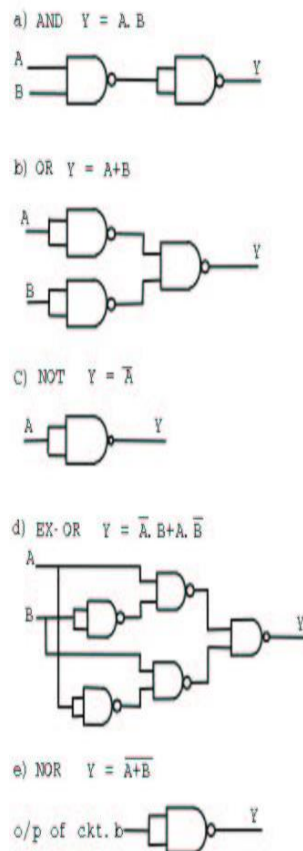
NAND and NOR are called universal gates as using only NAND or only NOR any logic function can be implemented. Using NAND and NOR gates and **De-Morgan's Theorems** different basic gates & EX-OR gates are realized.

PROCEDURE:

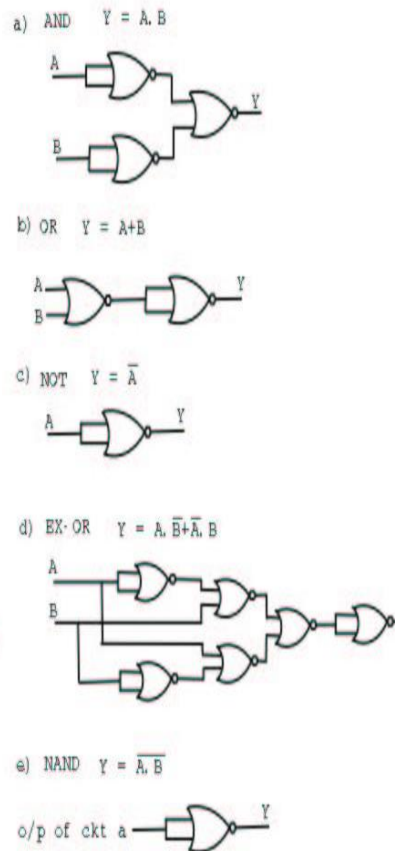
1. Give biasing to the IC and do necessary connections as shown in the circuit diagram.
2. Give various combinations of inputs and note down output using LED.
3. Repeat the procedure for all gates.

CIRCUIT DIAGRAM:

Using NAND



Using NOR



OBSERVATION TABLES:

Implement AND GATE Using NAND Truth Table:

X	Y	$(X.Y)'$	$(X.Y)''=X.Y$
0	0	1	0
0	1	1	0
1	0	1	0
1	1	0	1

Implement AND GATE Using NOR Truth Table:

X	Y	X'	Y'	$(X'+Y')'=X.Y$
0	0	1	1	0
0	1	1	0	0
1	0	0	1	0
1	1	0	0	1

Implement OR GATE Using NAND Truth Table:

X	Y	X'	Y'	$(X'.Y')'=X+Y$
0	0	1	1	0
0	1	1	0	1
1	0	0	1	1
1	1	0	0	1

Implement OR GATE Using NOR Truth Table:

X	Y	$(X+Y)'$	$(X+Y)''=X+Y$
0	0	1	0
0	1	0	1
1	0	0	1
1	1	0	1

Implement NOT GATE Using NAND Truth Table:

A	$(A.A)'=A'$
0	1
1	0

Implement NOT GATE Using NOR Truth Table:

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

Implement NOR GATE Using NAND Truth Table:

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

Implement NAND GATE Using NOR Truth Table:

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

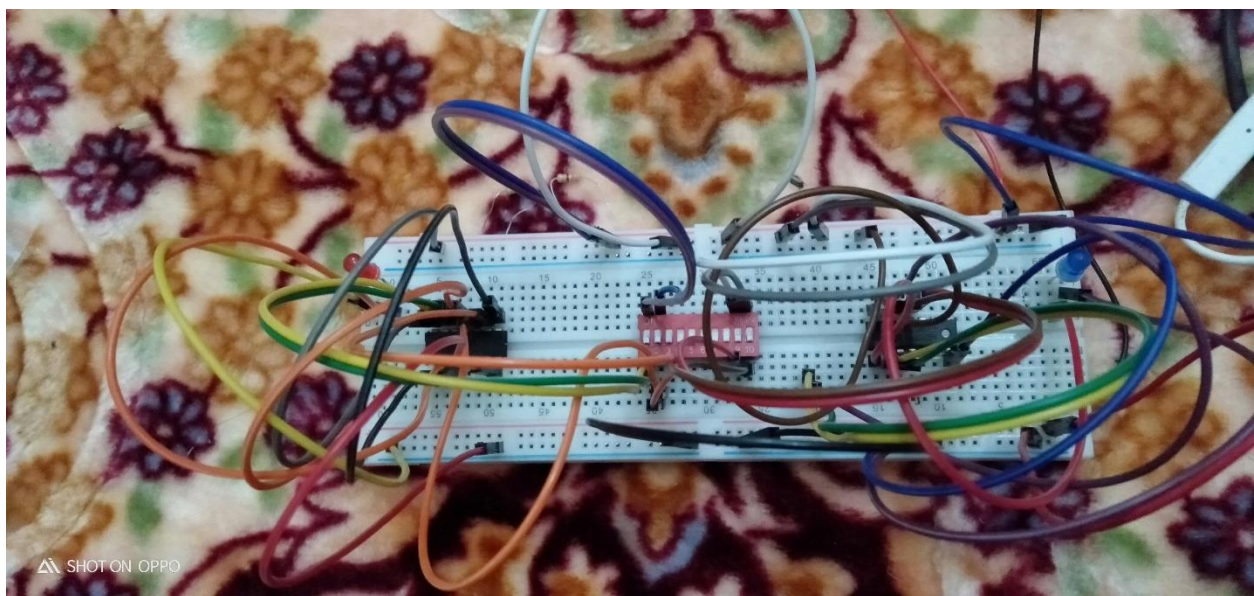
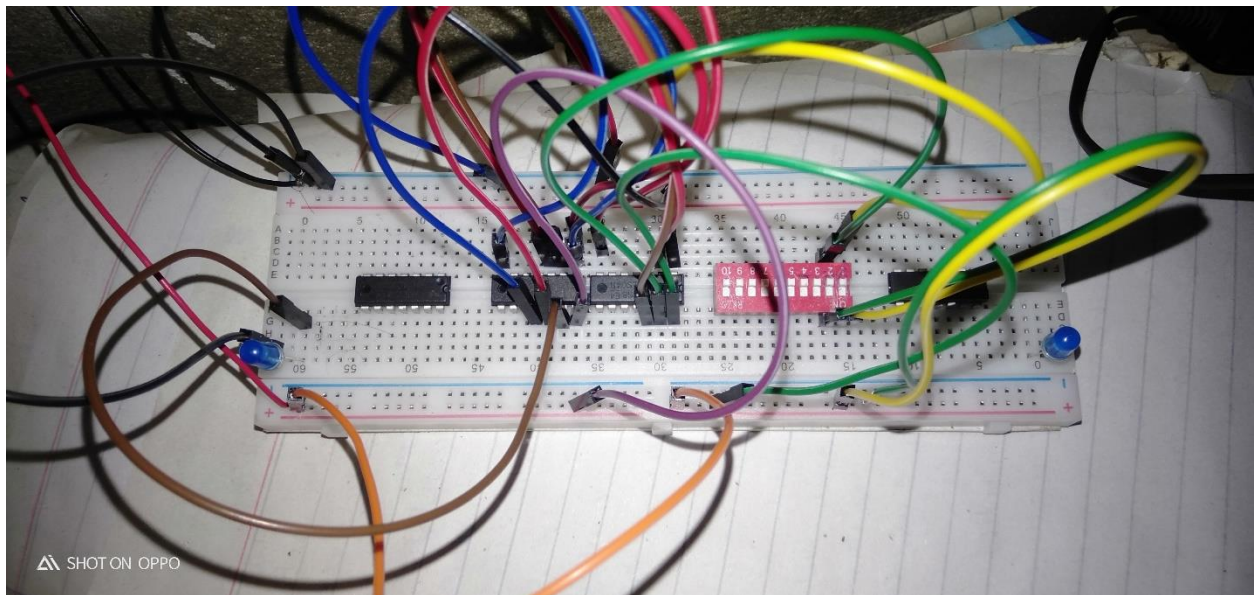
Implement EOR GATE Using NAND Truth Table:

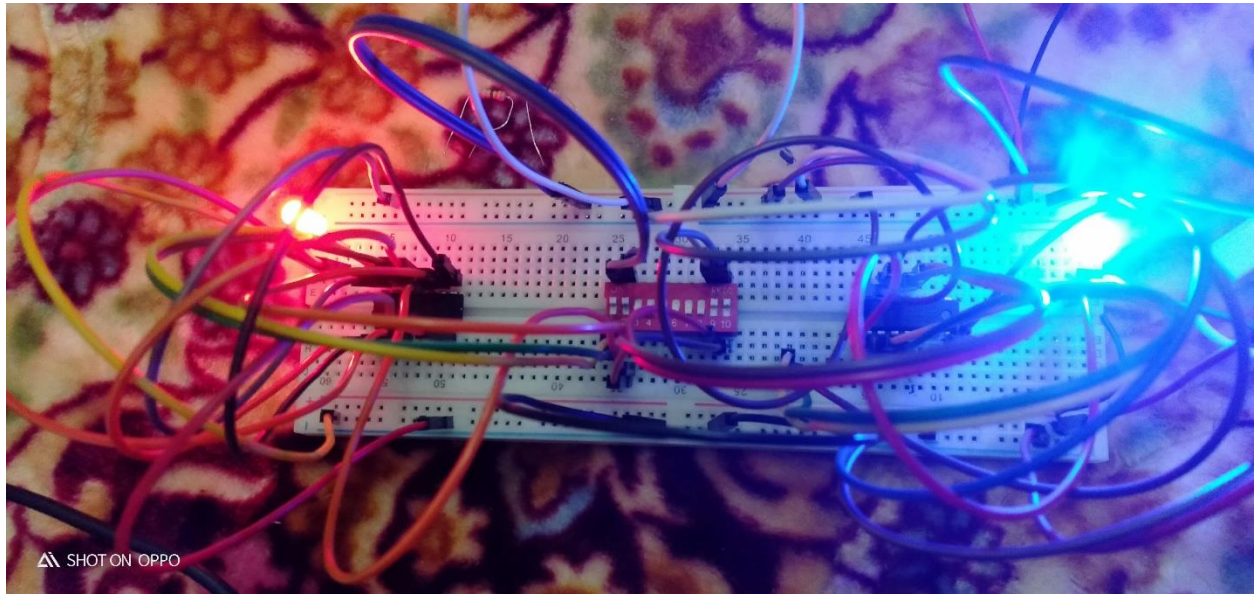
A	B	A'	B'	$(A.B)'$	$(A'.B)'$	$((A.B)'.(A'.B)')'=A.B'+A'.B$
0	0	1	1	1	1	0
0	1	1	0	1	0	1
1	0	0	1	0	1	1
1	1	0	0	1	1	0

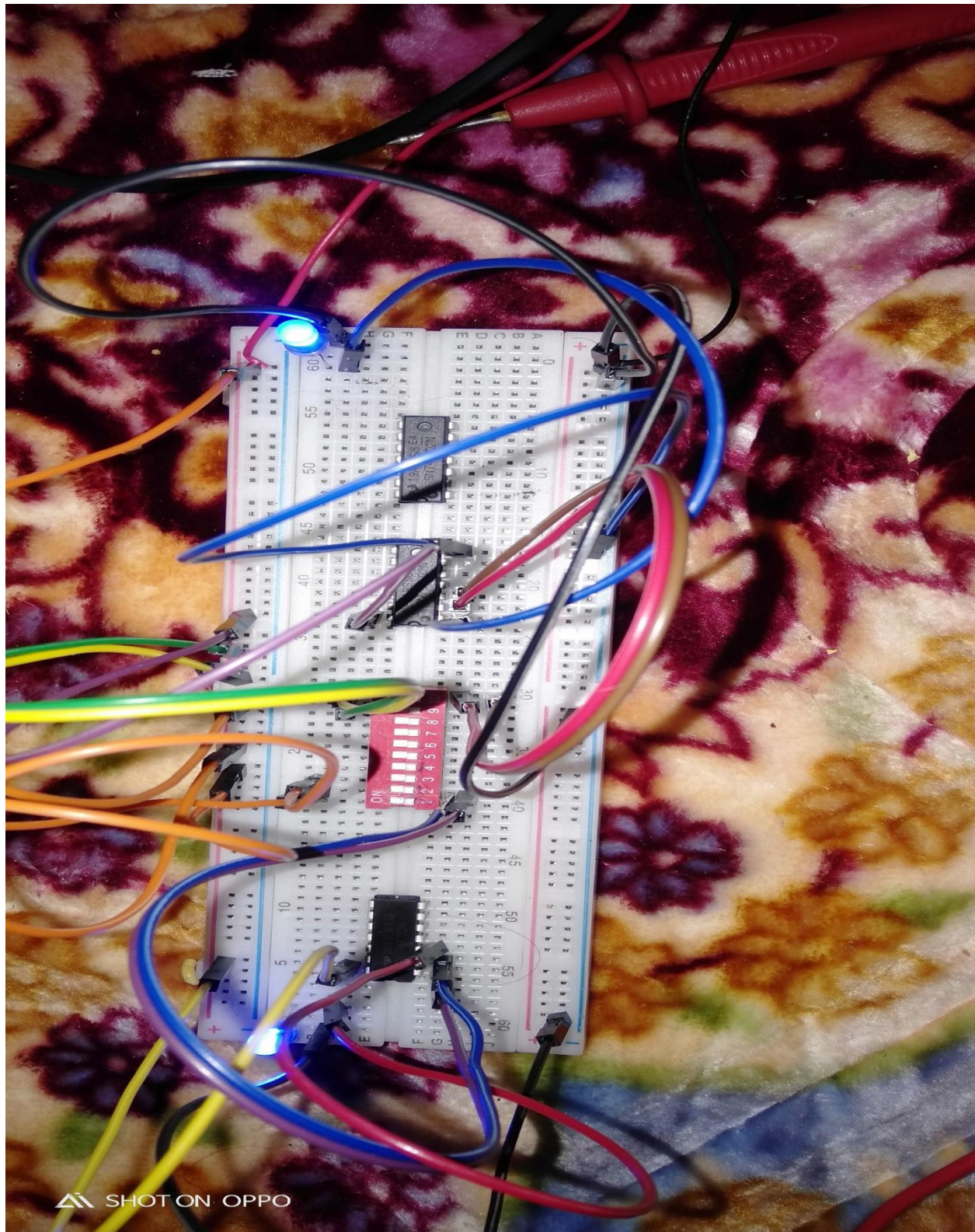
Implement EOR GATE Using NOR Truth Table:

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

IMAGE SHOT ON EXPERIMENT TIME:







CONCLUSION:

Thus universal gates are studied. They implement to the OR,AND,NAND,NOR,NOT GATES to Using the NAND and NOR GATES. They also verify to the experimentaly.